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The European Anaesthesiology Congress

Abstracts Programme
Berlin, Germany, May 30 - June 2, 2015

Wolters Kluwer

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Abstracts and Programme

EUROANAESTHESIA 2015

The European Anaesthesiology Congress

30 May - 2 June 2015
Berlin, Germany

Wolters Kluwer

European Journal of Anaesthesiology

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EUROANAESTHESIA 2015

The European Anaesthesiology Congress

BERLIN, GERMANY, 30 MAY - 2 JUNE 2015

ABSTRACT PRESENTATION PROGRAMME

Please note that all abstracts are presented as poster presentations: abstract presenters do not make a formal presentation of their abstract in a separate room, using audiovisual aids (except for the Best Abstract Prize Competition and the Best Abstracts - Runner-up Session 1 & 2). Instead, two chairpersons will conduct, in front of each poster, a short discussion of each abstract with the presenter and the audience, for every abstract in that session. Poster presenters have been asked to stand by their poster for 45 minutes before and 30 minutes after their session, to address further questions.

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ESA Best Abstract Prize Competition (BAPC)

ESAPC1-1

Airway management for surgery in children with an upper respiratory tract infection: a systematic review and meta-analysis for respiratory complications

Vital R.B.[1], Carvalho A.L.R.[2], Modolo M.P.[2], Silveira A.H.C.[2], El Dib R.P.[2], Modolo N.S.P.[2]
[1]UNESP, Dept of Surgery, Botucatu, Brazil, [2]UNESP, Dept of Anaesthesiology, Botucatu, Brazil

Background and Goal of Study: Rate of perioperative respiratory adverse events between endotracheal tube (ETT), laryngeal mask airway (LMA) and face mask (FM) remains a controversial issue during anesthesia in children with a recent history of upper respiratory tract infections (URTI). The aim of the present study was to assess which airway device has more efficacy and safety for surgery in pediatric patients with a recent history of upper respiratory tract infection.
Materials and Methods: A systematic review according to the recommendations of Cochrane was conducted. The primary outcomes were perioperative respiratory adverse events: sore throat, cough, bronchospasm, laryngospasm, arterial oxygen desaturation, and breath holding or apnea. Among the secondary outcomes were evaluated vomiting and hospital readmission. Data from each trial were combined to calculate the pooled relative risk (RR) and 95% confidence intervals.
Results and Discussion: Of the 679 studies identified, 4 were randomized clinical trials and included in the final analysis, presenting a total of 387 patients. LMA produced a significant reduction (RR 0.62, CI 95% 0.41-0.93, p=0.02) of cough compared to other airway devices (ETT and FM) (Figure 1). Also, LMA tended toward a protective effect against vomiting compared with other forms of airway management (ETT and FM) but did not reach statistical significance (RR 0.57, CI 95% 0.33-1.00, p=0.05) (Figure 2). There were no statistical difference with regard to sore throat, bronchospasm, laryngospasm, arterial oxygen desaturation, breath holding or apnea, and hospital readmission.
Conclusions: This systematic review evidences children with recent history of URTI have less postoperative incidence of cough when LMA was used. There is limited but reliable evidence that the LMA may show promise to airway management for surgery in children with a recent history of upper respiratory tract infection.

ESAPC1-2

European study on chronic post-surgical pain

Stamer U.M.[1], Lehmann T.[2], Meissner W.[3], Zaslansky R.[3], Pogatzki-Zahn E.[4], Fletcher D.[5], euCPSP Study Group
[1]University of Bern, Inselspital, Department of Anaesthesiology and Pain Medicine, Bern, Switzerland, [2]University of Jena, Department of Biostatistics, Jena, Germany, [3]University Hospital Jena, Dept of Anaesthesiology, Jena, Germany, [4]University Hospital Münster, Department of Anaesthesiology, Intensive Care and Pain Medicine, Münster, Germany, [5]Université Versailles St Quentin, Department of Anaesthesiology Raymond Poincaré Hospital, Garches, France

Background and Goal of Study: Severe chronic post-surgical pain (CPSP) resulting in relevant functional impairment is reported by 5-10% of the patients.[1,2] The aim of this study was to investigate the incidence, characteristics and risk factors for CPSP in Europe.
Methods: Prospective observational trial in 21 hospitals of 11 European countries.[3] Ethics approval and patient consent was ontained according to the local requirements of the participating hospital. Patients undergoing elective surgery were enrolled in the registry PAIN OUT.[4] Outcome was evaluated on the first postoperative day (D1) using a standardized questionnaire. Follow-ups at month 6 (M6) and 12 (M12) via email or telephone interview used the Brief Pain Inventory (BPI) and the DN4 (Douleur Neuropathique en 4 questions). Primary endpoint was the incidence of CPSP at M12. Statistics: Univariate analysis (means (95%-CI)), multivariate logistic regression analysis; Hosmer-Lemeshow test; odds ratios (OR).
Results: 3120 patients were assessed at D1, 1044 and 889 at M6 and M12. The incidence of at least moderate CPSP (NRS≥3) was 16.0% (14.0/18.3) and 11.8.% (9.7/13.9) at M6 and M12. Severe pain (NRS ≥6) was reported by 2.9% and 2.2% at M6 and M12. Specifically after some minor surgeries (knee arthroscopy, hernia repair) the incidence of CPSP was high. Signs of neuropathic pain were recorded in 39.2% (38.7/50.8) of the patients with moderate and 57.1% (30.7/83.4) with severe CPSP at M12. Functional impact of pain on activities increased with severity of CPSP with an BPI score of 3.4±2.3 for moderate and 5.5±2.6 for severe CPSP (p<0.001). Multivariate analysis identified orthopaedic surgery, preoperative chronic pain and percentage of time in severe pain at D1 as predictive factors. Scores for worst pain after surgery with an OR of 0.93(0.83/1.05) had no predictive value. A 10% increase in percentage of time in severe pain on D1 was associated with a 30% increase of CPSP incidence at M12 (OR 1.3 (1.2,1.5)).
Conclusions: Severe CPSP was rare, however, neuropathic pain was prevalent in 57% of these patients. In addition to some previously described variables, the percentage of time in severe pain during the first 24 hours after surgery was associated with CPSP at M12. This underlines the importance of adequate pain management after surgery.
References:
1. Haroutiunian S et al. Pain 2013;154:95
2. Kehlet H et al. Lancet 2006;367:1618
3. www.esahq.org/research/clinical-trial-network
4. www.pain-out.eu

ESAPC1-3

Gastric emptying time of fluids after oral rehydration therapy in morbidly obese patients determined by magnetic resonance imaging

Shiraishi T., Nakamura M., Yazaki T., Kobinata S., Ohba M.
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Background and Goal of Study: According to the international guidelines regarding preoperative administration of clear fluids before induction of anaesthesia, it has now been determined that two hours fasting is safe to avoid aspiration pneumonia. No reports have provided details about the fasting period for obese patients as there have been concerns about delays in gastric emptying times in this group of patients. In this study, we evaluated the changing of gastric fluid volume (GFV) after ingesting clear fluids in obese patients and compared to non-obese volunteers using Magnetic Resonance Imaging (MRI).
Materials and Methods: Ten obese patients (BMI≧35)and ten non-obese healthy volunteers(18≦BMI＜25) were studied. After securing 9 hours fasting, glucose-supplemented oral rehydration solution (ORS: OS-1, Otsuka Pharmaceutical Factory) was given in three minutes and GFV was evaluated using MRI. MRI scans were performed at pre-ingesting, 0 min, 30 min, 60 min, 90 min, and 120 min after the ingestion.
Results and Discussion: GFV were significantly higher in obese patients compared to non-obese volunteers at pre-ingesting, 0 min, and 30 min. After 60 min, GFV showed no significant difference between obese and non-obese. In each group, GFV had no significant difference between pre-ingesting and 120 min. The rate-of-change of GFV had no significant difference between obese and non-obese.
Conclusion(s): Residual GFV were higher in obese patients. But after ingesting ORS, obese patients showed no delay of gastric emptying faculty. In obese patients, initial residual gastric volume has influenced for 30 min, but after that, ORS was egested rapidly as non-obese volunteers. Two hours fasting before induction of anaesthesia was considered safe also in obese patients.

ESAPC1-4

Hemodynamic variation between continuous paravertebral and epidural thoracic block in laparoscopic oesophagectomy: a prospective randomized study

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Université de Lille II, Centre Hospitalier Universitaire de Lille, Dept of Anaesthesiology & Intensive Care, Lille, France

Background and Goal of Study: Continuous Paravertebral block (PVB) was reported to provide less episodes of hypotension than continuous thoracic epidural block (TEB). The maintenance of optimal tissue perfusion is essential for esophageal anastomosis in patients undergoing esophagectomy. This

preliminary study aimed to compare the proportion of hypotension episodes induced by ultrasound-guided continuous PVB or TEB in patients operated on esophagectomy.
Materials and Methods: After ethical committee approval, 20 patients scheduled for transthoracic esophagectomy under abdominal laparoscopy and thoracotomy were randomized to benefit of TEB or PVB. The anaesthetic and analgesic protocol were similar in both groups. A bolus of 5 ml of ropivacaine 0.2% and 10μg of Sufentanil was injected in the catheter at the end of the abdominal time. A continuous infusion of ropivacaine 0.2% at 4ml/h was then initiated at the thoracic time. Postoperative patient-controlled analgesia consisted on an infusion of ropivacaine 0.2% at 6ml/h and a permitted bolus of 4ml every 15min as required. The primary endpoint consisted to measure the frequency of hypotension episodes defined by a mean arterial pressure (MAP) less than 70mmHg or a decrease in MAP greater than 20% when compared with the preoperative value. Secondary endpoints evaluated the amount of fluid administration, the use of vasopressor drugs, the analgesic efficacy assessed by the numeric scale (NRS), and the morphine consumption. Registration was done during the surgical procedure until 48 hours after it. Comparisons between groups were performed by non-parametric tests.
Data are expressed as n (%) or median (quartile 25-75). The significance at $p<0.05$.
Results: Among the population, 11 were in the TEB group and 9 in the PVB group. The frequency of hypotension episodes was significantly higher in TEB group (9/11) when compared to PVB group (1/9, $p=0.022$). In TEB group, 9 (73%) patients required fluid challenge while only 1 (12%) in the PVB group ($p=0.02$). There was no significant difference between the two groups regarding the requirement of norepinephrine, the proportion of patient with NRS greater than 4 and the postoperative morphine consumption.
Conclusion: In patients undergoing esophagectomy, these initial results seem to indicate that PVB provides better hemodynamic stability than TEB while the quality of analgesia remains similar. Further data are required to confirm this preliminary study.

ESAPC1-5

Training the human factors in medical education: a proof-of-concept manikin study on the effects and the standardization of training under divided attention

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Background and Goal of Study: Divided attention, also known as dual-tasking, generates major stress in emergency situations and "education through simulation" has yet failed to offer a standardized training scenario for this key difficulty. We introduced and validated a quantifiable source of divided attention and investigated its effects on performance and workload in airway management.
Materials and Methods: Participants randomly performed six rounds of securing the airway of a manikin: supraglottic airway, conventional endotracheal intubation and video-assisted endotracheal intubation each in a native manner and as a dual-task. Primary endpoints were the time consumption for the completion of each airway task and the number of procedural mistakes made. A Paced Auditory Serial Addition Test (PASAT) served as a quantifiable source of divided attention. Workload was measured by the National Aeronautics and Space Administration (NASA) - task-load-index, a 6-dimensional questionnaire, which assesses the perception of demands, performance and frustration in respect to a task on a scale of zero to 100.
Results and Discussion: 150 participants from medical students to consultants completed the tests. Volunteers perceived our test to be challenging (99%) and true to an emergency situation (80%), but still fair (98%) and entertaining (95%).
The negative effects of divided attention are reproducible on all levels of expertise. Time consumption and perceived workload increase and more than half the participants make procedural mistakes for the first time under divided attention. The supraglottic airway technique proves itself as the least affected (Data see Table 1).

Comparison	Increase in time consumption in seconds:	Increase in number of procedural mistakes:	Increase in perceived workload - NASA-TLX:	Increase in NASA-TLX subcategory: Mental demand:	Increase in NASA-TLX subcategory: Temporal demand:	Increase in NASA-TLX subcategory: Frustration:
Supraglottic Airway	6.4; CI= [5.4;7.5]	0.03; CI= [-0.01;0.06]	29.4; CI= [26.6;32.1]	46.5; CI= [42.9;50.0]	31.7; CI= [27.7;35.8]	30.9; CI= [26.8;34.9]
Conventional Intubation	17.8; CI= [14.1;21.6]	0.57; CI= [0.45;0.68]	31.8; CI= [29.5;34.2]	49.6; CI= [46.4;52.7]	30.0; CI= [26.1;34.0]	34.0; CI= [30.3;37.7]
Video-Assisted Intubation	23.3; CI= [19.9;26.6]	0.60; CI= [0.47;0.73]	34.2, CI= [31.5;36.9]	54.0; CI= [50.7;57.2]	34.7; CI= [30.8;38.6]	34.5, CI= [30.1;38.9]

[Table 1: The effects of divided attention]

Conclusion: This study introduces for the first time an effective scenario of divided attention for simulation training in medicine. The significant effects on performance and perceived workload demonstrate our model´s validity. It is characterized by high acceptability, technical simplicity, a novel degree of standardization and offers the future outlook of more true-to-life emergency training in medical education.

ESAPC1-6

Transition to propofol after sevoflurane anesthesia to prevent emergence agitation: a randomized controlled trial

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[1]Women's and Children's Hospital, Department of Paediatric Anaesthesia, Adelaide, Australia, [2]University of Adelaide, Discipline of Acute Care Medicine, Adelaide, Australia

Background and Goal of Study: Emergence agitation (EA) is a common behavioural disturbance after sevoflurane anesthesia in children. Propofol 1 $mg \cdot kg^{-1}$ bolus at the end of sevoflurane anesthesia has had mixed results in reducing the incidence of EA whereas a short transition to propofol anesthesia could enhance the recovery of children following sevoflurane anesthesia. We aimed to determine whether transition to propofol over three minutes at the end of sevoflurane anesthesia reduces the incidence of EA in children.
Materials and Methods: In this prospective randomized controlled trial, 230 children aged 1-12 years, undergoing magnetic resonance imaging (MRI) under sevoflurane anesthesia were randomized to receive either propofol 3 $mg \cdot kg^{-1}$ over three minutes (propofol group), or no propofol (control group), at the end of sevoflurane anesthesia. EA was assessed by a blinded assessor using the Pediatric Emergence Anesthesia Delirium (PAED) scale[1] and the Watcha scale[2] until 30 minutes after emergence. EA on the PAED scale was defined as a PAED score >12. EA on the Watcha scale was defined as a score ≥3. Times to emergence, PACU discharge and discharge home were also recorded.
Results and Discussion: Data was analysed for 218 children. Incidence of EA was lower in the propofol group on both PAED (29% vs 7%; relative risk (RR)= 0.25; 95% confidence interval (CI), 0.12-0.52; $P<0.001$) and Watcha (39% vs 15%; RR = 0.37; 95%CI 0.22-0.62; $P<0.001$) scales. Duration and severity of EA were also reduced in the propofol group. Pre-planned subgroup analyses for midazolam premedication, pre-existing cognitive or behavioral disturbance, and age group did not alter our findings. Emergence time and time in PACU were both increased by a mean of 8 minutes in the propofol group ($p<0.001$) with no difference in time to discharge home.
Conclusion: Transition to propofol at the end of sevoflurane anesthesia reduces the incidence of EA and improves the quality of emergence. The small increase in recovery time does not delay discharge home.
References:
1. Sikich N, Lerman J. Anesthesiol 2004; **100**: 1138-1145.13.
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General Anaesthesiology

1AP1-1

Closed loop assisted versus manual goal-directed fluid therapy during high-risk abdominal surgery: first case control study with propensity matching

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Background and Goal of Study: Goal-directed fluid therapy strategies have been shown to benefit moderate- to high-risk surgery patients (1). Despite this, these strategies are often not implemented in current practice. We recently describe a new automated closed loop system for fluid administration. This system as been succesfully tested in engineering (2) and animal (3) studies.
The aim of this study was to assess a closed-loop fluid administration system in a moderate-to-high risk surgical cohort and compare that cohort to matched patients who received manual management. Our hypothesis was that the patients receiving closed-loop assistance would spend more time in a preload independent state, defined as percent of case time with stroke volume variation less than or equal to 12%.
Materials and Methods: Patients eligible for the study were all those over 18 years of age scheduled for hepatobiliary, pancreatic, or splenic surgery and expected to receive intravascular arterial blood pressure monitoring as part of their anesthetic care. The closed-loop resuscitation target was selected by the primary anesthesia team and the system responsible for implementation of goal-directed fluid therapy during surgery. Following completion of enrollment each study patient was matched to a non-closed-loop assisted case performed during the same time period using a propensity score match to reduce bias.
Results and Discussion: 40 patients were enrolled, five ultimately excluded, and 25 match pairs were found from the remaining 35 patients within the predefined caliper distance. There was no significant difference in fluid administration between groups. The closed-loop group spent a significantly higher portion of case time in a preload-independent state; the average closed-loop assisted patient spent 95 +/- 1% of the case time with an SVV less than or equal to 12%, whereas the manual group spent 87 +/- 14% in this range (p=0.008).
Conclusion(s): In this case control study with propensity matching, clinician use of the closed-loop assistance resulted in a greater portion of case time spent in a preload independent state throughout surgery when compared to manual delivery of GDFT.
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1AP1-2

Closed-loop control of anesthesia during liver transplantation: a pilot study

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Background and Goal of Study: Automated titration of propofol and remifentanil guided by the bispectral index (BIS) has been demonstrated feasible during induction and maintenance of general anesthesia and in some extreme situations like lung transplantation. The behavior of such a controller was unknown during orthotopic liver transplantation (OLT) during which propofol metabolism was strongly modified. Therefore the aim of this pilot study was to evaluate the performance of the controller and the propofol and remifentanil consumption during OLT.
Materials and Methods: After IRB approval (NCT00477347) and written consent, adults undergoing OLT were included in this prospective study. Patients with a pre-existing central neurologic disease or with consciousness disorder (encephalopathy) were not included. The goal of the dual loop controller was to achieve a BIS value at 50 all along the surgical procedure. Performance of the system or adequate anesthesia was assessed by the percentage of BIS in the range 40-60. Consumption of propofol and remifentanil at each period of surgery (dissection, anhepatia and reperfusion) were calculated and compared.
Results and Discussion: 15 patients (age 61 [50-62] y.o.) were enrolled and 13 were finally studied with a sex ratio of 1,6M/1F and various etiologies of terminal liver failure. No exclusion was reported. Performance of the controller reached 88% (89-97) with a too deep anesthesia in 8% [4-12] of the surgery. Median propofol consumption was 3.3 $mg.kg^{-1}.h^{-1}$ with a significant decrease of propofol requirement during anhepatia (2.9 $mg.kg^{-1}.h^{-1}$) in comparison to dissection period (4.6 $mg.kg^{-1}.h^{-1}$) with p=0.03. No variation of remifentanil was recorded all along the surgery with a median consumption of 0.12 $\mu g.kg^{-1}.h^{-1}$. No awareness was reported.
Conclusion(s): The dual-loop controller was feasible and demonstrated a decrease in propofol requirement during anhepatia. The magnitude of change was less than expected suggesting either a global failure in the hepatic metabolism before and after transplantation or other metabolic ways (lung, renal…) of propofol. As expected no change of remifentanil requirement was reported.
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1AP1-3

A utilisation review of thromboelastography in the peri-operative period

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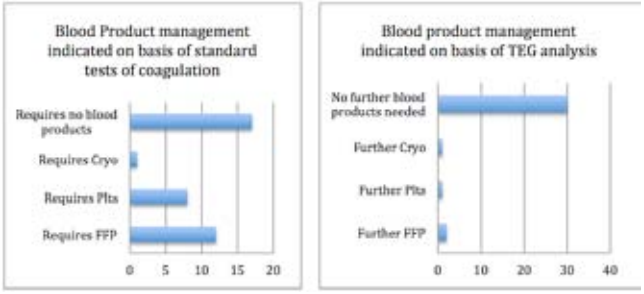
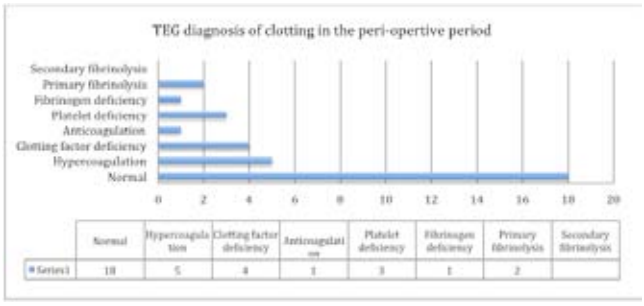
Background and Goal of Study: Thromboelastograpahy (TEG) is a near-patient assessment of whole blood coagulation and fibrinolysis which has been shown to reduce the unnecessary transfusion of plasma and platelets particularly during cardiothoracic surgery and liver transplantation. The value of TEG measurement in the peri-operative period in a general surgical population is uncertain.
Materials and Methods: A prospective audit of TEG tests performed on patients being treated on a general surgical ICU was conducted over a 2 month period.
Results and Discussion: Overall 33 patients had TEG performed in the peri-operative period. 27 patients (79.4%) were post-operative and 12 patients (35.3%) were planned for surgery in the near future with 6 of these patients returning to theatre. General surgical specialities accounted for 66% of patients, trauma and orthopaedics 28% and the rest had undergone vascular or maxillo-facial surgery. Indications for performing TEG included clinical evidence of coagulopathy (44%), on-going haemorrhage (20.6%), following packed red cell transfusion (35.3%), following pro-coagulant blood product administration (38.2%) and sepsis (23.5%). Based upon the routine laboratory tests, 12 patients fulfilled standard criteria for the administration of FFP, 6 patients for platelets tansfusion and 1 patient for cryoprecipitate. However, the TEG result suggested that only 2 patients required FFP, 1 required platelet transfusion and 1 required cryoprecipitate (figure 1). The diagnosis made with TEG is demonstrated (figure 2). 5 patients were diagnosed as having hypercoagulation and 2 hyperfibrinolysis that cannot be detected on standard tests of coagulation.



[Figure 1: Comparison of blood product administration require]



[Figure 2: Diagnosis made with TEG analysis in the peri-opera]

TEG resulted in a documented change of management in 18 cases. In 16 of these patients (88.9%) no further blood product administration was required. No documentation regarding the clinical decision based on the TEG result was found in the remaining 16 cases.

Conclusion: Performing TEG in this peri-operative period resulted in a change in patient management in 52.9% of cases. In almost all these cases, blood product administration was rationalised.

Using TEG to guide further blood product requirement may have potentially reduced the pro-coagulant blood product use from 21 administrations to 4 administrations for 34 patients.

1AP1-4

Anaesthesia management for cytoreductive surgery with intraperitoneal hyperthermic chemotherapy: a case report

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Background: Cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy (CRS/HIPEC) is considered the standard treatment for different malignant diseases of peritoneal surface.

During HIPEC, patients are exposed to high intra-abdominal temperatures, as well as high volumes of carrier solutions for intraperitoneal perfusion, with risk of electrolyte alterations (1).

These particular considerations make it interesting to describe the anaesthetic management.

Case report: In our center, between April and August 2014, 48 patients underwent CRS (open technique) and HIPEC. We recorded data from those where 5% dextrose was the carrier solution.

Data from 26 patients (13 male, 13 female) was registered. Average age was 66,42±8,75 years; IMC was 26.87±3.97 kg/m^2, and ASA score was 2 in 25 cases, with one case of ASA 3.

During CRS, temperature was kept within physiologic ranges. Around 30' minutes prior to HIPEC and in order to prevent systemic hyperthermia, core body temperature was allowed to drift to no less than 35.5ºC.

Intra-abdominal warming for HIPEC lasted 41±4,16 minutes, and induced hyperthermia with an overall median peak temperature of 37.54±0,57ºC. Active cooling measures (water blanket, open air flow, cold gels or cold iv infusions) to prevent systemic hyperthermia were used in 15 cases.

There was a tendency, already described in other works (2,3), for a decrease in systemic vascular resistances and an increase in heart rate during HIPEC.

Fluid reposition was goal-directed, administering on average 3811,36±853,69 mL crystalloids and 777,27±397,53 mL colloids per patient.

Throughout surgery, pH and BE values decreased from 7.33±0.05 to 7.29±0.04 (p< 0,05) and -5.93±1.5 to -8.86±1.89 (p=0,07), respectively. There was also a significant increase in lactate, from 1.15±0.69 to 2.36±1.43 (p<0,05).

Conclusions: CRS/HIPEC is associated with major haemodynamic and metabolic alterations. It is important for the anaesthetist to strictly manage, understand and prevent haemodynamic and temperature changes, as well as fluid management and blood transfusion in order to improve patient outcome.

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1AP1-6

Effect of tranexamic acid on surgical bleeding in pulmonary resection: a randomized controlled trial

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Background and Goal of Study: The effectiveness of Tranexamic Acid (TA) in reducing blood loss and transfusion requirements has been amply demonstrated in many types of surgery , including traumatology, orthopedics and cardiovascular surgery [1,2] . However, to date, there are no studies evaluating the effect of TA in pulmonary resection surgery.

The aim of our study is to evaluate the effect of TA on perioperative bleeding and transfusion requirements for patients undergoing pulmonary resection surgery.

Materials and Methods: Prospective randomized double blinded placebo-controlled, parallel-group trial including patients aged over 18 years, scheduled for surgical pulmonary resection of infectious or neoplastic diseases. Biological, demographic, clinical, transfusion requirements, blood loss and perioperative complications data were recorded.

2 groups of patients:

- TA group;
- Placebo group (p).

Results and Discussion: Thirty-three patients were collected. The mean age was 46 ± 15.46 years. The main co morbidities found: diabetes (4%), chronic obstructive pulmonary disease (8%) and pulmonary tuberculosis (4%). Approximately 54.5 % of patients belonged to the TA group (n = 18). Fifty -six percent in the TA group had a lung resection on infectious disease. There was no significant difference between the two groups in per operative blood loss assessed by surgical aspiration (p = 0.48), gauze and surgical sites (p = 0.32). Postoperative blood loss quantified by chest tubes were significantly lower in the TA group (p = 0.009). On perioperative transfusion requirements, they were similar in both groups (p = 0.58 vs 0.49). Also, no significant difference was found between the two groups in the levels of hemoglobin, hematocrit, prothrombin and activated partial thromboplastin time pre-, and postoperatively. The most important per operative and postoperative complications were bleeding (8%) and sepsis (8%). No side effects related to the TA (convulsion, thromboembolism) were noted perioperatively.

Conclusion(s): In pulmonary resection surgery, TA seems to reduce postoperative bleeding without impact on transfusion requirements. Other large-scale studies are needed to confirm these results and will thus establish a clear protocol for the use of TA in this type of surgery.

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1AP1-7

Effectiveness of the surgical drape ´EXGARD´ for maintenance of body temperature under general anesthesia: preliminary report

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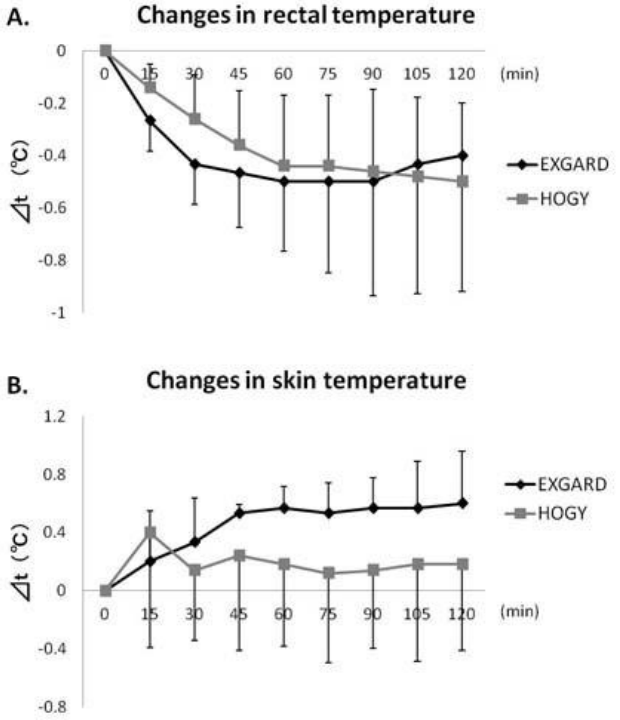
Background and Goal of Study: Hypothermia during surgery is known to increase the risk of perioperative complications. Recently, a surgical drape with a thermal effect, ´EXGARD´ (TOYOBO, Japan), that is made of polyurethane and rayon has been developed.

In this study, we investigated whether the temperature of a patient's body covered with ‚EXGARD' was adequately maintained compared with the effect of the conventional surgical drape ‚HOGY' (HOGY Medical, Japan), which is made of polyester and polyethylene.

Materials and Methods: After approval of the study protocol by the ethical committee of our institution, informed consent was obtained from each patient. Eight patients (ASA physical status 1 or 2) who were scheduled to undergo elective video - assisted thoracic surgery under combined epidural and general anesthesia were enrolled in this study. The patients were randomly divided into two groups: HOGY group (n = 3) and EXGARD group (n = 5). After induction of general anesthesia , each patient was covered with a drape. We recorded rectal temperature and skin temperature of the epigastrium. Temperatures were recorded every 15 minutes up to 120 mintes.

Data are expressed as means ± SDs and were statistically analyzed by ANOVA. A P value <0.05 was considered statistically significant.
Results and Discussion: There were no significant differences in patients' backgrounds . Changes in rectal temperature did not show a significant difference and showed almost the same tendency in the two groups (Figure 1A). Changes in skin temperature of the epigastrium also showed no significant difference; however, skin temperature in the EXGARD group showed a tendency to be high compared to that in the HOGY group (Figure 1B).
A surgical drape material , may affect body temperature of under general anesthesia. A larger sample size is needed to assess the effect of ‚EXGARD'.
Conclusion: The Newly developed surgical drape ‚EXGARD' might have a rewarming effect on skin.



[Fig 1 Changes in body temperature]

1AP1-8

Effects of donor characteristics and recipients Model for End-Stage Liver Disease (MELD) and MELD-sodium scores on postoperative outcome in liver transplantation

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Background and Goal of Study: The aim of this study was to investigate the effect of donor risk index (DRI) and other donor characteristics, as well as recipients MELD and MELD sodium (MELD-Na) score, on early postoperative outcome in liver transplantation (LT).
Materials and Methods: We analyzed 200 patients who underwent LT between January 2013 and September 2014. Exclusion criteria were: living-donor LT, incomplete data collection, re-transplantation and death within 28 days of LT. Collected data were: donor related (age, DRI, and biochemical tests, cold ischemic time (CIT), warm ischemic time (WIT)), recipient MELD and MELD-Na scores, intraoperative vasopressor support, incidence and severity of postoperative pulmonary, neurologic and renal complications, PostAnaesthesia Care Unit (PACU) Length of Stay (LoS).
Results and Discussion: Of all patients, 125 were included in the final data analysis. DRI correlated with an increase in postoperative serum creatinine levels (p=.047, 95% CI [0.03, 0.47]). Both CIT (p=.006, 95% CI [1.42, 8,36]) and WIT (p=.02, 95% CI [0.131, 1.55]) correlated with intraoperative vasopressor requirements during the neohepatic phase. Duration of CIT was also a predictor for postoperative neurologic complications (p=.037, 95% CI [6.34, 310.12]). We calculated Δsodium as the mathematical difference between donor and recipient sodium. An increase Δsodium was associated with increased PACU LoS (p=.046, 95% CI [0.05, 1.72]). MELD-Na score correlated with increased blood loss during surgery (p=.021, 95% CI [0.07, 0.89]) and increased transfusion requirements (p=.008, 95% CI [0.13, 0.85]). MELD-Na score was associated with postoperative severity (p=.012 95% CI [0.95, 7.41]) and duration of renal dysfunction (p=.045, 95% CI [0.08, 1.50]) and PACU LoS (p=.026, 95% CI [0.06, 1.00]).
Conclusion(s): Δsodium and CIT correlated with postoperative neurologic complications. WIT and CIT were associated with haemodynamic instability and increased vasopressor support during the neohepatic phase. MELD-Na score, rather than MELD score, represents a good predictor for intraoperative blood loss, postoperative renal dysfunction and increase PACU LoS.

1AP1-9

Effects of midline laparotomy on cough strength. Preliminary results

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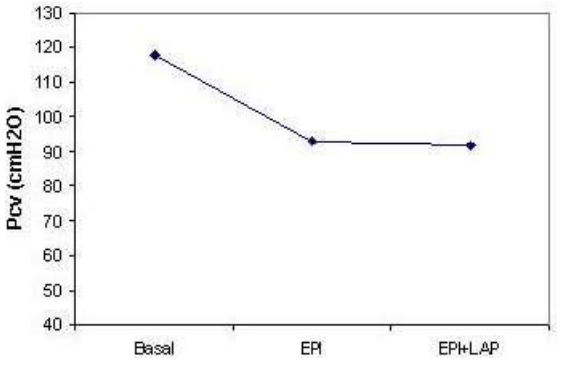
Background and Goal of Study: Cough is a physiological mechanism needed to avoid postoperative respiratory complications, is related to expiratory muscle function, and can be weakened because of anaesthetics, pain or surgery (1). Cough strength can be evaluated with Cough pressure (Pcough), measured with oesophageal and gastric balloons or with Central venous pressure(2). The goal of this study was to determine the individual effects of thoracic epidural analgesia and laparotomy on Pcough.
Materials and Methods: 8 patients scheduled for colon surgery were recruited. Pcough was determined: 1/ preoperatively (Basal); 2/ after administration of 0.25% epidural bupivacaine (BP) to reach a segmentary T6-T12 sensitive level before surgery (EPI); 3/ after laparotomy with the same epidural dose of BP (EPI+LAP); all patients were painless (VAS=0). Patients were asked to perform a maximal single cough effort from Total Lung Capacity in supine position. Central venous cough pressure (Pcv) was recorded; the manoeuvre was performed 3 times, always with the same command, and best recordings were compared (Wilcoxon signed rank test).
Results and Discussion: Basal Pcv (mean±SD) was 118±51 cmH_2O. Pcv-EPI was 93±29 cmH_2O (*p< 0.01 vs Basal). Pcv-EPI+LAP was 92±32 cmH_2O (**p=0.889 vs EPI). Results are shown in table 1 and figure 1. Epidural BP causes a motor blockade that decreases abdominal and intercostal muscle strength, expressed as a decrease in cough effort. After midline laparotomy in painless patients, the same Pcough values were observed, suggesting cough strength is not affected by surgery in patients under epidural blockade.

	Basal	EPI	EPI+LAP
Pcv (mean±SD, cmH2O)	118±51	93±29*	92±32**

[Table 1. Cough pressure]



[Figure 1. Pcv evolution]

Conclusion(s): In this preliminary study, epidural 0.25% BP decreased Pcough. This effect remained unchanged after midline laparotomy, suggesting that laparotomy by itself did not decrease expiratory muscle strength when an epidural block with BP is established. The clinical relevance of this effect might be further investigated.
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1AP1-10

FLUid intervention and renal outcome trial in patients undergoing major surgery: an observational single-centre study (the FLURO trial)

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Background and Goal of Study: Quantitative toxicity (fluid overload) and qualitative toxicity (fluid type) are associated with kidney injury and adverse outcomes. We hypothesized that positive perioperative fluid balances and chloride-liberal fluid intervention are associated with adverse renal outcomes and increased morbidity in patients undergoing major surgery.
Materials and Methods: A single-centre, prospective observational study of adult patients undergoing major surgery. Detailed quantitative and qualitative fluid intervention data were retrospectively analyzed for determinants of early acute kidney injury (AKI) (KDIGO Classification) and adverse outcomes. Factors associated with complications and length of hospital stay were evaluated using descriptive statistics, univariate and multivariate regression analysis.
Results and Discussion: 542 consecutive patients undergoing major surgery were included. Most patients were elderly, overweight, and with pre-existing medical co-morbidities. Median (IQR) fluid balances were positive both intraoperatively and on postoperative day (POD) 1, and negative on POD's 2 and 3. 357 patients (66%) developed at least one postoperative complication. Half of these patients had $\geq$ 3 complications. The most common complications were cardiovascular (70%), metabolic (34%), genitourinary (30%), respiratory (29%), blood transfusion (23%), and AKI (15%). Amount of administered fluid (median, IQR) intraoperatively and on POD 1,2 and 3 was significantly higher in patients with complications. Patients with AKI received significantly more fluids on POD's 2 and 3. For patients with complications, chloride supraphysiological fluid use was higher on POD 1: 1035ml (581:2000) vs. 890ml (581:1410); p=0.047. Median (IQR) hospital LOS was 6 days (4:11). Perioperative mortality was 0.7%. Hospital LOS was longer in patients with complications: 8 days (5:13) vs. 4 days (2:6); p<0.0001. Multivariate regression modelling could not identify specific factors associated with complications.
Conclusions: These findings support the hypothesis that IV fluids may be associated with the development of complications and organ dysfunction, and prolonged length of hospital stay. The type and volume of perioperative fluid may be a modifiable risk factor for the prevention of morbidity in patients undergoing major surgery. These results can be used to generate hypotheses and establish outcome benchmarks for future controlled trials.

1AP1-11

General desflurane based low-flow inhalation anaesthesia

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Introduction: To present the experience of common low-flow inhalation anesthesia on the basis of desflurane.
Materials and Methods: A prospective analysis of the low-flow inhalation anesthesia on the basis of desflurane in 50 patients aged 42.1±17.7 years (laparoscopic tubectomy - 22; laparoscopic enucliation of ovarian cysts capsule - 8; laparoscopic cholecystectomy - 8; gerniolaparotomy, plastic hernia - 4; laparotomy cholecystectomy - 8). Induction of anesthesia was performed by intravenous injection of 1% propofol solution at a dose of 1.5-2 mg / kg and 0,005% solution of fentanyl in a dose of 0.7-1 mg/kg, suxamethonium chloride at a dose of 1-1.5 mg/ kg. Maintenance of anesthesia was carried out as follows: for the first 90 seconds of fresh gas flow of 3 l/min, feed desflurane - 10 vol.%, Which ensures the achievement of desflurane concentration in exhaled gas at the level of 0.6 - 0.7 MAC. Then - the transition to a low fresh gas flow - 0.8 l / min., the supply of desflurane 6 vol.%. Fentanyl is administered every 15-20 minutes, 0.1 mg.
The most informative parameters for evaluation of anesthetic, we used the following: the time required to achieve the MAC desflurane - 0.6-0.7; hemodynamics, bispectral index score of anesthetic gas mixture, the severity of stress reactions (cortisol in the blood); wake-up time. The study was conducted in the following stages: Stage 1 - after premedication; Stage 2 - 20 minutes from the start of anesthesia.
Results and Discussion: Desflurane concentration in exhaled gas of 0.6 - 0.7 MAC and fractional fentanyl provide a level of BIS 40-50%. The average level of BIS was 42,7±4,2%.The time required to obtain a concentration of desflurane in the exhaled gas at the level of 0.6 - 0.7 MAC averaged 90-100 seconds. At the 2nd stage of the study the average MAP was 103.7 ± 6.2 mm Hg, representing an increase of 12.2% from baseline values. The average level of heart rate - 82,6 ± 12,6 beats per minute, which corresponds to an increase of 5.8% from baseline. Average cortisol step 1 was averaged 448.1 nmol/l, and 2nd at 11.1% was higher (504.3 nmol/l). Wake-up time was measured from the time of filing of desflurane to extubation and recovery of consciousness to a level equal to 85% of the BIS. On average wake-up time ranged from 170-240 seconds.
Conclusion: Desflurane concentration of 0.6 - 0.7 MAC and 0.1 mg fentanyl administration every 15 20 minutes, maintained at BIS 42.7±4.2%.

1AP1-12

The perioperative management of a patient with Bartter syndrome using a multidisciplinary approach

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Background: Bartter Syndrome is a rare autosomal recessive disorder with an incidence of less than 1 per million. It is associated with hypokalemic alkalosis, electrolyte and fluid loss, elevated renin, aldosterone and angiotensin levels in the absence of hypertension and diminished response to vasopressors. Management is aimed at perioperative correction of fluid and electrolyte abnormalities, maintaining cardiovascular (CVS) stability and prevention of renal compromise [1,2].
Case report: An 18 year old female with Bartter Syndrome requiring continued care by parents and a nephrologist presented for ovarian cystectomy. She was taking daily oral K^+ supplements (1500mmol), Indomethacin, spironolactone and Diarolyte. Her anaesthetic and postoperative management was planned using the anaesthetic pre-assessment clinic, advice from her nephrologist regarding K^+ and fluid replacement, discussion with the surgeon, patient, parents and intensivist. Anaesthetic management started preoperatively with the initiation of intravenous K^+ and fluid replacement. In theatre Propofol, fentanyl and rocuronium were used for induction and intubation. Arterial, central venous and urinary catheters were established. Anaesthesia was maintained with Sevoflurane and positive pressure ventilation. Three litres of Hartmann's solution with an additional 60mmol of K+ was given during the 90 minute procedure. Following surgery she was extubated and transferred to Intensive Care where she required additional K^+, Mg^{2+} and fluids. After restarting oral medications, she was discharged 48 hours later.
Discussion: Perioperative management of our patient required considerable planning to address the challenges to CVS stability, fluid and electrolyte balances. The need for hourly measurements of fluid and electrolyte loss and their replacement required the use of urinary, arterial and central venous catheters plus intensive care support.
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Learning Points: A multidisciplinary approach combined with fluid and electrolyte replacement guided by invasive monitoring and Intensive Care support is essential for safe perioperative management of patients with Bartter syndrome.

1AP2-1

Acute rhabdomyolysis following succinylcholine administration

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Background: Rhabdomyolysis is a clinical and laboratory syndrome resulting from the skeletal muscle injury, with release of potentially toxic intracellular substances at circulation[1]. Its etiology is wide, being one of the causes, although rare, the use of succinylcholine. Is here reported a case of rhabdomyolysis secondary to the use of succinylcholine, in a patient with no history

of malignant hyperthermia or muscular dystrophy, in which the severity of fasciculations was not correlated with the aggressiveness of muscle injury.
Case report: 47 years-old patient, ASA I, submited to tympanoplasty under general anesthesia. Without history of muscular trauma and without changes to the physical examination. Induction with 200 mg of propofol and 50 mg of succinylcholine. Fasciculations noted were not intense. Maintenance with sevoflurane and remifentanil. Intraoperative and immediate postoperative period without problems.
Six hours after the end of surgery the patient starts choluria, myalgias and muscle contractures with impossibility of upper limb extension. No other changes in the physical examination. Analytically CK 4216U/L, LDL 274 U/L, AST 51U/L and hypocalcemia. Without changes in renal function. Presence of myoglobin in urine test. Arterial blood gas test was normal. Was started vigorous hydration at 6L/24h and furosemide, with correction of laboratory results after 5 days.
Discussion: The administration of succinylcholine may have precipitated the rhabdomyolysis. This is a rare complication of this drug. The rapid therapeutic may have prevented the occurrence of more severe complications such as kidney failure, hyperkalaemia or cardiac arrest. Furthermore, severity of muscle damage not correlated with the severity of fasciculations. In published reports of rhabdomyolysis after succinylcholine administration, there was always association with malignant hyperthermia or muscular dystrophy, which did not happen in this case. Thus it is intended to emphasize the possibility of this complication in patients with no previous history of malignant hyperthermia or muscular dystrophy.
Reference:
1. Allison RC, Bedsole DL - The other medical causes of rhabdomyolysis. Am J Med Sci, 2003;326:79-88.
Learning Points: In this case it is intended to increase the degree of evidence for a rare complication of succinylcholine in patients without predisposing factors, as well as the absence of relationship between the fasciculations intensity and muscle injury.

1AP2-2

An attempt on methemoglobinemia: its treatment, and relationship between treatment and cerebral oximeter value: case presentation

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Background: Methaemoglobinemia (MetHb) is a clinical syndrome caused by elevated MetHb levels produced due to congenital changes in hemoglobine synthesis or side effects of some drugs.High methaemoglobin level, caused by performed anesthetic methods and associated variety of drugs are not easily detected during routine anesthetic applications and create danger for the patient. The purpose in our phenomenon is to investigate if there is a correlation between pulse oximeter, cerebral oximeter(CO) and MetHb values in the patient with congenital methaemoglobinemia (CM).
Case report: CM diagnosis was detected in 35year old, 70kg, ASA-2, male patient's who was planned to undergo laparoscopic cholecystectomy procedure. We have been informed that methemoglobinemia level has been about 12-20% in performed scatter measurements. No extra pathological symptom was detected in his physical examination except mild cyanosis on finger tips and lips. During anesthesia the patient received cerebral oximeter in addition to standard monitorization and monitorization with the CO-oximeter device to watch the MetHb values. During general anesthesia,patients methemoglobine levels increased to 16% and methylene blue was performed by the intravenous way to the patient. Peripheral oxygen saturation values regressed to 86% and CO values dropped. Patient was observed in the ICU for 24 hour postoperatively. No complication was detected in the patient during intra and post-operative period.
Discussion: Methylene blue treatment was performed in its optimum time and amount in our patient with CM by using cerebral oxymetry and co-oxymetry monitorings that permitted the follow up of the patient's pre, during, and post-operation. No publication has been found in the literature regarding the use of CO and continuous methaemoglobin screening follow up in patients whit methaemoglobinemia. Potential complications have been prevented through appropriate treament and monitorization. We think that NIRS and Co-Oxymetry device provides the physicians secure follow ups and treatment in intra and postoperative follow ups of patients with methaemoglobinemia.
References:
Mittnacht A, Fischer GW, Reich DL.Methylene Blue Administration is Associated with Decreased CO Values.Anesth Analg 2007;105:549-550.
Learning Points: NIRS and Masimo Co-Oxymetry device provides security conditions for patients and the physicians treatment in the intra and postoperative follow ups of patients with methaemoglobinemia.

1AP2-3

Aspiration pneumonitis associated with bile acid aspiration during general anesthesia

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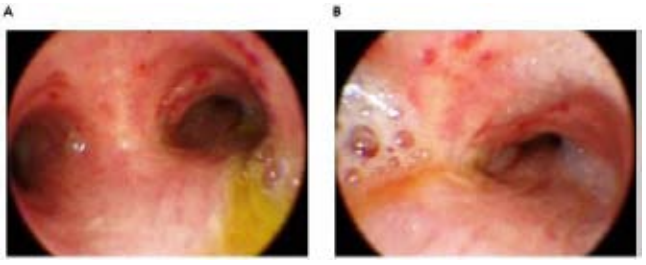
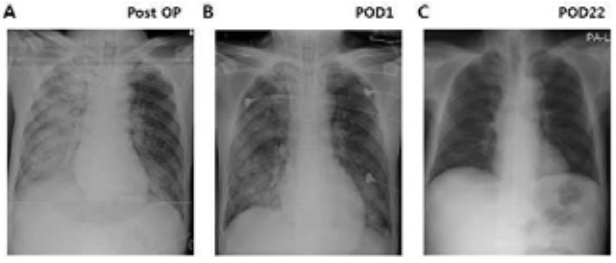
Background: Patients with a history of total gastrectomy are vulnerable to pulmonary aspiration of bile acid during general anesthesia. Bile acid has also been reported to produce more severe pathological changes after aspiration than gastric contents. However, there have been few reports regarding bile acid aspiration and the clinical course is not well known.
Case report: A 54-year-old male patient with a history of total gastrectomy was scheduled for low anterior resection due to rectosigmoid ascending colon cancer. During induction of general anesthesia, the patient vomited bile-colored fluid.



[Fig 1]

Initial treatment was immediately performed and the aspirate was thoroughly suctioned using a general suction tip and a fiberoptic bronchoscope. Surgery was delayed but eventually performed 90 min later after confirming stable vital signs.
However, respiratory symptoms, such as pulmonary edema, hypoxemia, and hypercapnia, developed 30 min after initiation of surgery. Surgery lasted for 3 h and the patient was transferred to the intensive care unit (ICU), where he received supportive care. Unexpectedly, the patient recovered rapidly and was extubated the following day.
The patient showed continuous improvement and was transferred to a general ward on postoperative day (POD) 3. In contrast, unlike the rapid clinical recovery, chest X-ray showed little improvement. The patient's chest X-ray was completely cleared of consolidation on POD 22.



[Fig 2]

Discussion: The present case suggests that anesthesiologists should be aware of bile acid aspiration in patients with a history of total gastrectomy. If bile acid aspiration does occur, rapid management with appropriate guidelines as well as other interventions, such as bronchoscopic suctioning, may be useful in reducing the severity of pulmonary complications.

1AP2-4

Bilateral vocal cord paralysis after thyroidectomy - a recurrent problem or a rare complication of an unknown neuromuscular disease?

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Background: Bilateral vocal cord paralysis is a possible complication following thyroid surgery, usually manifested with biphasic stridor or/and respiratory distress. It is most frequently iatrogenic[1] but are we overlooking other causes?
Case report: 64 year-old woman diagnosed with asymptomatic multinodular goiter proposed for total thyroidectomy. She had history of ptosis, xerophthalmia and photophobia, for which she was seen once by a neurologist. No investigation or medication was started. She had no complications in past surgeries. The patient underwent general anesthesia with neuromuscular blockade with standard dose of Atracurium. The intubation was uneventful. Recurrent laryngeal nerves were identified during surgical procedure and considered intact. The procedure lasted 2 hours, after which the patient was extubated.
Following extubation the patient immediately developed stridor without any signs of residual curarization or difficulty breathing. Bilateral ptosis was also present. Hydrocortisone was given with no improvement. A nasolaryngoscopy was made, showing a bilateral vocal cord paralysis. Subsequently she began progressively dyspneic and was re-intubated. The patient was transferred to the intensive care unit where a neuromuscular disease (Myasthenia Gravis) was proposed as a diagnosis and pyridostigmine started. She was extubated 48 hours later without any stridor or other symptoms. She was transferred to the nursery with no sign of vocal cord paralysis or voice changes and discharged 2 days later. The patient was referred to a Neurology specialist and a full investigation started with pending results.
Discussion: Bilateral vocal cord paralysis is a rare but known complication of Myasthenia Gravis[2] and, in this case, probably precipitated by the use of standard doses of muscle relaxant. Prompt diagnosis and treatment with pyridostigmine avoided the need for tracheostomy.
References:
1. Rosenthal, L. H. S., et al (2007), Vocal Fold Immobility: A Longitudinal Analysis of Etiology Over 20 Years. The Laryngoscope, 117: 1864-1870.
2. Khan, Muhammad Kamaal et al. “Myasthenia Gravis Presenting as Acute Vocal Cord Paralysis.” BMJ Case Reports 2010 (2010).
Learning Points: Myasthenia gravis presenting as bilateral acute vocal cord paralysis is rare. This is a reversible condition as long as the possibility of Myasthenia Gravis is remembered.

1AP2-5

Bronchoscopic lung volume reduction - is the anesthesia risk worth taking?

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Backgronud: Bronchoscopic lung volüme reduction (BLVR) procedures appear to be safer than surgery and alternative treatment for severe chronic obstructive pulmonary disease (COPD) (1).
We present our first anesthetic experience in a patient with severe COPD who underwent BLVR coil treatment.
Case report: A 63 year old man, weighing 63 kilograms, ASA 3, with a history of hypertension and severe COPD who did not respond to standard treatment was eligible to undergo BLVR. He had no prior surgery. Dyspnea was persistant in his physical examination. Pulmonary functional test variables such as FEV1 and FEV1/FVC were 42% and 50%, respectively. Total lung capacity (TLC) and residual volume (RV) were measured 7700 ml (127%) and 5420 ml (241%) by plethysmography. The upper lobe heterogenous pattern of emphysema was seen on computed tomography. 6-min walk distance (6MWD) test was 480 m, COPD Assessment Test (CAT) score was 20 and St. George Respiratory Questionnaire (SGRQ) score was 39.54. His medication regimen including inhalated bronchodilatators and steroids was continued up to the procedure. Written informed consent was obtained from the patient. He was not given sedative premedication. A total IV anesthetic technique of target-controlled infusion propofol, supplemented by a remifentanil infusion was used. Neuromuscular blockage was achieved with rocuronium. Volume controlled mechanical ventilation was performed. The objective of ventilation was to avoid hyperinflation. An inspired oxygen of 50% was set. 3 coils to anterior segment and 3 coils to posterior segment of right upper lobe, 4 coils to right apical segment were inserted. Decurarization was achieved with suggammadex. He discharged home at the postoperative third day. FEV1/FVC and FEV1 levels were 51% and 44% at the postoperative first month, respectively. TLC was 7140 ml (118%) and RV was 4800 ml (208%). Improvement in 6MWD was 140 meters. Regression was 6 point in CAT and 1.7 point in SGRQ.
Discussion: These patients are at high risk for general anesthesia and represent a great challenge to the anesthesiologist.
References:
1. Edmond Cohen. Bronchoscopic treatment of end-stage chronic obstructive pulmonary disease Curr Opin Anesthesiol 2014,27:36-43.
Learning points: Patients with extremely poor lung function can safely be anesthesized through the BLVR period by using modern anesthetic techniques and drugs which minimize intraoperative gas trapping and postoperative respiratory depression.

1AP2-6

Bronchospasm as the single symptom of anaphylaxis to rocuronium with response to sugammadex

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Background: Adverse drug reactions are related to the total number of drugs received by a patient among other factors.
The incidence of perioperative anaphylaxis ranges from 1/5000 to 1/20000 with a 3-7% mortality rate. Neuromuscular blocking drugs cause 50-70%, and 50-87% occur during induction.
In this setting, most frequent are cardiovascular(78.6%), skin(66.4%) and bronchospasm(39.9%) symptoms. 10-14% can involve a single organ system, and use to be most severe, being isolated cardiovascular collapse or severe bronchospasm the most frequent, hindering the diagnosis.
Case report: A 36 y-o male (66kg, 162cm, ASA I) heavy smoker, required laparotomy for abdominal blunt trauma. He was hemodinamically stable. Induction of anesthesia and intubation was accomplished with midazolam, fentanyl, propofol and rocuronium (1.2 mg/kg), and suddenly severe arterial oxygen desaturation and impairement to both mechanical and manual ventilation occurred. Missplacement, kinking of the tube and pneumothorax were excluded by exploration and chest x-ray. Some improvement was observed with IV steroids, and intratracheal beta2 agonists. Suspecting rocuronium anaphylaxis, sugammadex 280 mg were administered with complete recovery of the symptoms. Surgery proceeded after cisatracurium, without complications. From perioperative blood samples, serum tryptase, complement, and total IgE showed normal results. A late skin prick testing was positive to rocuronium. Latex and propofol were tested too.
Discussion: Diagnosis of anaphylaxis during anesthesia may be difficult, because hypotension and bronchospasm can present during anaesthesia being of multiple causes. Mortality and morbidity due to perioperative anaphylaxis may be avoidable if the reaction is promptly diagnosed and treated. Due to the isolated respiratory symptoms and the blunt trauma in our patient the diagnosis was delayed. As was the epinephrine (main) therapy not chosen at first.A positive prick test result confirms the diagnosis, but a negative result does not excluded a hypersensitivity reaction.
Reference: F. Escolano Villén. REDAR 2005; 52: 67-70
Learning Points: In some cases of isolated symptoms (cardiocirculatory collapse, severe bronchospasm) an anaphylaxis reaction should be suspected, and immediate treatment started.
A case of rocuronium-induced anaphylaxis with clinical improvement after receiving sugammadex is presented, which adds to the small body of evidence regarding this topic.

1AP2-7

Cardiac tamponade after intrapericardial infusion of total parenteral nutrition

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Background: Central venous catheterization is a very common technique, although its complications can be multiple and sometimes fatal.
We present a case of cardiac tamponade(CT) after intrapericardial infusion of total parenteral nutrition (TPN), in a patient who had a central venous catheter (CVC).
Case report: 12 years-old-male. 12 days after central venous catheterization of right internal jugular vein, he suffered sudden loss of consciousness with subsequent drowsiness, distal malperfusion, jugular venous distention, tachypnea,tachycardia and severe hypotension, refractory to volume expansion.
Diagnostic transthoracic echocardiography was performed: we found a severe pericardial effusion(35mm). CVC was sealed. Right femoral vein was cannulated. Hemodynamic bad situation persisted despite of volumetric expansion, so orotracheal intubation was decided, and pericardial puncture was performed with an 18G needle, taking out 200cc of white liquid, compatible with NPT. He presented a progressive hemodynamic improvement, without requiring vasoactive drugs.
Then, he was moved to the operating room: under sedoanalgesia effects and connected to mechanical ventilation, he remained stable throughout the surgical process [Pericardial window: 400cc of white fluid. CVC wasn´t in the pericardial cavity and it was removed. Observation for 15minutes: no bleeding into the pericardial cavity].
At the end, he was moved to ICU without incidents, and extubated 4hours after surgery. Pericardial drain was removed after 48hours with a total drainage of 150ml.
Discussion: CT is a rare mechanical complication of CVC associated with a very high mortality
CT can present within minutes to days after central venous catheterization
Early recognition and treatment of CT is essential if mortality is to be avoided
Reference: Shamir MY, Bruce LJ. Central venous catheter-induced cardiac tamponade: a preventable complication. Anesth Analg 2011Jun; 112(6):1280-2
Learning Points:
CT caused by CVC is a catastrophic complication that can be easily prevented by chest x-ray, to confirm the correct position of the CVC tip.
A sudden and unexpected deterioration in a patient receiving TPN through a CVC should arouse suspicion of CT.
Immediate diagnosis and treatment is mandatory.
The best diagnostic test is echocardiographic confirmation.
It's necessary to perform emergency pericardiocentesis, and if it fails, emergency surgery.
Supportive treatment should be based on volumetric resuscitation through another CVC.

1AP2-8

Could the combination of intravenous ketamine and lidocaine be an alternative to fentanyl for allergic patients to opioids? About one case

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Background: Anaesthetic management of patients with documented allergy to opioids is difficulted when regional techniques can´t be performed[1], because of the risk of anaphylaxis and crossed reactions[2]. We describe a case of allergy to opioids, managed intraoperatively using a combination of intravenous lidocaine and ketamine.
Description of the Case: A 39-year old ASA I patient with a recent history of allergy to codein (positive prick test to codein), but not tested for other opioids, was scheduled for a laparoscopic cholecystectomy. The allergologist counter-indicated the use of codein and derivated opioids. The intervention was decided to be performed without opioids, but the patient refused the realization of an adjuvant central nervous block.
General anesthesia was so induced using 4% expired fraction of sevoflurane plus 3mg/kg/h IV propofol, associated with a 0,3 mg/kg IV bolus of ketamine and 0,5 mg/kg of atracurium before tracheal intubation. The anesthesia was maintained with 3,5% expired fraction of sevoflurane plus 3mg/kg/h propofol infusion, and an infusion of 1mg/kg lidocaine over 1h, with good haemodynamic tolerance. 1g of iv paracetamol, 30mg of iv ketorolac, 2g of iv metamizol and 4mg of iv dexamethasone were administered 30 min before the end of the procedure. The surgical ports were then infiltrated with 10mL of 0,25% bupivacaine, general anaesthesia was reversed, and the tracheal tube was withdrawn with no complications and a good control of early postoperative pain. Pain scores in the PACU between 2 and 4/10 allowed the patient to be discharged to the ward after 1h, and from the hospital on day 3 with good levels of analgesia.
Discussion and conclusion: Allergy to opioids accounts for a very little number of cases of drug allergies. When these patients present for sugery, regional anaesthesia is generally preferred. In the present case, combined central block and general anaesthesia was considered, but given the refusal of the patient for regional block, this alternative was proposed successfuly. To our knowledge, this case report is the first description of systemic treatment with the combination of lidocaine and ketamine for intra-operative pain treatment.
References:
1. Rev Esp Anestesiol Reanim. 2009 Jan;56(1):53-4
2. Anaesth Intensive Care 2012; 40: 216-235
Learning Points:
Avoiding opioids for general anaesthesia is possible and safe.
Combining Ketamine and lidocaine seems an acceptable solution.

1AP2-9

Domino pediatric liver transplant: playing the game

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Background: The lack of organ donors has stimulated the development of many technical innovations. The concept of sequential organ transplant or dominoes began in 1990 with the possibility to cure various errors of metabolism with liver transplantation, including the leucinosis. The organ receiver becomes a domino potential donor, once his liver is still functioning and has little structure change, being able to be used as a bridge to more serious cases.
Case report: The domino transplant started by the donor, male, 25 years old, ASA I underwent general anesthesia associated with epidural, central venous catheter, invasive blood pressure and minimally invasive cardiac output monitoring. A left hepatectomy with total duration of 7 hours of anesthesia and surgical procedure. The domino donor was a female patient, 3 years and 2 months, ASA II, with leucinosis, mental retardation and gastrostomy. The domino donor received general anesthesia, central venous catheter, invasive blood pressure and minimally invasive cardiac output; the procedure initiated 15 minutes after the start of the anesthesia of the healthy donor, and the surgical steps were harmonized between the two surgeries. After 6 hours of the anesthesia onset of the healthy donor, the domino receiver anesthesia started: a children, 1 year, ASA III, with cirrhosis caused by biliary atresia, ascites and jaundice. The children received general anesthesia, central venous line and invasive blood pressure with minimally invasive cardiac output. Total duration of the procedures was 11 hours, without complications. For each patient an anesthesiologist and an anesthesia resident were responsible for the procedure.
Discussion: The excellent clinical outcomes with domino liver transplant established this technique as an innovation for supply of livers. In the case of leucinosis, the patient has a disease that can be cured with the liver transplant. The recipient patient keep the loss functions in extra hepatic tissues, so the liver will be fully functional for a long time. The success of the procedure depends on the expertise of the team involved in a harmonious and synchronized work between anesthetic and surgical team, which is made possible with mutual respect and always prioritizing patient safety.
Reference: Ericzon BG, Larsson M, Wilczek HE. Domino liver transplantation: risks and benefits. Transplantation proceedings 2008;40:1130-1.

1AP2-10

Life-threatening subcutaneous emphysema due to laparoscopy

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Background: Laparoscopy may involve life threatening conditions such as subcutaneous emphysema, which could lead to pneumothorax or pneumomediastinum. It might be suspected by increased Co2 production or by hemodynamic instability.We present a case of a patient who underwent laparoscopy hemicolectomy and developed subcutaneous emphysema leading to a 400% increase of Co2 elimination, respiratory acidosis and hemodynamic instability as the first sign of alarm. Risks, diagnosis and anaesthetic considerations in relation to subcutaneous emphysema are discussed.
Case report: A 50 year old patient underwent laparoscopic hemicolectomy. He was classified as ASA I and was a habitual marihuana user. Sixty minutes after Co2 insufflation, Blood Pressure (BP), Heart Rate (HR) and Cardiac Index (CI) increased reading BP of 200/110, HR 105 bpm and CI 4,8. Superficial hypnosis and pain were ruled out. Compliance, plateau and peak pressures remained unchanged, so, pneumothorax and airway obstruction were ruled out as the ventilator did not show either a resistive or an elastic problem.A MVCO2 (CO2 production) of 1205 ml/min was noticed and Et Co2 (end-tidal carbon dioxide) had increased from 40 to 62 mmHg. Minute ventilation was increased and subcutaneous emphysema was noticed.A subcutaneous leak from one of the four trocars was seen, therefore, pneumoperitoneum was deflated and all the parameters returned to baseline levels. A difficult airway situation was planned at the end of the surgery and the patient was extubated after a cuff leak test with an airway exchange catheter placed.
Discussion: Subcutaneous emphysema is related to some conditions as extraperitoneal dissections. Some anaesthesia machines can measure MVCo2, being useful to detect increases in Co2 production. It is advisable to palpate the patient if this condition occurs.Hypercapnia stimulates the sympathetic nervous system, thus, BP and HR increase. It also sensitizes the myocardium to catecholamines, predisposing to cardiac arrhythmias. Pneumoperitoneum removed and airway assessment is crucial. A direct laryngoscopy, cuff leak test, airway exchange device and postponing tracheal extubation should be considered.
Conclusions: When subcutaneous emphysema is noticed, the Anaesthesiologist has to consider a physiologic setting of the ventilator.
Airway management and hemodynamic stabilization have an important role in this situation.

1AP2-11

Operative hysteroscopic intravascular absorption syndrome: are we prepared?

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Background: Hysteroscopic procedures are a well-established method in minimally invasive gynecologic surgery. Anesthesiologists routinely recognize hydro-electrolyte disorders during transurethral resection of the prostate (TURP), but it's now established that operative hysteroscopy has the same potential for these serious pathophysiologic changes[1]. However, the classic intravascular absorption syndrome itself is rare.
Case report: A 28-year-old woman with intracavitary myomas underwent an elective hysteroscopy. The procedure was performed under balanced general anesthesia and isotonic sodium chloride 0,9% was used as a distending media. One hour after the procedure had started, SpO_2 abruptly declined to 90%, $ETCO_2$ decreased to 18 mmHg and facial swelling was evident. Inhaled bronchodilators and corticosteroids were administered and positive pressure ventilation was applied, stabilizing SpO_2 at 97% and $EtCO_2$ at 30 mmHg. It was decided to awake and transfer the patient to the recovery room, where desaturation (SpO_2 85%), breathing impairment, facial edema and agitation were detected. Venturi Mask (FiO_2 60%) was placed and furosemide, clemastine and hydrocortisone were administered. Arterial blood sample revealed hyperchloraemic acidosis with hyperlactacidemia and thoracic x-ray was suggestive of pulmonary oedema. Two hours after the episode, her mental was alert and her vital signs were stable with a urine output of 2,5 l/h. Clinical course was favorable and she was discharged after 6 days.
Discussion: Operative Hysteroscopic Intravascular Absorption Syndrome has a similar pathogenesis as TURP syndrome. Isotonic electrolyte-containing distending media were introduced into practice to limit the risk induced by hyponatremia. However, the risk of excessive fluid absorption is still present, as well as the occurrence of severe hyperchloremic metabolic acidosis[1,2]. General anesthesia could mask signs of fluid intoxication, namely, an altered level of consciousness.
References:
1. Wegmüller B, *et al.* A. Life-Threatening Laryngeal Edema and Hyponatremia during Hysteroscopy. *Crit Care Res Pract* 2011.
2. Schäfer M, *et al*. Isotonic Fluid Absorption during Hysteroscopy Resulting in Severe Hyperchloremic Acidosis. *Anesthesiology*. 2005 Jul; 103(1):203-4.
Learning Points: Close clinical observation and good communication between the surgical team are extremely important and an exact determination of the fluid balance is mandatory.

1AP2-12

Thrombosis within bare metal stent after revision knee replacement in a patient 5 weeks after percutaneous coronary intervention: a case report

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Background: Perioperative stent thrombosis is a life-threatening complication for patients undergo noncardiac surgery early after stent implantation with either bare-metal or drug-eluting stents. We present a case of fetal thrombosis in the implanted bare metal stent after revision knee replacement.
Case report: A 71-year-old woman with bare metal stents, which were implanted five weeks and 2 days before the operation, scheduled for revision knee replacement. Aspirin and clopidogrel were administered until one week before the operation and then aspirin alone was continued until the day of surgery. Even though the surgery was completed without any intraoperative cardiac events, she complained of acute chest pain and her systolic blood pressure was suddenly dropped to 40 mmHg 20 minutes after the operation. Urgent coronary angiography showed total occlusion of LAD, near total occlusion of LCX, of which the blood flow was successfully recovered by kissing ballooning. Despite of the PCI and medical treatment such as aspirin and inotropes, she was expired due to persistent cardiogenic and hypovolemic shock.
Discussion: *According to guidelines,* elective noncardiac surgery is not recommended within 4 to 6 weeks of bare-metal coronary stent implantation in patients in whom aspirin and clopidogrel therapy will need to be discontinued perioperatively [1]. Wilson et al. suggested that non-cardiac surgery should be delayed six weeks after stent placement, by which time stents are generally endothelialized, and a course of antiplatelet therapy to prevent stent thrombosis has been completed [2]. Furthermore, in patients undergoing early surgery, discontinuation of antiplatelet therapy may be major cause of the cardiac events [3, 4]. In Korea, many patients underwent many noncardiac surgeries at least 4 weeks with aspirin therapy or heparin bridging therapy after bare metal stent implantation.
References:
1. Circulation 2009; 120: e169-276.
2. Journal of the American College of Cardiology 2003; 42: 234-40.
3. Journal of the American College of Cardiology 2007; 49: 122-4.
4. Journal of the American College of Cardiology 2000; 35: 1288-94.
Learning Points: *We cautiously suggest that 5 weeks* antiplatelet therapy is not sufficient to prevent the formation of stent thrombosis and anesthesiologists should consider the timing of the operation, and continue administration of antiplatelet therapy until more evidence is available.

1AP3-1

Analysis of the level of consciousness with sample entropy: a comparative study with bispectral index

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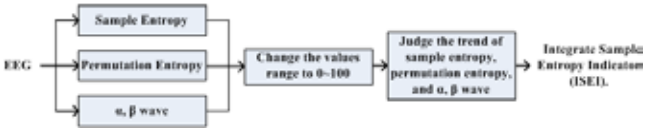
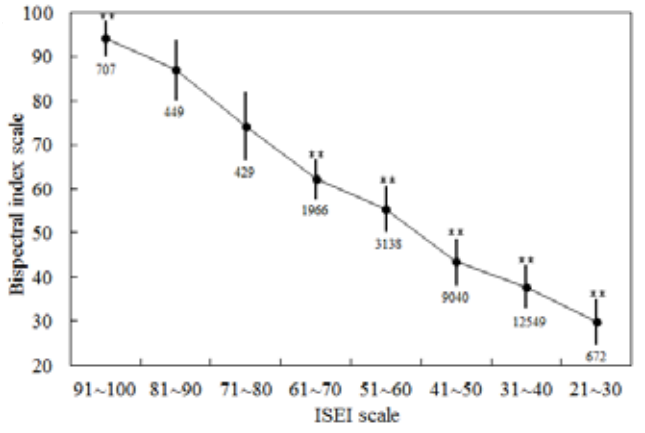
The level of consciousness calculated by analyzing electroencephalograph (EEG) signals with sample entropy, permutation entropy, and α, β waves in comparison with bispectral index monitoring. The flow chart of integrate sample entropy indicator (ISEI) is shown in Figure 1.



[The flow chart of ISEI]



[ISEI and BIS values as measured in 20 patients]

The Figure 2 shows that the level of consciousness by the ISEI is similar to the value of BIS. The double star (**) indicates that BIS values of an individual ISEI values are significantly different with P< 0.01 when compared to the BIS values. The compared results of ISEI and BIS are shown in Table 1.

n	BIS	ISEI [n(%)]						
		91~100	81~90	71~80	61~70	51~60	41~50	0~40
780	91~100	613(78.6)	164(21)	2(0.3)	1(0.1)	0	0	0
417	81~90	87(20.9)	220(52.8)	107(25.7)	1(0.2)	1(0.2)	1(0.2)	0
404	71~80	5(1.2)	55(13.6)	193(47.8)	136(33.7)	6(1.5)	9(2.2)	0
1766	61~70	2(0.1)	6(0.3)	126(7.1)	1214(68.7)	370(21)	46(2.6)	2(0.1)
3632	51~60	0	2(0.06)	1(0.02)	598(16.5)	2208(60.8)	794(21.9)	29(0.82)
10694	41~50	0	0	0	15(0.1)	539(5)	5869(54.9)	4271(40)
11253	0~40	0	0	0	1(0.01)	14(0.1)	2321(24.4)	8917(75.5)

[The compared results of ISEI and BIS]

When BIS values were measured between 0 and 100, 50% of all datum indicated between 0 and 100 by the ISEI approximately.
BIS is the most popular index of the patient monitor field. To compare with BIS has important meanings for proving the validity of ISEI scale.

1AP3-2

Bispectral index and explicit memory: analysis of 8,150 cases

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Background and Goal of Study: The bispectral index (BIS) measures the depth of anesthesia based on electroencephalographic (EEG) data. The occurrence of explicit memory during general anesthesia at BIS values under 60 is highly unlikely. The objective of the study was to evaluate the incidence of explicit memory during different types of BIS-monitored surgical procedures.
Materials and Methods: Data on a variety of elective surgical procedures in adults covering the period August 1996–November 2009 were retrieved from an anesthesiology service database and analyzed retrospectively with regard to postoperative occurrence of explicit memory. Five items of information were collected:
1) the last remembrance before anesthesia,
2) the first remembrance upon emergence,
3) remembrance of events between these two moments,
4) dreaming between these two moments, and
5) the most unpleasant remembrance of the procedure.
BIS was maintained in the range 40-60 during all procedures.
Results and Discussion: The sample consisted of 8,150 patients, of whom 5,450 were female (age: 18- 70 years) and 2,700 were male (age: 18-69 years). Ten patients (0.12%) (7 females) reported having dreams during surgery. No patient reported explicit memory.
Conclusion(s): The occurrence of dreams during general anesthesia may be due to inadequate depth of anesthesia, despite the absence of explicit memory. On the other hand, dreaming is more common during emergence from anesthesia. Without monitoring of CNS activity, the incidence of intraoperative dreaming and explicit memory is 3-8% and 0.1-0.2%, respectively.
References: Mashour GW. Consciousness, awareness, and anesthesia, 1st edition, New York, Cambridge University Press, 2010;74-89.

1AP3-3

Correlation between cerebral state index (CSI), depth of anesthesia and Ramsey score during plastic surgery

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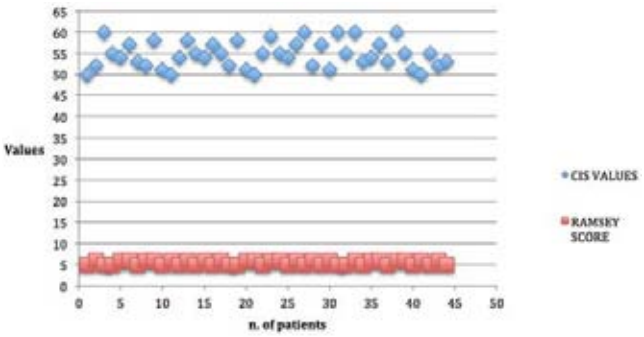
Background: The purpose of this study was to evaluate the correlation between cerebral state index (CSI) and Ramsey score in determining the level of sedation in patients undergoing minor plastic surgery (1).
Materials and Methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 44 patients, aged between 22 and 63 years, ASA I - II, undergoing minor ENT and plastic surgery were treated. The anesthetic management, after the execution of regional anesthesia with levobupivacaine 0.5% was conducted with midazolam 0.01-0.02 mg/kg i.v. following to a bolus injection of propofol 1-1.5 mg/kg, up to a level of Ramsey Sedation score of 5-6 and a CIS value between 60 and 50. During the procedure were administered additional doses of 4-6 mg propofol to maintain the level of sedation. The respiratory assistance was performed with a facial mask, by administering a mixture of air/O_2 (50%). The mean duration of surgical procedures was 68 ± 4.4 min. Additional drugs, side effects, the answer to surgical stimulation and the time of awakening were all recorded. The level of sedation was based on Ramsey Score with the values detected by continuous monitoring of the CIS.
Results: The mean CSI value detected 2 min after induction was 57 ± 4. At the maximum surgical stimulation CSI showed an increase of mean value of 60 ± 2. A significant correlation was observed between CSI values and Ramsey Score 5-6 ($p<0.001$). For values of Ramsey score of 2-3 was not observed correlation with CSI values ($p = 0.3$) (Fig.1)
Discussion: Monitoring the state of consciousness is important to avoid excessive or inadequate sedation. The significant correlation between the as-

sessment objective state of sedation using the CSI and the evaluation performed with the Ramsey Score allows an optimal adaptation of sedation.
Conclusions: The CSI technology, provides a simple way to monitoring the level of sedation especially during day surgery in which it is often difficult define the optimal level of sedation.
References: 1. Nishiyama T. Cerebral state index vs bispectral index during sevoflurane-nitrous oxide anaesthesia. Eur J Anesthesiol 2009; 26:638-42.



[Figure 1. CIS values and Ramsey score observed during the study]

1AP3-4

Explicit and implicit memory in BIS-monitored anesthesia with neuromuscular blockade

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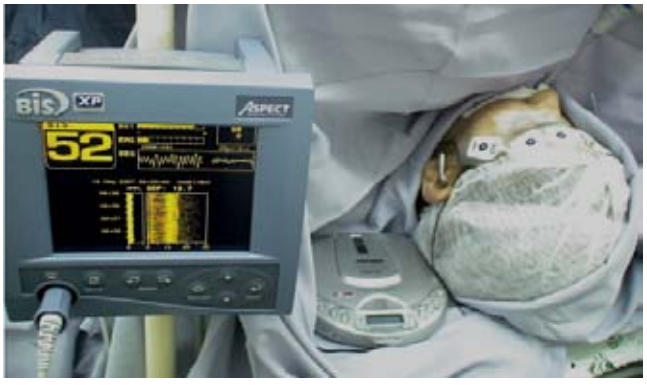
Background and Goal of Study: Recent advances in CNS monitoring have improved control of adequacy of anesthesia by way of non-linear biological (electroencephalographic) signals. However, neuromuscular blocking agents (NBA) can interfere with the interpretation of these signals, resulting in perioperative awareness and memory. The objective of the study was to evaluate the occurrence of explicit and implicit memory in BIS-monitored anesthesia with neuromuscular blockade.
Materials and Methods: The sample consisted of 1,200 patients aged 18-60 years, ASA I and II, submitted to general anesthesia. Exclusion criteria: hearing and/or neuropsychiatric disorders, and duration of surgery under 30 min. Patients in Group 1 (n=600) received non-depolarizing NBA (rocuronium), with T1=0 throughout the surgery; in Group 2 no NBA was administered.
The groups were subdivided according to BIS range: BIS 31-40 (G1a / G2a), BIS 41-50 (G1b / G2b) and BIS 51-60 (G1c / G2c), with 200 subjects in each subgroup.



[BIS]

All patients wore headphones calibrated with a sound level meter in which the Brazilian national anthem was played with intermittent explicit commands for non-verbal response requesting the patient to touch his/her ear as many times as possible during a standardized 5-min postoperative interview with the anesthesiologist conducted 24-36 hours later. Responding to the command was interpreted as implicit memory.
Standard anesthesia was used: remifentanil (Minto model) and sevoflurane adjusted to maintain the desired BIS levels, and rocuronium in G1, with monitoring of neuromuscular blockade.
Results and Discussion: Patients in G1c were the only to have implicit (88.5%) and explicit (2%) memory.
Conclusion(s): The use of NBA directly impacts standardized BIS values in the range 51-60 (G1c) and is potentially harmful to patients due to the possibility of intraoperative memory. Thus, in the presence of deep neuromuscular blockade, BIS values should not exceed 50.
References: Echevarría M, Caba F, Rodrígez J et al. Memoria explícita e implícita durante anestesia inhalatoria e intravenosa. Rev Esp Anestesiol Reanim, 1998;45:220-225.

1AP3-5

Response entropy and explicit memory: analysis of 2,225 cases

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Background and Goal of Study: Derived from the electromyographic activity of the facial muscles and cortical electrical activity, respectively, response entropy (RE) and state entropy (SE) are used to measure the adequacy of anesthesia. The purpose of the study was to evaluate the incidence of explicit memory during different types of RE-monitored surgical procedures.
Materials and Methods: Data on a variety of elective surgical procedures in adults covering the period March 2003–August 2009 were retrieved from an anesthesiology service database and analyzed retrospectively with regard to postoperative occurrence of explicit memory. Five items of information were collected:
1) the last remembrance before anesthesia,
2) the first remembrance upon emergence,
3) remembrance of events between these two moments,
4) dreaming between these two moments, and
5) the most unpleasant remembrance of the procedure.
RE was maintained in the range 40-60 during all procedures. No pre-anesthetic medication was used.
Results and Discussion: The sample consisted of 2,225 patients, of whom 1,700 were female (age: 18-78 years) and 525 were male (age: 18-75 years). No patient reported explicit memory or having dreams during the procedure.
Conclusion(s): The occurrence of dreams during general anesthesia may be due to inadequate depth of anesthesia, despite the absence of explicit memory. The experience is better described as an altered state of consciousness characterized by previously experienced thoughts, facts or images. Without monitoring of CNS activity, the incidence of intraoperative dreaming and explicit memory is 3-8% and 0.1-0.2%, respectively.
References: Mashour GW. Consciousness, awareness, and anesthesia, 1st edition, New York, Cambridge University Press, 2010;74-89

1AP3-6

The bispectral index (BIS) may have a clinically significant processing time delay that may be independent of the smoothing rate (SR)

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Background and Goal of Study: Delay in the BIS processing time is a matter of concern. Although the manufacturer claims a delay of only 5 to 10s[1], studies suggested longer delays[2,3] but were criticized for feeding recorded EEG to a computer and not using the clinical setting.In the present study we used a simpler approach, to investigate the existence of a time delay in BIS processing and its relation to the SR.
Materials and Methods: Forty consecutive cases where general anesthesia was monitored with a BIS VISTA had the monitor set to a SR of 10, 15 or 30s. After the end of the case, instead of removing the BIS sensor,a scissors was used to cut the sensor at a point one cm distal to the connection be-

tween the sensor and the cable. The BIS monitor was carefully observed and a chronometer was used to identify the precise moment a BIS value was no longer displayed on the screen. Total time of BIS monitoring per case and BIS value before the BIS was cut were noted. Data are presented as mean±SD. Statistics used ANOVA, Student's t test and linear regression.Significancy was for P< 0,05.

Results and Discussion: Of the 40 cases studied,the SR was 10s in 13, 15s in 14 and 30s in 13. In all cases the EEG signal was immediately lost,the message "press electrode 1" was shown but a BIS value remained displayed.BIS at the moment of sensor cutting was 82,2±9 and total monitoring time was 3h43min±2:40. Average time with a BIS value displayed on the monitor after cutting the sensor was 49,1±10s. There were no statistical differences in time displaying BIS between different SR:for the 10s SR it was 50.2±6, for the 15s SR it was 52.1±14 and for the 30s SR it was 45,4±7. Time with BIS displayed after cutting the sensor was inversely correlated with the value of BIS before cutting the sensor but had no correlation with duration of monitoring.

Conclusion: By cutting the BIS sensor, the monitor does not seem to recognize immediately that there is no EEG signal and appears to be processing the BIS index. Our results may be another indication that the delay in BIS processing may be much higher than stated by the manufacturer. Our suggested average delay of 49s is shorter than the delays previously reported, but it is still clinically significant. The finding that the possible delay might be independent of the SR is a novelty that deserves further investigation.

References:

1. Using the Bispectral Index During Anesthesia. A Pocket Guide for Clinicians.
2. Br J Anaesth 2009: 394-9.3.Anesthesiology. 2006:488-94

1AP3-7

Use of dexmedetomidine for supraventricular tachycardia reversion in the inmediate postoperaty recovery

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Background: Dexmedetomidine (Dex) is a potent and selective alpha-2 adrenergic agonist which gives important sympatholytic and vagotonic effect in addition to its known and particularly sedative effect

Case report: Male 52 years old, ASA I patient undergoing laparoscopic radical nephrectomy. Non intraoperative incidents. After extubation, the patient was moved to the recovery room for postoperative control where arrived Haemodynamically stable(Heart Rate (HR) 86 bpm, Blood Pressure (BP) 126/74 mmHg) and eupneic ($SatO_2$ 97% with nasal glasses O_2 3lpm). After 15 min, in the context of an onset of anxiety, we monitored supraventricular tachycardia (SVT) at 168 bpm and BP 168/75 mmHg. After initial assessment it was decided to administer Dex in 2 consecutive bolus of 0.5 mcg/kg in 10 min followed by an infusion at 0.7 mcg/kg/h presenting a reversion within minutes. After 30 min, infusion was discontinued, the patient presented a Ramsay sedation level 2, haemodynamically stable (HR 80 bpm and BP 127/63 mmHg) and eupneic ($SatO_2$ 98 %, O_2 3lx). Four hours after ending Dex infusión, the patient was discharged to a regular ward and did not repeat any new episode of SVT.

Discussion: There are numerous references on the beneficial effect of Dex as sedation in agitated and anxious patients in Recovery room/ICU. There are publications about the antiarrhythmic effect of Dex and potential indication to reverse SVT episodes, although the majority of them refer to paediatric patients. In our case we used a single drug to solve two problems: anxiety and SVT in an adult patient. The use of conventional sedative farmacs mid by GABA, avoided the respiratory depression. In addition, other anti-arrhythmic farmacs, as adenosine or calcium antagonists diltiazem/verpamil, currently used for the treatment of SVT, have significant adverse effects such as hypotension, maintained bradycardia, asystole, ventricular dysfunction and even cardiovascular collapse especially in newborns

Learning points: Dexmedetomidine, a selective α2-adrenergic, is an excellent sedative anti-arrhythmic with promising potential. Recent studies could benefit from a more favorable therapeutic profile, with greater efficacy and fewer side effects than other drugs used for treatment and prevention of acute tachyarrhythmias. In our case, the use of dex allowed to use two effects together to address both clinical symptoms without any adverse effects.

1AP3-9

Effect of dexmedetomidine on fentanyl induced cough, preliminary results

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Background and Goal of Study: In the recent years it was noted that opioids, which are generally known to be antitussive sometimes produce cough. This condition especially occurs during anesthesia induction and in some instances (increased intracranial, intraocular and intraabdominal pressures) can harm the patient. Many solutions have been proposed to this condition of undefined origin. We investigated the effect of dexmedetomidine on the cough produced by fentanyl.

Materials and Methods: The study was performed on 40 patients of ASA physical status I-II, which were scheduled for any elective surgery. Patients with Chronic Obstructive Pulmonary Disease, cigarette smokers, those with Upper Respiratory Tract Infection history in the last two weeks and patients using ACE inhibitors were not included. Patients were randomly divided into two groups; control group Group P (n = 20) and dexmedetomidine group Group D (n = 20). These groups were treated by iv normal saline and dexmedetomidine respectively. After 10 minutes both groups were treated by fentanyl (2.5 $\mu g\ kg^{-1}$ in 2 seconds). The numbers of coughs after the injection of fentanyl were recorded for 1 minute. The frequencies of cough were compared using the chi-square test or Fisher's exact test with Bonferroni correction. A probability (P) value < 0.05 was considered statistically significant.

Results and Discussion: Six (30%) out of 20 patients in the control group experienced cough. On the other hand, 2 (10%) out of 20 patients coughed in the dexmedetomidine group. We have shown decrease in clinically observed cough incidence in dexmedetomidine pretreated group, but this was statistically insignificant (P = 0.235).

Conclusion: Pre-treatment with iv 1 $\mu g\ kg^{-1}$ dexmedetomidine may suppress the fentanyl induced cough during general anesthesia induction, but more clinical trials are needed to evaluate its effect.

1AP4-1

A study that compared the trending abilities during abdominal surgery of Doppler and BioReactance cardiac output monitoring

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Background and Goal of Study: Trending by cardiac output (CO) monitors can be shown clinically by comparing serial changes (ΔCO). In clinical anaesthesia CO can be monitored using Doppler methods, suprasternal (USCOM, Australia) or oesophageal (CardioQ, England), and BioReactance (NICOM, Israel). Whereas Doppler systems can track changes in flow reliably, it is not known whether changes in electrical flux pathways caused by upper abdominal surgery effects BioReactance. The goal was to compare Doppler and BioReactance CO readings during different types of surgery.

Materials and Methods: Data from anaesthetized patients, aged 58(32-78) years, were collected:
(a) controls - lower abdominal or peripheral surgery (n=9);
(b) laparoscopy with abdominal insufflation (n=6);
(c) open upper abdominal surgery with large multi-blade retractor placement (n=6) and
(d) head-down robotic surgery (n=6).
Simultaneous NICOM and Doppler (i.e. USCOM with CardioQ) readings were taken at 15-30 minute intervals. Within subject correlation (i.e. R^2) and across study concordance analysis using the 4 quadrants plot was performed with exclusion zone of 0.5 $L.min^{-1}.m^{-2}$. CO was indexed to BSA.

Results and Discussion: 390 sets of NICOM comparisons were collected. Duration of surgeries were 4 (1½ to 11) hours with 7 to 22 sets of reading per case. Mean (s.d.) cardiac index from USCOM readings was 3.5(1.0) $L.min^{-1}.m^{-2}$. Within subject correlations between CardioQ and USCOM showed good trending R^2=0.87 (range: 0.60 to 0.97). Control group NICOM-USCOM

also showed good trending R^2=0.89 (0.69 to 0.97). Trending was poor in the surgical intervention groups, R^2=0.43 (0.03 to 0.71) (p< 0.001). Where >92% was set for good and reliable trending, concordance rate between NICOM and Doppler (USCOM) (i.e. all patients) was 82% from 101/359 data pairs (unreliable trending) and between CardioQ and USCOM was 95% from 72/248 pairs (reliable). Concordance rate between NICOM and USCOM in control group patents was 95% from 34/103 pairs compared to 76% from 67/256 pairs in intervention group patients. Whereas the two Doppler methods tracked each other's CO readings reliably, there was clear evidence that during upper abdominal interventional surgery the NICOM did not track changes reliably. But control group data suggested that NICOM did track changes reliably at other times.

Conclusion: The NICOM needs to be used with caution during upper abdominal open surgery and laparoscopy.

1AP4-2

Comparing invasive blood pressure measurements with both classic intermittent and novel continuous, non-invasive measurements in patients undergoing cardiac surgery

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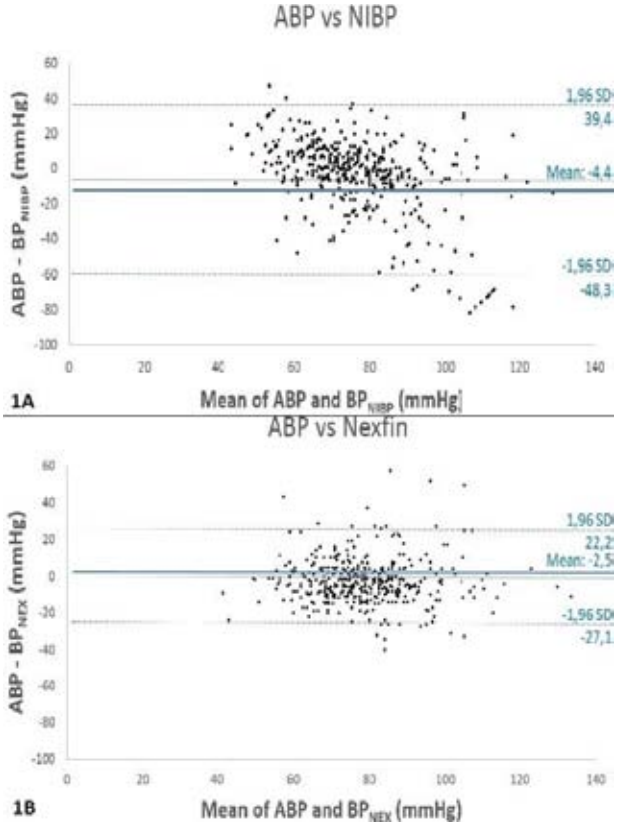
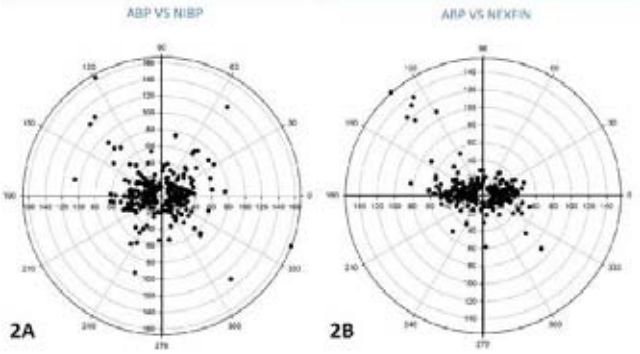
Background and Goal of Study: Measuring blood pressure (BP) invasively via an arterial catheter (ABP) is widely used but may cause complications [1]. Classic non-invasive measurement by arm cuff (NIBP) measures BP intermittently (BP_{NIBP}), presenting a major shortcoming, but with minor risk of complications. Novel non-invasive BP measurements (e.g. Nexfin™) (BP_{NEX}) are continuous and show little risk of complications. We recently showed promising results comparing BP_{NEX} with ABP in haemodynamic stable patients [2]. This study compares BP_{NEX} and BP_{NIBP} with ABP in unstable haemodynamic conditions during cardiac surgery.

Materials and Methods: This prospective, observational single center study includes seventy patients undergoing off-pump coronary artery bypass surgery. Measurements were obtained intermittently (BP_{NIBP}) and continuously (ABP, BP_{NEX}) and analyzed in 30 minute intervals. Bland-Altman and polar plot methodology were used to compare accuracy, precision and trending ability.



[Figure 1A and 1B: Bland-Altman]

Results and Discussion: Agreement analysis of BP_{NIBP} (Fig. 1A) and BP_{NEX} (Fig.1B) versus ABP showed a bias of respectively -4 and -2 mmHg and 95% limits of agreement (LoA) of ± 22 and 12 mmHg. This results in a percentage error of 118%^{error} for the BP_{NIBP} and 64%^{error} for the BP_{NEX}. Trending ability analysis with an exclusion zone of 8 mmHg showed a percentage within LoA of 47% for the BP_{NIBP} (Fig. 2A) and 68% for the BP_{NEX} (Fig. 2B).



[Figure 2A and 2B: Polar plot]

Conclusion(s): In contrast to BP_{NIBP}, BP_{NEX} shows a promising agreement with ABP in patients undergoing surgery involving haemodynamic instability, yet it is not interchangeable.

References:

1. Scheer et al, *Critical Care* 2002; 6: 199-204
2. Vos et al, 2014; 113: 67-74

1AP4-3

Does vassopresor in the anhepatic phase influence hepatic artery resistive index in pacients with liver transplantation?

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Background and Goal of Study: Detection and treatment of hepatic arterial complications is considered one of the most important factors affecting graft survival in the immediate post-transplantation period. However, recent studies show that IR are modified by the administration of a vasodilatator or vasoconstrictor stimuli, resulting from reciprocal portal vein and hepatic artery flow relationship.[1]

The goal of this study was to investigate the intraoperative factors that influence IR in the early postoperative period.

Materials and Methods: This retrospective observational study included 65 pacients with liver transplantation. Exclusion criteria: pacients with retransplantation and intraoperative death. During surgery intraoperative bleeding, transfusion of blood derivates, concentrated coagulation factors and anhepatic phase lengh were noted. Most of this pacients required vasopressor medication in intraoperative time. Doppler ultrasonography was performed intraoperative and in postoperative days (POD) 1,2,3,4,5. An interval of 0,6-0,7 was considered normal for resistive index .Statistical analize was performed in SPSS var. 19.0 using Mann-Whitney test for quantitative variables with p< 0,05 statistically significant.

Results and Discussion: This study included 31 men (47,68%) si 34 women. Mean age (±SD) was 48,5 (±14,54) years. Mean MELD (±SD) and MELDNa (±SD) scores were 16,53 (±6,61) and 19,06 (±6,72). IR did not correlate with intraoperative bleeding (p=0,768 POD 3, p=0,481 POD 5), transfusional requirements(p=0,182 POD 3, p=0,337 POD 5) and concentrated coagulation factors administrated (p=0,607 POD 3, p=0,979 POD 5). A good correlation was found between anhepatic phase duration and IR in POD 5 (p=0,022). A significant correlation was also found between noradrenaline dose in neohepatic phase and IR in POD 3 (p=0,025), and POD 5 (p=0,01).

Conclusion: IR early after transplantation was influenced by noradrenaline dose in neohepatic phase and by duration of anhepatic phase. Adequate preloade before liver removal could help reduce vassopresor requirements in the anhepatic and neohepatic phase and may reduce postoperative vascular arterial complication.

References:

1. M Anders, D Alvarez, E Quiñonez, et al ISRN Transplantation, vol. 2014, Article ID 757910, 5 pages, 2014. doi:10.1155/2014/757910

1AP4-4

Hemodynamic changes during general anesthesia in prone position

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Background and Goal of Study: Prone position leads to several physiologic changes in healthy people and patients under anesthesia. When predicted and appropriately corrected they are not followed by complications. This preliminary study aims to evaluate hemodynamic changes in prone position under general anesthesia.
Materials and Methods: We examined 22 ASA I-II patients who were elected for spine surgery in prone position under general anesthesia and 10 healthy volunteers. All patients were intubated in supine position (fentanyl 100 μg, propofol 1,5 mg/kg, rocuronium 0,5 mg/kg) and 5 minutes later were turned into prone position. Hemodynamics was assessed in supine position and 5 minutes after turning into prone position. For examination we used echocardiographic method with apical 4 chamber view: left ventricular end-systolic and left ventricular end-diastolic volumes (LVESV and LVEDV) were measured and ejection fraction (EF) was calculated with Simpson rule; mean arterial pressure was measured non-invasively.
Results and Discussion: In healthy volunteers turning to prone position did not lead to statistically significant changes in LVEDV, LVESV and EF. We found that in anaesthetized patients changing the position was accompanied by 18% decreasing of LVEDF, 24,1% decreasing in LVESV ($p < 0,05$) and 15,5% increasing of EF. No significant difference in mean arterial pressure was found in both volunteers and anesthetized patients. No inotropic drugs were used.
Conclusion(s): Unlike non-anesthetized people, patients under general propofol/fentanyl anesthesia have significant changes in hemodynamics after turning to prone position. Further investigations should be performed to estimate how these changes influence on outcome and number of complications.

1AP4-5

Intravenous fluid flow monitor

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Background and Goal of Study: The reported intra-operative incidence of undetected dry intravenous (IV) fluid bag was 29.6%[1]. This may be problematic when the IV line is being used as a carrier fluid for the administration of total intravenous anesthesia (TIVA) or vasopressors. Recently, a new IV fluid flow monitor, the Fluid IV Alert (FIVA™, EnginuityMed, Halifax, Canada), has been developed. FIVA is a small, battery-powered device that attaches to the IV reservoir of a gravity-fed delivery system. It has a sensor that detects the refractional change of light passing through fluid and air in the IV fluid reservoir and will stop fluid flow as well as activating an audible and a visual alarm when the IV bag is empty. The goal of this study was to evaluate the efficacy of the FIVA in detecting empty IV fluid bag.
Materials and Methods: This is a Quality Improvement study approved by our institution. Staff anesthetists were recruited to evaluate the performance of the FIVA in the operating rooms for a three month period. After a brief introduction and demonstration, the anesthetists used the FIVA device for all the IV fluid administration during the day to determine the efficacy and the functionality of the FIVA.
Results and Discussion: 30 anesthetists used the FIVAs during the evaluation period. The FIVAs were used to monitor a total of 635 bags of IV fluid administered to 262 patients during a variety of surgical procedures. Both the audio and visual alarms were activated and the fluid flow was stopped when the IV bag was empty for all the IV bags administered to the patients, including 23 pressurized IV bags. 198 of the IV fluid bags given to 62 patients were used as a carrier fluid for TIVA or vasopressors. The alarms of FIVA were incorrectly triggered six times when air was detected in the IV reservoir during rapid fluid administration. In no case was air allowed into the IV tubing when the device was active. FIVA was found to be most useful for long surgical procedures, using more than one IV bag. Many anesthetists reported that the FIVA was particularly useful when the IV fluid line was used for the administration of TIVA and vasopressors, as well as when the IV fluid bag was pressurized.
Conclusion: FIVA is an effective device to detect when the IV fluid bag is empty and to alert the clinician to change the IV bag. Future larger clinical studies are needed to confirm the clinical utility of FIVA.
References: 1. Can J Anaesth 1998;45(5II):A5

1AP4-6

Noninvasive tracking of systolic arterial blood pressure using pulse transit time measured with ECG and carotid Doppler signals with intermittent calibration

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We have shown that pulse transit time (PTT) from the heart to the common carotid artery, measured by using an ECG R-wave and Doppler ultrasound detector attached at the anterior neck, has a moderate but significant correlation with systolic arterial pressure ($R^2 = 0.46$)[1]. In this study, we aimed to examine the validity of our system when combined with calibration every 15 min in the ICU setting.
Materials and Methods: After written informed consent was obtained from the patients' relatives, 17 patients (mean age 71 years) under invasive mechanical ventilation in the ICU were included in the study. In each patient, radial arterial blood pressure had been continuously monitored via a 20-gauge catheter. Carotid blood flow wave was obtained via an 8-MHz Doppler ultrasound detector attached to either side of the anterior neck. Carotid Doppler flow, ECG, and systolic arterial pressure signals were recorded from each patient using a data recorder for 30 to 60 min.
We measured PTT, which is defined as the time delay between the ECG R wave peak and the maximum upstroke of the carotid blood flow wave. PTT was converted to estimated systolic blood pressure (Dopp_SBP) using the following equation.
$SBP = APTT2 + B$, ($R^2 = 0.46$), where $A = 7.0 \cdot 10^5$ and $B = 49.6$. Units of SBP and PTT are presented in mmHg and ms, respectively. PTT and Inv_SBP were assigned to the equation to determine B; Dopp_SBP was then calculated with the obtained B, while A was considered constant.
Results and Discussion: Inv_SBP ranged from 213 to 82 mmHg (125±24 mmHg), and PTT ranged from 165 to 77 ms (115±14 ms), resulting in Dopp_SBP in the range of 185 to 71 mmHg (126±24 mmHg). The Bland-Altman plot of the comparison between Inv_SBP and Dopp_SBP revealed limits of agreement of -20.1 to 17.7 mmHg (mean difference, -1.2 mmHg) (Fig. 1). There was a statistically significant close linear correlation between Inv_SBP and Dopp_SBP ($y = 0.9494x + 7.5171$, $R^2 = 0.8471$, $p < 0.0001$).
The results of the present study show that our system, which uses Doppler ultrasound flow signals from the carotid artery and ECG signals, is feasible for SBP tracking over a longer interval if it is combined with intermittent calibration and an automatic arterial blood pressure monitor.

1AP4-7

Haemodynamic effect of intravenous paracetamol in healthy volunteers

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Background and Goal of Study: IV paracetamol is one of the most ubiquitously used pharmaceuticals in the hospital setting worldwide; yet may be associated with transient hypotension in ICU patients. There are no studies investigating the haemodynamic effects of IV paracetamol in healthy volunteers and little is known about the effects of the 3.91g of mannitol present in the majority of IV paracetamol formulations available. We tested the hypothesis that IV paracetamol (+ mannitol) and IV mannitol would have adverse effects on blood pressure (BP) in healthy volunteers compared to IV 0.9% normal saline (NS).
Methods: With Austin HREC approval we performed a double-blinded, triple-crossover, controlled trial (RCT) of 24 adult healthy volunteers. Each volunteer received paracetamol (1g paracetamol + 3.91g mannitol/100mL IV), mannitol (3.91g mannitol/100mL IV) and 100mL 0.9% NS over a 15 minute infusion period. A minimum washout period between treatment arms was 24 hours. Endpoints were continuously measured over 1 hour using the Edwards Lifesciences Nexfin™ and included MAP, SBP, DBP, HR, SV and CI.

Results and Discussion: IV paracetamol was associated with a decrease in BP from baseline during infusion.
Results are described as alterations from baseline. In paracetamol, at infusion end (T60): MAP -1.85mmHg, SBP -0.54mmHg and DBP -1.92mmHg, p<0.0001. Post-infusion, BP returned to baseline and continued to increase. At T60, BP in paracetamol was evenly matched with mannitol: MAP (+1.96mmHg vs. +1.95mmHg), SBP (+5.15mmHg vs. +5.89mmHg) and DBP (+1.03mmHg vs. +0.77mmHg). NS had a significantly increased BP at T60: MAP +4.31mmHg, SBP +8.91mmHg and DBP +2.28mmHg, p<0.0001. SV at T60 was similar in mannitol and NS (+5.19mL vs. +5.22mL) vs. paracetamol (+3.58mL).
HR was similar in paracetamol and mannitol (-2.47bpm vs. -2.85bpm) vs. NS (-1.49bpm). CI at T60 was significantly higher in NS (+0.1L/min/m^2) vs. paracetamol (-0.01L/min/m^2) and mannitol (+0.02L/min/m^2).
Conclusion: IV paracetamol reduced BP in healthy volunteers during the infusion period. End-study BP variables were comparable between paracetamol and mannitol. Transient alterations in BP reported in this healthy volunteers study warrants studies to determine the haemodynamic effects of IV paracetamol and its mannitol content in patient subgroups who are at risk of haemodynamic instability e.g. surgical and ICU patients.

1AP4-8

Haemodynamic effect of restrictive fluid therapy and intermittent pringle maneuvre during major hepatic surgery

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Background and Goal of Study: Liver resections have been associated with high mortality and morbidity rates. Anesthetic and surgical management have significaly reduced the operative risk.From surgeons point of view inflow vascular occlusion is a common procedure in order to reduce blood loss. On the other hand anesthesiologists tend to use a low central venus pressure as aguide for fluid therapy in major liver surgery.
The goal of this study is to acces the haemodymanic effects of the pringle maneuver in combination with restrictive fluid therapy.
Materials and Methods: Patients (n=10) undergoing major hepatic surgery were enrolled in this study. In all patients intermittent pringle maneuvre with duration of 4 minutes applied twice, from the same surgical team. All patients had an thoracic epidural block and they were anesthetized with a combination of volatile anesthetic and propofol/remifentanyl regimen. Using the pulse contour analysis (FLO TRAC Edwards Lifesciences) Stroke Volume (SV) , Stroke Volume Variation (SVV) , and mead arterial pressure were continuously monitored.
Results and Discussion: Mean Stroke volume reduction after the initiation of the pringle maneuvre were 23,4%±4,5%. For Stroke Volume variation the increase was 53%±15%. Mean Arterial Pressure had a mean reduction of 11%±3,6%.Al patients were extubated in theater and were discharged from the intermediate care unit within 12-24 hours.
Current literature supports that there is a reduction in SV and an increase in SVV with a mild increase in MAP.
In this study this is not the case regarding the MAP. Reason(s) for this deviation it is the restrictive fluid therapy and the intense epidural block.
Conclusion(s): Restrictive fluid therapy during major hepatic surgery attenuates the mild increase in systemic resistance which is seen after implementation of intermittend Pringle maneuver. This requires from the anesthesiologist a high level of vigilance in order to avoid haemodynamic instability.
References:
A. Chouke`r1, T. Schachtner1, R. Schauer2, M. Dugas3, F. Lo¨he2, A. Martignoni1,
B. Pollwein1, M. Niklas1, H. G. Rau2, K. W. Jauch2, K. Peter1 and M. Thiel1* Effects of Pringle manoeuvre and ischaemic preconditioning on haemodynamic stability in patients undergoing elective hepatectomy: a randomized trial, British Journal of Anaesthesia 93 (2): 204-11 (2004)

1AP4-9

Lung ultrasound B lines and fluid therapy in hip fracture surgery

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Background and Goal of Study: Perioperative fluid management in the elderly population is a challenge issue for the anaesthesiologist. Lung Ultrasound B lines are proportional to extravascular lung water [1]. We assessed B lines and their correlation with Inferior Vena Cava (IVC) and B type natriuretic peptide (BNP), during fluid therapy, in patients undergoing spinal anaesthesia for hip fracture surgery.
Materials and Methods: Using off label the Lichtenstein's Blue Points, we counted the number of B lines four times. T0: at O.R. arrival; T1: after 8mL/Kg of Ringer Lactate; T2: after another 8 mL/Kg of R.L. and finally T3: at the end of surgery. At the same time points we measured IVC diameter and after surgery the BNP.
Results: We recruited 39 pts, 82±5 yrs, surgical time: 54±24 min, total fluid administration: 2100±350 mL, blood loss 275±185 mL. All the patients voided and had a positive fluid balance (+950±230). B lines increased in all the time points (T0: 2[1-5], T1: 3[1-6], T2: 5[2,25-8], T3: 7[4,5-11] Friedman Test p< 0,001). IVC significantly increased after the first fluid bolus, (T0: 1,49[1,22-1,79], T1: 1,82[1,49-2,16], T2: 1,67[1,36-1,97], T3: 1,39[1,16-1,79] Friedman Test p< 0,001 and SNK p< 0,01) but it returned to baseline value at the end of surgery. IVC and B lines do not correlate. There is only a weak correlation between B lines increase and BNP (Spearman R: 0,4 p< 0,05). A retrospective analysis showed that patients schedule for early surgery had less B lines then patients awaiting surgery for more then 48 hours. Moreover patients with surgical procedure in the lateral decubitus had quite all the B lines in the dependent lung.
Discussion and conclusions: IVC diameter does not increase farther because of spinal anaesthesia, blood loss, but most of all, because crystalloids move to the interstitial space, where we see them like B lines. In this scenario B lines represent atelectatic water that increases with fluid therapy and positioning.
References: 1. Volpicelli G, Skurzak S, Boero E et al. Lung Ultrasound predicts well extravascular lung water but it is of limited usefulness in the prediction of wedge pressure. Anaesthesiology 2014 Aug; 121(2): 320-7

1AP4-10

Myocardial perfusion imaging as a prognostic tool for peri-operative adverse cardiac events

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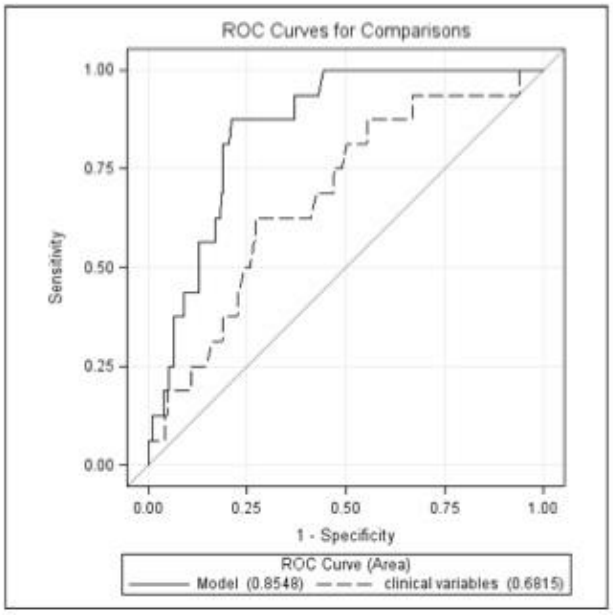
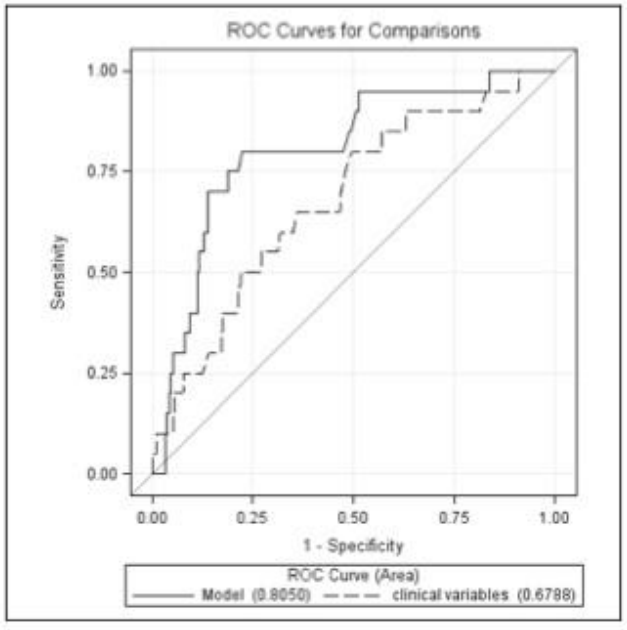
Background and Goal of Study: We evaluated the prognostic value of Summed Stressed Score (SSS), Summed Difference Score (SDS) and left ventricular ejection fraction (LVEF) in predicting the risk for Major Adverse Cardiac Event (MACE) through 180 days.
SSS is a 5 point score on myocardial perfusion imaging (MPI) studies that reflect the extent and severity of perfusion defects while SDS illustrates the degree of ischemia reversibility.
Materials and Methods: An retrospective review of 40,715 patients who underwent surgery at the Singapore General Hospital, Singapore from January 2011 till December 2011 were done. A total of 644 patients were cross-matched with the MPI dataset.
Univariate and multivariate logistic regression and receiver- operating curves (ROC) were used to identify and assess measured demographic and clinical characteristics as independent predictors of MACE.
Results and Discussion: SSS and LVEF, but not SDS, were statistically significant independent predictors for MACE.

The increment in AUC due to SSS was ΔAUC=0.1734 (95% CI, 0.0314 - 0.3153) and was statistically significant (p=0.0167).



[Receiver- Operating Curves For Summed Stress Score]



[Receiver-Operating Curves for LVEF]

Conclusion(s): Our study demonstrated that SSS and LVEF has significant incremental prognostic value in predicting perioperative outcomes among patients undergoing non-cardiac surgery.

References:

1. Etchells E MM et al. Semiquantitative dipyridamole myocardial stress perfusion imaging for cardiac risk assessment before noncardiac vascular surgery: A meta-analysis. *J Vasc Surg*. 2002;36:6

2. Chen T KY et al. The usefulness of dipyridamole thallium-201 single photon emission computed tomography for predicting perioperative cardiac events in patients undergoing non-cardiac vascular surgery. *Ann Nucl Med*. 2002;16:8 NT

1AP4-11

Non-invasive cardiac output measurement by impedance plethysmography under general anaesthesia

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Background: The qCO (Quantium Medical, Barcelona, Spain) is a recently-developed monitor to register the cardiac output (CO) using impedance cardiography in a continuous non-invasive way.

The aim of this study was to validate whether the qCO could detect changes in the CO during general anaesthesia. Previous studies have shown that general anaesthesia can reduce the CO by 20%.

Methods: The study included 26 patients scheduled for major ambulatory surgery under general anaesthesia. Mean age of 59 years, 38% males and 62% females.

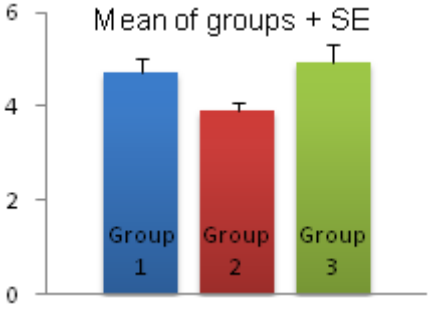
The average CO was calculated in three time intervals; before anaesthesia induction, during surgery and after recovery of consciousness. Shapiro-Wilks test was used to investigate normal distribution of the samples and a Wilcoxon signed rank test to prove significant differences among groups.

The prediction ability of the CO with respect to effect site concentration (Ce) of propofol was assessed with the Pk.

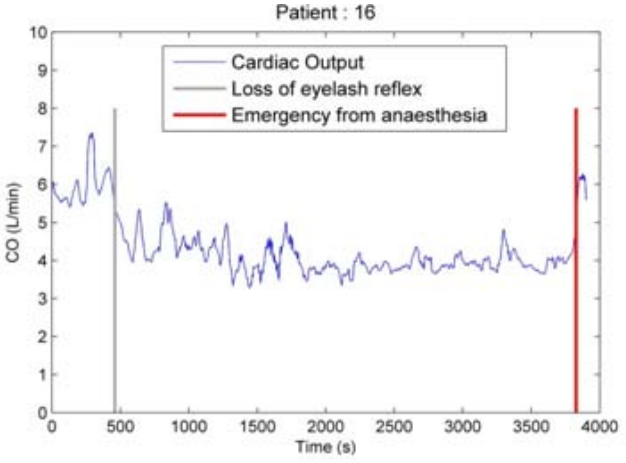
Results: The Wilcoxon test showed significant differences between awake and anaesthetised patients; the group under anaesthesia exhibited a smaller median.

Time in relation to anaesthesia	Mean CO ± SE	SD
1. PRE	4.73 ± 0.29	1.48
2. UNDER	3.91 ± 0.18	0.94
3. POST	4.95 ± 0.38	1.42

[Table 1. Data of the three groups]



[Figure 1. Representation of mean and SE]



[Figure 2. Example of a qCO recording]

Differences in medians between groups	1 - 2		2 - 3		1 - 3
Wilcoxon test	Two-sided	Right-sided	Two-sided	Left-sided	Two-sided
p-value	2.94E-05	1.55E-05	0.003	0.002	0.042

[Table 2. Results of Wilcoxon signed rank test]

Pk	SE
0.672	0.004

[Table 3. Pk computed from CO and Ce of 0 and 4 µg/m]

Conclusion: The CO decreases when the anaesthesia is induced and increases again after the recovery from anaesthesia.
Additionally the Pk value shows that CO can predict the Ce of propofol, evidencing a correlation between CO and Ce propofol.
References:
1. X. García, et al. Med Intensiva, 35(9):552—561 (2011).

1AP4-12

Ultrasonography evaluation of diaphragm dysfunction after pulmonary resection

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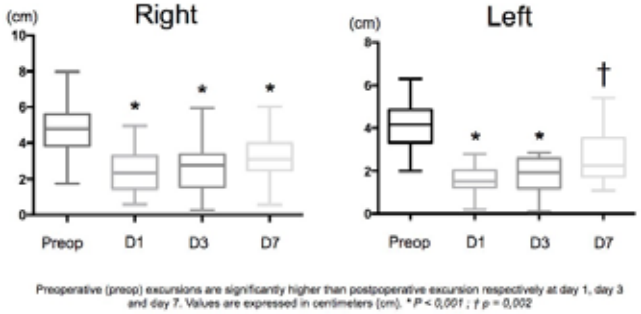
Background and Goal of Study: Diaphragm dysfunction (DD) is common in abdominal and cardiac surgery. Using ultrasonography, diaphragm motion after thoracic surgery has only been investigated in one previous study (1). Our goal was to observe the incidence of DD after pulmonary resection and to determine if DD may be associated to postoperative morbidity.
Materials and Methods: After obtaining approval by our local ethical committee, the diaphragm motion was evaluated preoperatively and at 1, 3 and 7 days after the surgery by ultrasound in patients scheduled for pulmonary resection. Each hemidiaphragm excursions were measured with 2D mode. The best excursion (Best E) was the greatest positive value from either hemidiaphragm. DD was defined by a 30% decrease of postoperative diaphragm excursion while a Best E < 25 mm confirm a severe DD.
Results and Discussion: During a 12 months period, 100 consecutive patients with a mean age of 62 ± 10 years were included. Epidural analgesia was used in 64% of patients. Only 7 videothoracoscopy were performed. We recorded less than 10% of failure of measurement. The mean preoperative right and left hemidiaphragm excursions were respectively 46 ± 12 mm and 42 ± 11 mm (NS). The D1, D3 and D7 diaphragm excursions are statistically decreased compared to the preoperative period (fig 1).



[Fig 1. Perioperative hemidiaphragm excursion]

Postoperative diaphragm movement ipsilateral to the incision was statistically significantly less when compared to the controlateral side. Postoperative dysfunction of the diaphragm occurred in 87%, 80% and 53% of cases and were severe in 13%, 9% and 10% of cases respectively at D1, D3 and D7. A D7 postoperative DD was significantly associated with a higher rate of atelectasis (p = 0.05), pneumonias (p = 0.041) and a longer ICU hospital stay (p = 0.002).
Conclusion(s): DD is frequent after pulmonary resection and can be detected by using ultrasonography at the bedside. Patients who have a DD at J7 are at risk to develop respiratory complications with prolonged ICU hospital stay.
References: Gethin-Jones TL and al. Quantification of diaphragm function using ultrasound: evaluation of a novel technique. Ultrasound Med Biol. 2010 Nov;36(11):1965-9.

1AP5-1

Ability of sugammadex administered according to ideal body weight to reverse profound rocuronium-induced neuromuscular blockade in morbidly obese patients

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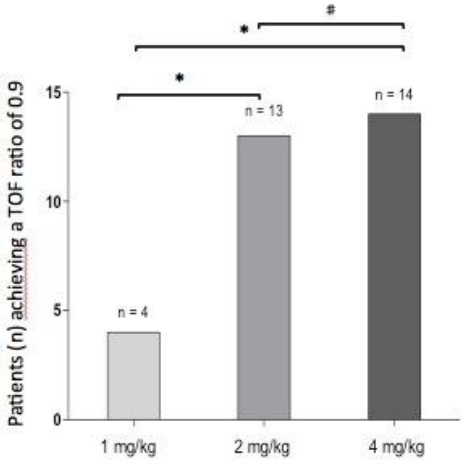
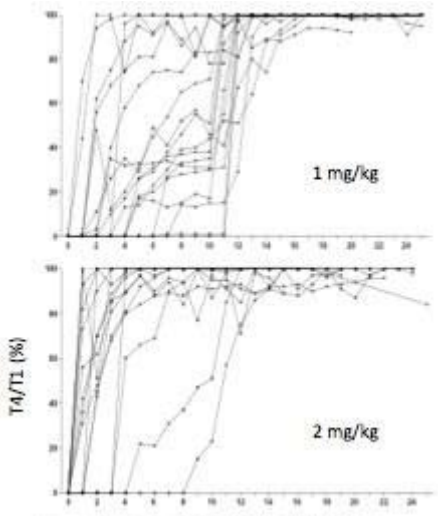
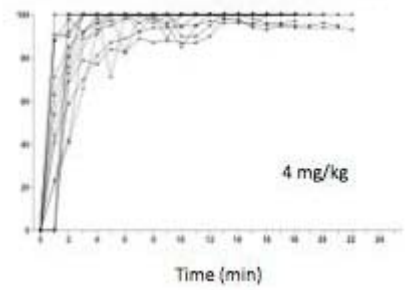
Background and Goal of Study: Sugammadex given to morbidly obese (BMI ≥ 40 kg/m²) at usual dosage based on ideal body weight (IBW) is insufficient to reverse neuromuscular blockade within 3 minutes (1). The objective of study was to determine whether these dosages would reverse profound rocuronium-induced neuromuscular blockade within 10 minutes.
Materials and Methods: In this monocenter, randomized, double-blinded study, curarization after calibration was monitored using an accelerometer at the adductor pollicis muscle (TOF-Watch®SX). Anesthesia was maintained with desflurane, remifentanil and rocuronium. At the end of surgery with deep neuromuscular blockade (Train of Four [TOF] = 0/4 and post-tetanic count = 1-5), patients randomly assigned to receive sugammadex 1 mg/kg, 2 mg/kg or 4 mg/kg of IBW. The primary study endpoint was the success rate of reversal of the neuromuscular blockade defined by a TOF ≥ 0.9 within 10 minutes after sugammadex administration.
Results and Discussion: Sixty patients were randomized and 50 evaluated. The success rate at 10 minutes was 22%, 77% and 93% for 1 mg/kg, 2 mg/kg or 4 mg/kg groups, respectively ($p<0.05$ vs 1 mg/kg group), with no significant difference between group 2 and 4 mg/kg. The median dose of 4 mg/kg IBW group corresponded to 1.9 [1.8 to 2.0] mg/kg of real body weight. A second dose of sugammadex was administered to 14 patients in group 1 mg/kg, 4 patients in group 2 mg/kg and 1 patient in group 4 mg/kg ($p<0.05$ vs group 1 mg / kg).



[Success rate for reversal of neuromuscular block]

* p<0,05. ♯ p = 0,34





[Individual evolution of T4/T1 ratio]

Conclusion: In morbidly obese patients, 4 mg/kg of ideal body weight of sugammadex allows reversal of profound neuromuscular blockade induced by rocuronium in less than 10 minutes. Monitoring remains mandatory to detect residual curarization or recurarization.
References: Llauradó S. Anesthesiology 2012;117:93-8.

1AP5-2

Clinical use of electromyography to monitor neuromuscular function

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Background and Goal of Study: Intraoperative use of neuromuscular monitors (NMMs) decreases residual weakness and critical respitatory events (1). However, a majority of anaesthesiologists do not use NMMs routinely. Limitations of current NMMs that rely on the ability of muscles to move (eg, accelerographs) explain the lack of universal adoption. We tested the clinical applicability of a new electromyography (EMG)-based NMM. This unblinded, single-centre, prospective and registered clinical investigation examined the prototype of a hand-held, battery-operated, quantitative, EMG NMM (TetraGraph, Acacia Designs BV, Amsterdam, Holland).
Materials and Methods: After local IRB approval 50 consenting patients (aged 52±14 y, male:female=10:40, BMI 28±5) were enrolled. They received neuromuscular blocking agents (NMBAs) for elective surgeries. Data were collected throughout the surgical procedure, from induction of anaesthesia until tracheal extubation. Intraoperative data were not available to the investigators, who relied on subjective evaluation, as per current clinical routine. EMG data were recorded continuously, and were downloaded for off-line evaluation. The ulnar nerve was stimulated with a train-of-four (TOF) pattern at the wrist via surface electrodes using a current of 30 mA, 0,2 msec pulse duration, frequency of 2 Hz every 20-sec. EMG data were recorded at the abductor digiti minimi muscle. A set of 3-10 successive TOF EMG responses were recorded prior to administration of NMBAs, and was continued until complete reversal. Data were analysed *post hoc* regarding applicability (ease of use, safety), repeatibility and performance (signal quality and accuracy, consistency with clinical findings, noise level).
Results and Discussion: The number of BASELINE TOF recordings was between 3-10 in each patient (Table). For the 20 patients analysed, the average baseline TOF ratio was 103.75±3.3% (range 98.0-111.10%). The recorded EMG shows 4 equal responses at baseline TOF (Fig 1); fade of TOF during block onset (Fig 2); full onset and recovery curve of TOF ratio (Fig 3). No perioperative adverse events were observed.
Conclusion(s): The EMG-based TetraGraph NMM can record evoked muscle action potentials. These data (T1, T4, TOF) can be used clinically to assess the effects of muscle relaxants on neuromuscular transmission (onset, duration and recovery from neuromuscular block).
References: Murphy GS et al. Anesthesiology 2011;115:946-54.

1AP5-4

The effects of reversal of neuromuscular blockade with sugammadex and neostigmine on intraocular pressure, hemodynamic response and recovery for ophthalmological surgery

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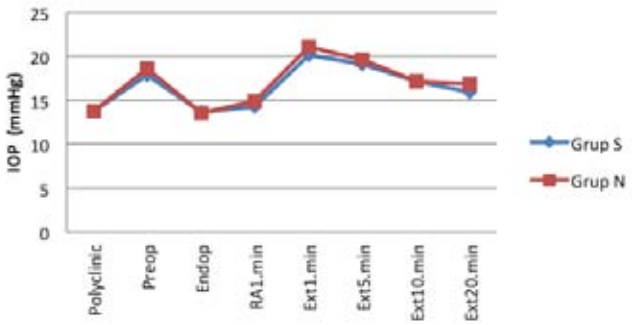
Background and Goal of Study: For the anaesthesia in ophthalmological surgery, it is recommended to choose anaesthetics and techniques which do not increase intraocular pressure(IOP), moreover those decrease IOP. Sugammadex is a new alternative reversal agent. We couldn't find any study about sugammadex and ophthalmological surgery and intraocular pressure. In this study, our objective was to compare the effects of sugammadex and neostigmine-atropine combination on IOP, hemodynamic response and recovery in ophthalmological surgery.
Materials and Methods: This study was performed at University Hospital after acquiring ethic committee approval of the instutition. 60 Patients with normal IOP, who was going to undergo unilateral ophthalmological surgery under general anaesthesia, (estimated surgery time 30-90 minutes) between the ages of 18-80, ASA physical status I-II, with no renal or liver insufficiency, body-massindex< 30, and no history of allergy to any of the study drugs were included to the study. Patients were divided into 2 groups (Group S: Sugammadex, Group N: Neostigmine-atropine) randomly. A standart anaesthesia induction and maintainance was performed. For the reversal of neuromuscular blockade, 2 mg/kg iv Sugammadex was administered to Group S and 0,05 mg/kg iv neostigmine and 0,02 mg/kg atropine was administered to Group N. IOP was recorded preoperatively, after the surgery, 1 minute after the reversal agent and on the 1st, 5th, 10th, 20th minutes after extubation with Tono-Pen AVIA Aplation Tonometer Device.
Results and Discussion: Age, gender, ASA status, BMI, surgery characteristics, the durations of anesthesia and surgery were similar between groups. In Group S, there was no statistically significiant difference for IOP after the surgery and 1 minute after the reversal drug (p=0,313) however in Group N, the difference was significant (p=0,045). Modified Aldrete Scores were significiantly higher at Group S. We observed that these 2 agents have similar effects on IOP, but the IOP 1 minute after reversal agent was higher at Group N.
Conclusion(s): This situation supports that sugammadex may be a secure alternative drug for patients with glaucome by means of providing a stabile IOP. Since our patients were without glaucome, we suggest repeating a similar study in patients with glaucome which will be helpful for evaluating the role of sugammadex in ophthalmological anaesthesia.



[IOP]

1AP5-5

The influence of mild hypothermia on reversal of rocuronium-induced deep neuromuscular block with sugammadex

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Background and Goal of Study: The study analyzed patient recovery time and response to sugammadex after a prolonged rocuronium-induced deep neuromuscular block (NMB) during mild hypothermia.
Materials and Methods: Sixty patients were randomly (1:1) allocated to the mild hypothermia and normothermia groups, defined as having core temperatures between 34.5 - 35°C and 36.5 - 37°C, respectively. Patients received 0.6 mg/kg of rocuronium, followed by 7 - 10 μg/kg/min to maintain a deep NMB [post-tetanic count (PTC) 1 - 2]. After surgery, the deep NMB was reversed with sugammadex 4.0 mg/kg. The primary end-point was the time until the train-of-four (TOF) ratio was 0.9.
Results and Discussion: The appropriate neuromuscular function (TOF ratio ≥ 0.9) was restored after sugammadex was administered, even after hypothermia. The length of recovery in the hypothermia patients [mean (sd), 171.1 (62.1) seconds (s)] was significantly slower compared with the normothermia patients [124.9 (59.2) s] (p = 0.005). There were no adverse effects from sugammadex.
Conclusions: Sugammadex safely and securely reversed deep rocuronium-induced NMB during mild hypothermia. An additional 46 s was required for recovery from a deep NMB in hypothermia patients. Based on the results, we think this prolonged recovery time is clinically acceptable.
Trial registration: ClinicalTrials.gov Identifier: NCT01965067.

1AP5-6

sugammadex decreases postoperative respiratory complications of residual neuromuscular blockade. A systematic review and meta-analysis

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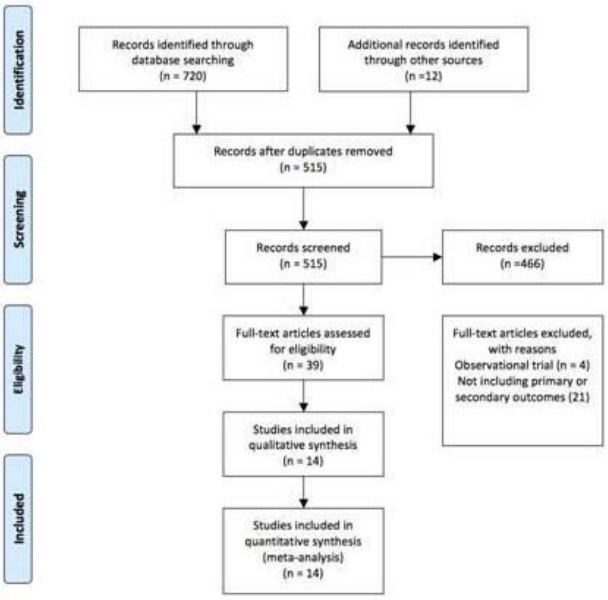
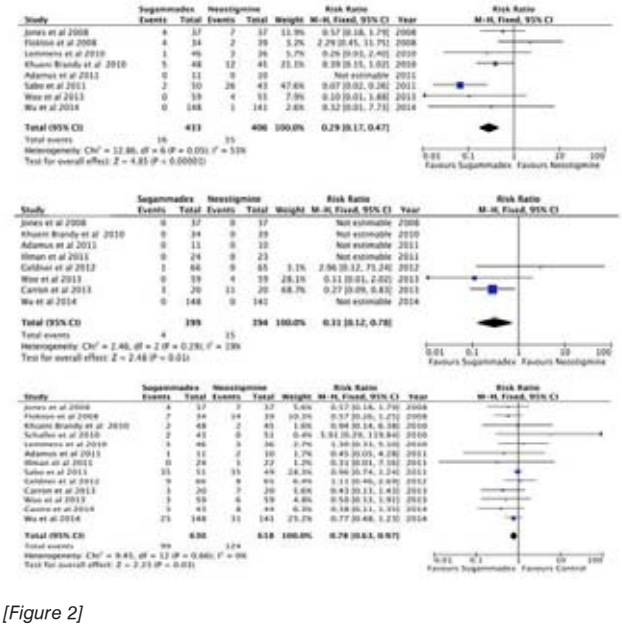
Background and Goal of Study: It has been shown that postoperative residual neuromuscular blockade and the resulting muscular weakness caused by nondepolarizing neuromuscular blockade (NDNMB) are associated with increased mortality and morbidity.
Materials and Methods: A systematic review and meta-analysis were performed according to PRISMA methodology to find differences between the signs of residual neuromuscular blockade due to rocuronuium and respiratory complications derived from this between sugammadex and neostigmine. A systematic search was performed in Medline, PubMed, Embase, and the Cochrane Library (last update, October 2014). Inclusion criteria: Randomized clinical trials (RCTs) comparing sugammadex and neostigmine in adult patients undergoing surgery requiring endotracheal intubation in whom neuromuscular blockade was performed using rocuronium or vecuronium. Endpoints: Signs and symptoms of postoperative residual paralysis (PORP), complications derived from PORP, postoperative nausea and vomiting (PONV) and drug-related adverse events. Those studies that fulfilled the entry criteria were examined in full and subjected to quantifiable analysis.
Results and Discussion: 14 RCTs were included for systematic review and meta-analysis, including a total of 1,317 patients. The use of sugammadex compared to neostigmine significantly reduced the signs of PORP (RR 0.29, 95% CI: 0.17-0.47; p< 0.001), as well as complications derived from PORP (RR 0.31, 95% CI: 0.12-0.78; p=0.01) and PONV (RR 0.78, 95% CI: 0.63-0.97; p=0.03). However, no differences were found in drug related adverse events (RR 0.81, 95%CI: 0.59-1.12; p=0.20).
Conclusions: Sugammadex reduces the clinical signs of residual NDNMB caused by rocuronium, with evidence of a reduction in adverse events due to this residual NDNMB and PONV compared to neostigmine.



[Figure 1]



[Figure 2]

1AP5-7

Sugammadex neuromuscular blockade reversal in obese vs. non-obese - influence of different dosage schemes in BIS and EMG measurements

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Background and Goal: The influence of Neuromuscular Blockade (NMB) reversal in Bispectral Index© (BIS) values is controversial with studies consistently presenting non-uniform results. None has approached this question either by a dosage or body constitution point of view. We aim to assess the effects of different Sugammadex doses on BIS and EMG readings in morbidly obese patients compared to non-obese controls without reversal of NMBA.
Materials/Methods: Forty-eight morbidly obese patients (BMI>35) were randomly assigned into 4 Sugammadex dosage categories: 2mg/Kg Lean Body Weight (LBW), 2mg/Kg Total Body Weight (TBW), 4mg/Kg LBW, and 4mg/Kg TBW. Anaesthesia consisted of Propofol/Remifentanil titrated to maintain BIS between 40-60, and NMB was achieved with 1.0mg/KgLBW Rocuronium titrated to a Post-tetanic Count (PTC) of 1-2. Rocuronium was stopped at the

end of surgery and Sugammadex administered. Fifteen non-obese controls received Propofol/Remifentanil anaesthesia titrated to BIS 40-60. NMB was achieved with 0.9mg/KgLBW Rocuronium with additional bolus whenever necessary. Spontaneous recovery of NMB was applied in this group.
BIS and EMG recordings were analysed every 5 seconds until extubation and the 95% confidence intervals (CI) for the difference between the mean value between groups were calculated and plotted. All possible inter-group comparisons were made.
Results and Discussion: BIS, EMG and extubation times showed no significant differences between the different Sugammadex dosage-groups.
However, time to TOFratio >0.9 was significantly higher in the 2mg/KgLBW group when compared to other doses.
Compared to non-obese controls, only Sugammadex 4mg/KgTBW was associated with significantly higher BIS and EMG values up to approximately 350 seconds after injection ($p < 0.05$).
The dose of Sugammadex for NMB reversal significantly affected the behaviour of BIS. Only the higher doses (4mg/KgTBW) led to a significant BIS rise up to 350 seconds after injection. The concomitant EMG rise in the exact same periods suggested that increased BIS values are a consequence of EMG contamination due to activity in frontal muscles. This dose-dependent behaviour might be explained by inability of the lower Sugammadex dosages in rapidly reverting the NMB, yielding similar NMB recovery patters compared with controls or other dosage regimens.
Conclusion: BIS seems to respond in a dose-dependent manner to Sugammadex NMB-reversal.

1AP5-8

Sugammadex reversion of rocuronium's neuromuscular blockage in a patient with Charcot-Marie-Tooth

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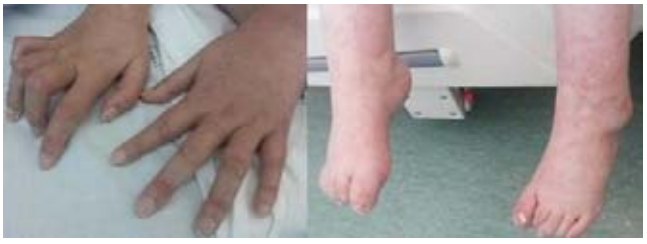
Background: The neuromuscular diseases represent a challenge to any anaesthetic technique, associated with a higher complication rate, mainly respiratory.(1)
Case report: We describe a clinical case of a thirty-nine years old woman with Charcot-Marie-Tooth (CMT), with neuromuscular abnormalities, anaesthetised for a laparoscopic cholecystectomy.



[Abnormalities of hands and feet]

The anaesthetic technique chosen was totally intravenous, with propofol perfusion, and rocuronium administration in bolus, administrating sugammadex for rocuronium's residual neuromuscular blockage reversion. The patient had a normal post-operative recovery, without clinical complications.
Discussion: The CMT disease represents an hereditary peripheral neuropathy, known for a progressive muscular atrophy and mainly distal sensitivity loss(2,3). The anaesthetic approach of these patients comprehends higher risks, predominantly dependent on the technique and anaesthetic drugs chosen(3). The muscular relaxation is one of the biggest anaesthetic concerns since these patients are more susceptible to those drugs, increasing the risk of prolonging the time of action and the risk of per operatory complications, such as respiratory insufficiency with prolonged mechanical ventilatory support.(1)
Sugammadex is a new drug, approved as a specific rocuronium antagonist, encapsulating its molecules and eliminating them from circulation, therefore reversing the rocuronium effect. Although further studies are needed, for the pharmacological properties of this new drug, it might represent a secure and predictable anaesthetic approach in patients with neuromuscular diseases.
References:
1. Romero A., Joshi G.P. Muscle Nerve 2013;48:451-460
2. Gondin F.A.A., Oliveira G., Thomas F.P. Medscape.2014
3. Errando C., Pasha T., Pareyson D. Orphanesthesia.2014
Learning points: The use of neuromuscular blocking agents in a patient with neuromuscular disease is controversial and represents one of the biggest concerns for the anaesthesiologist. The introduction of sugammadex, used in the correct dosage and due to its mechanism of action, could represent a safer approach in these pathologies, reducing the risk of post-operative respiratory complications.

1AP5-9

Sugammadex: one year of clinical practice in a Portuguese hospital

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Background and Goal of Study: Sugammadex is the first selective relaxant binding agent available, and its use has been widely accepted among anaesthesiologists. Our study aimed to quantify the use of sugammadex in our institution, identify the surgeries in which sugammadex was more often used, and the criteria applied for its use.
Materials and Methods: After ethical committee's approval, we conducted an observational retrospective study, undertaken from 1st December 2011 until 31th December 2012, reporting the first 13 months audit of our department´s experience in the use of sugammadex. Data were collected from a justification form to the use of sugammadex.
Results and Discussion: A total of 466 patients were given sugammadex, which represents a utilization rate of 13.96% among all the 3338 general anaesthesias performed in our institution. Monthly usage ranged from 0.89% in the first month of use, to 22.02% in October 2012, which was also the month in which more general anaesthesias were performed.
General surgery procedures, which are those more commonly performed in our hospital, represented 69.74% of sugammadex use, 88.62% of which were relative to intra-abdominal surgery. Sugammadex was used in 52% of bariatric surgeries.
The clinical conditions that more frequently led to sugammadex administration were: respiratory disease (23.83%); obesity (23.67%); heart disease (19%); and anastomosis of the gastrointestinal tract (16.33%). Other criteria considered by our anaesthesiologists included: deep neuromuscular block at the end of surgery (n=13); residual curarization (n=4); severe bronchospasm (n=2); pseudocholinesterase deficiency documented (n=1).
Difficulty in tracheal intubation or ventilation justified the use of sugammadex 17 times at the end of the surgery, with 1 case of impossible intubation in which it was necessary to immediately reverse neuromuscular block after an intubation dosage of rocuronium.
Conclusion: Sugammadex was used in 13.96% of the general anaesthesias, mostly intra-abdominal procedures, which probably reflects the need of optimal doses of neuromuscular blocking agents in those surgeries.
Sugammadex has changed the way our anaesthesiologists deal with some problems, particularly: obese patients and those with respiratory disease, where an efficient recovery of ventilatory capacity is desired; and patients with heart disease or recent gastrointestinal tract anastomosis, in whom neostigmine and atropine may be deleterious.

1AP5-10

Reversal of rocuronium: comparison between sugammadex versus two doses of neostigmine

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Background and Goal of Study: The aim of this prospective randomized trial is to compare the quality of reversal of rocuronium with either sugammadex versus 2.5mg or 5mg neostigmine.
Materials and Methods: IRB was obtained. 110 patients with BMI above>40 underwent elective bariatric surgery were enrolled in this study. Exclusion criteria were: co-existing muscular and cardiovascular diseases. Patients were randomly allocated to one of the following groups: group A, 38 patients (sugammadex), group B, 31 patients (neostigmine 2.5mg) and group C, 41 patients (neostigmine 5mg).
General anesthesia was induced in the three groups using propofol 2.0 mg/kg of CBW and fentanyl 3 mcg/ kg of CBW. Anesthesia was maintained with O2/air/desflurane 1MAC. Remifentanil infusion started at 0.05-0.2 mcg/kg/min. Tracheal intubation was facilitated with rocuronium 1.2 mg/ kg of CBW guided with PNS. When train of four (TOF) reached zero intubation was performed using GlideScope. At the end of surgery, TOF ratio and PTC counts

were recorded. Sugammadex 2 mg/ kg of CBW (group A), neostigmine 2.5mg (group B) and neostigmine 5mg (group C) were administered. The time to achieve 90% of TOF was recorded in seconds using a timer. ANOVA for repeated measurements was used for statistical analyses. P< 0.05 was considered significant.

Results and Discussion: The mean time to reach TOF>90% was 210 seconds in group C which was significantly shorter than in group A and B (P<0.05). There was positive correlation (P< 0.05) between the duration of surgery and the time to reach 90% of TOF in all the three groups. The time to reach 90% TOF was significantly shorter with group A versus groups B and C (P<0.05).

Conclusion(s): Though sugammadex proved to be faster than neostigmine 5mg in attaining TOF >90%, however the recovery pattern of both was similar.

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Acknowledgements: Prof.A.Dawltly for revising manscript.

1AP5-11

Rocuronium and recovery time after sugammadex reversal versus neostigmine after microlaryngoscopy

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Background: The purpose of the study is to test the rapid muscle activity recovery of sugammadex vs neostigmine after surgery through microlaryngoscopy.

Materials and Methods: A systematic multicentric and retrospective review of our recorded data were analyzed. We enrolled 148 patients between 39 and 68 years old, ASA I-II, undergoing surgery through microlaryngoscopy for laryngeal pathology. The patients were divided into two groups: S (74 pts) and N (74 pts). The group S received sugammadex in a dose dependent on the depth of the block. The patients of Group N received neostigmine for decurarization. In both groups the curarization was obtained by the administration of rocuronium. The recovery time and the achievement of the TOF-ratio 0.9 as extubation index were recorded.

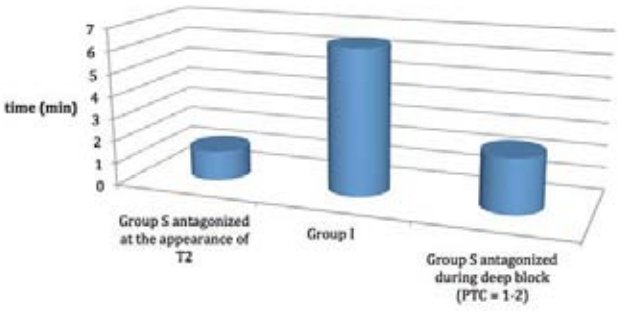
Results: At the end of surgery (mean duration 28 ± 7 min) the TOF showed a partial recovery in 111 patients; in the remaining 37 patients a post-tetanic counts (PTC) was performed to assess the depth of the block and the recommended dose of sugammadex was administered.

Of the 111 patients with moderate muscular block and reappearance of T2 to TOF, 33 patients were included in group S with administration of 2 mg/kg of sugammadex while 78 were included in Group I with administration of neostigmine 0.05 mg/kg. 37 patients in which PTC showed a value of 1-2, indicating deep block, were antagonized with sugammadex 4 mg/kg. Times muscle recovery, were respectively: 1 min, 33±6 sec for 33 patients of the group S antagonized at the appearance of T2; 6 min and 45±5 sec for 78 patients of group I and 2 min 42± 3 sec for 11 patients of Group S antagonized during deep block (PTC = 1-2). At a TOF ratio 0.9 all patients were extubated. No case of PORC/PONV were recorded (Fig. 1)

Discussion and Conclusion(s): The study showed that the administration of sugammadex determined a shortening of muscle recovery from rocuronium when compared with neostigmine with advantage during microlaryngoscopy.

Reference:

1. Geldner G. A randomised controlled trial comparing sugammadex and neostigmine at different depths of neuromuscular blockade in patients undergoing laparoscopic surgery. Anaesthesia 2012; 67:991-8.



[Figure 1. Recovery time]

1AP5-12

Urgent laparotomy in a patient with Becker's muscular dystrophy

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Background: Becker muscular dystrophy (BMD) is a congenital neuromuscular disease caused by a mutation of the dystrophin gene. Its clinical course is similar than Duchenne muscular dystrophy, including progressive muscular weakness and cardiac disorders, but generally with a milder and later presentation. During the anesthetic management in both scheduled and urgent surgeries, it is common to find problems with airway (due to fibrosis of masseters and involvement of the neck muscles), comorbid cardiac disease with alterations in conduction and contractility, reduced pulmonar capacity, increased susceptibility to develop malignant hyperthermia, and a variable susceptibility to various drugs, specially opioids, halogenated and those involved in neuromuscular blockade.

Case report: The aim of this abstract is to share our experience in a case of a 64 years old woman with BMD diagnosis, who underwent an emergency laparotomy to repair a duodenal ulcer perforation. She presented a long history of upper gastrointestinal bleeding and an incipient valvular heart disease. We proceed to a rapid sequence induction with a very low dose of rocuronium (0,3 mg/kg), and we obtained optimal intubation conditions in less than thirty seconds. Extra dosis of rocuronium was not required during the surgery. Analgesia was performed across a thoracic epidural catheter (T11-T12) and opioids were only needed during intubation. Neuromuscular monitoring was not availabe so we decided to administer 2 mg/kg of sugammadex to reverse any residual blockade. The patient was extubated in the operating room without incidences and she was transferred to the Intensive Care Unit conscious and hemodynamically stable.

Discussion: It is important to know the pathophysiology of BMD to anticipate contingencies that may occur during anesthesia. Total intravenous anesthesia with propofol and very low doses of rocuronium associated with epidural analgesia, could be a safe technique for anesthesia in patients with BMD. Reversal agent sugammadex is a very useful drug in these patients, who could present residual blockade and respiratory compromise symptoms despite of using very low doses of rocuronium.

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Ohshita N, Tomiyama Y et al. *"Anesthetic management of a patient with Becker muscular dystrophy".* Masui 2011 Aug;60(8):950-2.

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1AP6-1

Acidosis and coagulopathy: what does thromboelastometry show?

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Background and Goal of Study: The underlying mechanisms related to the development of coagulopathy induced by acidosis are not fully understood. The two proposed mechanisms are depletion of platelets and accelerated fibrinogen consumption. The purpose of this study was to investigate with the help of thromboelastometry the contribution of each of these two mechanisms.
Materials and Methods: Blood samples were taken from twenty adult patients scheduled for elective abdominal surgery. Acidosis (pH <7.1) was induced by addition of 0.1 M acetic acid to the blood samples.
Subsequently 8.4% solution of sodium bicarbonate was added to correct acidosis (pH >7.35). Coagulation function was assessed by thromboelastometry (EXTEM and FIBTEM tests) and platelet count at three time points: baseline, 15 minutes after acidosis and 15 minutes after its correction.
Results and Discussion: Compared with baseline values acidosis decreased platelet counts by 12.3% from $222*10^3$ ml^{-1}(173-259) to $195*10^3$ ml^{-1} (139-235). After acidosis correction number of platelets remained unchanged - $203*10^3$ ml^{-1} (148-231). Induced acidosis impaired coagulation mainly by reducing clot firmness. It also caused slight prolongation of clot formation but had no effect on clot stability. All these changes were not reversed by correction of blood pH.

	Baseline	Acidosis	After correction
CT	74 (66-76)	71 (62-84)	73 (61-80)
CFT	94 (65-114)	104 (73-125) *	108 (72-127) *
Alpha angle	76 (73-79)	74 (70-77)	74 (72-79)
A10	53 (47-58)	47 (41-55) *	48 (42-57) *
MCF	62 (56-69)	57 (49-66) *	57 (50-67) *
LI60	4 (2-10)	5 (2-11)	4 (2-11)

* p<0.01 compared with baseline

[Effects of acidosis on parameters of EXTEM test]

Clot firmness was decreased due to platelet depletion and not due to reduced fibrinogen activity as clot firmness in FIBTEM test remained unchanged.

	Baseline	Acidosis	After correction
A10	16 (15-26)	15 (12-24)	16 (13-25)
MCF	18 (16-27)	18 (14-27)	17 (13-26)

[Effects of acidosis on parameters of FIBTEM test]

Conclusion(s): Acidosis compromised the coagulation by affecting the clot strength. Clot firmness was decreased mainly due to depletion of platelets. Fibrinogen activity as well as clot stability were not affected. Correction of the blood pH with bicarbonate did not reverse acidosis-induced coagulation impairments.

1AP6-2

Coagulation factor concentrates (CFC) can induce fibrin clot formation in an artificial, blood component free solution based on human albumin 5%

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Background and Goal of Study: In case of massive perioperative blood loss, there are two main objectives of clinical management:
1. to maintain hemodynamic stability by adequate volume replacement
2. to avoid the onset of coagulopathy.
Unfortunately, colloid and crystalloid solutions induce dilutional coagulopathy (DC). To overcome this clinical dilemma some clinicians tend to start preterm transfusion of fresh frozen plasma (FFP) in severe bleeding as it is the only "volume therapy" with procoagulant properties.
However, hypovolemia is by no means a formal indication for plasma transfusion. So far we are missing an "ideal" plasma-free, volume-therapeutic agent with fibrin clot formation capacity. We hypothesised that commercially available CFCs can induce fibrin clot formation in an initially coagulation-factor and corpuscular-blood-component free solution based on human albumin.
Material and methods: Human albumin 5% (Grifols, Spain) in Viaflo Plasmalyte® 148 (Baxter, Spain), enriched with Ca++ gluconate (0,9 mmol/l) was titrated with TRIS buffer 2M to pH 7,3 -7,4 and heated to 37ºC, defining our stem solution (SS). Prothrombin Complex Concentrate (PCC), Beriplex®P/N*, Fibrinogen concentrate (FC), RiaSTAP®*, factor XIII concentrate (FXIII), Fibrogammin®* were supplemented to the final concentrations of 1 UI/ml, 4 g/l and 1 IU/ml, respectively.The solution was tested for fibrin clot formation performing rotational thrombelastometry on ROTEM® delta using ex-tem® S and fib-tem® S reagents. *CSL Behring GmbH, Marburg, Germany
Results and Discussion: Fibrin clot formation was observed when CCP and CF were added to the SS and tested by ex-tem® S and fib-tem® S subtests (coagulation activation by tissue factor, phospholipid and Ca++). Additional supplementation of FXIII improved physical blood clot stability significantly. At high physiological concentrations of CCP (1IU/ml), CF (4g/l) and FXIII (1 IU/ml) the observed fibrin clot showed the following characteristics:·
mean CT - 128,2 sec
mean A10 - 20,6 mm
mean MCF - 22,9 mm
The fibrin clot was stable as no significant lysis could be observed at 60 minutes.
Conclusion(s): To our knowledge this is the first study to show that CFCs can form a strong and stable fibrin clot in a plasma free, albumin based colloid solution. As recent evidence questions the benefit of routine use of FFP in severe bleeding, artificial procoagulant solutions based on purified CFCs might become an interesting future alternative for DC therapy.

1AP6-3

Coagulopathy in patients undergoing major liver resection

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Background: The aim of this study was the investigation of the immediate and late perioperative coagulation profile changes in patients undergoing hepatectomy using liver preconditioning. A right hepatectomy for a liver mass could reduce the hepatic synthesis of clotting factors resulting in coagulation abnormalities from the diminished synthesis of anticoagulants, extensive tissue trauma and acute phase response.
Methods: After informed consent, 20 consecutive patients (age: 45±14 years, males/females: 11:9) undergoing right hepatectomy for hepatic tumors were included in this study. Patients were randomised into two groups with similar characteristics: Group A (10 patients) in which liver preconditioning with a volatile anesthetic was used, and Group B (10 patients) in which no preconditioning was used. The clinical data and coagulation parameters were prospectively studied in days 1, 3 and 5 postoperatively. Standard coagulation tests [Prothrombin time (PT), activated partial thromboplastin time (aPPT), fibrinogen, fibrin degradation product (D-dimer), platelets and natural anticoagulant activity levels (Antithrombin III, Protein C and Protein S)] were measured and compared between the two groups. All data were tested with Kolmogorov-Smirnov test and were found normally distributed and are presented with mean ± SD in tables. Data were statistically analyzed using Student-t test and results were considered statistically significant for p-values less than 0.05. ANOVA test was conducted for continuous variable measurements over time.
Results: Time course of coagulation markers are shown in Table 1 preoperatively (Pre-Op), and in the first (POD-1), third (POD-3) and fifth (POD-5) postoperative day.
Conclusion: Higher levels of natural anticoagulants (AT III and Pr C) were observed in investigation group of patients, D-Dimer levels were elevated in both groups of patients during the early postoperative period. The impact of two different techniques on standard coagulation tests was mild and similar between the groups of patients undergoing hepatectomy.

	Pre-Op		POD-1		POD-3		POD-5		p
	Invest. group	Control group	Invest. group	Control group	Invest. group	Control group	Invest. group	Control group	
PT (sec)	12.8±1.1	12.8±1.8	14.9±2.2	13.2±0.7	15.3±2	13.1±1.3	13.9±1.7	13.9±1.9	ns
INR	0.98±0.1	1.1±0.1	1.2±0.2	1.1±0.1	1.2±0.1	1.1±0.1	1.06±0.1	1.07±0.1	ns
aPTT (sec)	26.2±2	29±3.7	27.8±2.2	27.8±1	28.9±2.4	28.5±0.7	27.9±2.7	25.5±4.9	ns
Fib (g/L)	2.4±0.5	2.4±0.4	2.7±0.6	3.6±1	3.06±0.6	2.9±0.7	4.1±0.6	3.1±0.2	ns
D-dimer (µg/ml)	0.55±0.3	0.57±0.3	0.6±1.3	3.6±1.4	4.9±3	4.2±2	3.6±1.6	3.2±1.6	ns
ATIII (%)	86.6±10	77.2±8.7	76.3±15	60.3±10	74±17	69±17	90±14	80±22	0.05
Protein C (%)	89.6±8.8	84.6±8.1	71.8±22	59.3±16	74.4±26	57.5±13	119±76	92±24	0.04
Free protein S	83.5±14	84.1±6.8	64.8±17	60.8±20	66.6±22	59.9±17	87±34	85±27	ns

[Table 1]

1AP6-4

Ecarin-activated assay for thromboelastometry - a valid method to assess the effect of dabigatran compared to standard laboratory parameters?

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Background and Goal of Study: Until a few years ago, oral anticoagulation was limited to vitamin K antagonists. Today three oral anticoagulants are available, including dabigatran etexilate (DE). Dabigatran is a direct thrombin inhibitor that is said not to require routine monitoring. In some cases as surgery or in bleeding management, the measurement of diluted thrombin time (dTT) has shown reliable correlation with plasma levels as compared to standard coagulation assays. For urgent situations a point of care (PoC)-assay is vital to measure the effect of dabigatran. The ECATEM uses ecarin to initiate the coagulation cascade at the step of thrombin generation and measures the clotting time by thromboelastometry. This study investigated the correlation of the ECA-Tem-assay with standard laboratory assays in dabigatran-treated patients.
Materials and Methods: 10 patients undergoing total hip- or knee-arthroplasty without bleeding or thrombotic comorbidities or anticoagulant medication were included in the study. DE for thromboprophylaxis was started 4 hours after surgery. Blood samples were taken before first adminstration 2, 6 and 12h after ingestion on the second postoperative day. Dabigatran concentration (dTT, Hemoclot®, Hyphen Biomed, Neuvielle-sur-Oise, France), aPTT, TT and CT ECATEM were measured. The data were analysed with Spearman's rank correlation coefficient using SPSS 22 (IBM, Ehningen, Germany).
Results and Discussion:

	Pre value*	Correlation coefficient	2h*	Correlation coefficient	6h*	Correlation coefficient	12h*	Correlation coefficient
Dabigatran ng/mL	0 (-1,26-3,26)		106.50 (75.53-254.,87)		46,50 (33,94-124,26		8,50 (4,55-46,65)	
aPTT (s)	41,5 (37,6-47,1)	0.174	87,1 (62,1-107,5)	0.845	64,5 (54,1-76,5)	0.418	53,6 (43,1-65,1)	0.849
TT (s)	11,5 (10,4-14,5)	0.525	54,7 (39,6-91,6)	0.845	32,6 (25,6-55,5)	0.879	18,8 (14,3-33,1)	0.935
CT ECATEM (s)	76 (71-86)	0.524	147 (120-238)	0.899	113 (95-157)	0.770	96 (88-117)	0.845

[Measurement results]

Median and 95% confidence interval in brackets*. All parameters showed a good correlation (correlation coefficient>0.7) 2h after DE ingestion. Only CT ECATEM and TT had clinically reliable correlations at all time points.
Conclusion(s): CT ECATEM appears a reliable PoC coagulation parameter to correlate with different dabigatran levels. Due to its shorter turn around times, results from the CT ECATEM as a PoC assays may better guide treatment e.g. in emergency situations.

Reference:
1. Lippi G, Favaloro EJ, Recent guidelines and recommendations for laboratory assessment of the direct oral anticoagulants (DOACs): is there consensus?; Clin Chem Lab Med 2014. [Epub ahead of print]

1AP6-5

Examination of factors determining the amount of bleeding in scoliosis surgery for adolescents

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Background: In corrective surgery for scoliosis in adolescents, hypotensive anesthesia is commonly used as a method to decrease bleeding[1]. However, it is not known with certainty that it can reduce bleeding in this surgery. In addition, although there are other factors related to the amount of bleeding in spinal surgery[2], they seem not to be evaluated for this operation. In this study, we analyzed the perioperative factors that might influence the amount of bleeding in corrective surgery for scoliosis in adolescents.
Methods: With IRB approval, we retrospectively extracted the anesthetic records of adolescent patients who underwent primary corrective surgery for scoliosis in our hospital from Dec. 1999 to Oct. 2014. We recorded weight, the initial Cobb angle, intraoperative mean blood pressure (mBP: mmHg), the number of vertebral levels fused, the amount of bleeding (per operation time and weight: ml kg^{-1} h^{-1}), and operative time. We evaluated the relations between independent variables and the intraoperative amount of bleeding by using multiple linear regression analysis.
Results: There were 135 cases, the mean patient age was 14.7±2.0 years. The mean Cobb angle was 62.1±10.4 degrees, and the mean number of vertebral levels fused was 9.3±2.6. The mean mBP was 61.5±4.7 mmHg. The mean amount of bleeding was 4.35±3.04 ml kg^{-1} h^{-1}. The mean operative time was 294.4±60.7 minutes. Multiple linear regression analysis showed significance for the initial cobb angle, and operative time as shown in Table 1.

Variable	Estimate	p-value
Initial cobb angle	0.076	0.008
Operative time	0.012	0.015

[Table 1]

Discussion: Though hypotensive anesthesia is recognized to be a method to decrease bleeding in this surgery, there was no correlation between the mBP and the amount of bleeding.The Cobb angle determined the severity of the scoliosis. It may be reasonable that operation becomes difficult when it increases. The longer operation time may also suggest the complexity of the surgery.
Conclusions: In corrective surgery for scoliosis in adolescents, intraoperative blood pressure seems not be a determinant of the intraoperative bleeding. Rather, the initial cobb angles and the operative time appear to affect it.
References:
1. Urban MK: Anes. for orth. surg. In Miller RD (eds): Miller´s Anes. 7th. Ed., pp2241-2259.
2. Nutall GA et al: Predictors of blood transfusions in spinal instrumentation and fusion surgery. Spine 25, 596-601, 2000.

1AP6-6

In vitro thromboelatographic evaluation of the efficacy of fresh platelets, frozen platelets and frozen platelets with diluted cryopreservation

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Background and Goal of Study: One military medicine basis is the control of hemorrhagic shock. Supportive care directed at minimizing blood loss is an actual challenge. The advantage of frozen blood products is mainly logistics.

The major benefit is especially with platelets because by freezing prolong the half-life of 5 days to 2 years. Dutch, Australian and Spanish military medical Corps are the only Armed Forces Health Services that have this resource. The aim of this study is to evaluate in vitro by TEG (ROTEM® DELTA) hemostatic efficacy of transfusion of fresh platelets (FP) vs frozen platelets (FzP) vs frozen with diluted cryopreservation (FzP*) platelets.
Materials and Methods: Experimental, prospective, multicenter study (CTFAS, HUCD "Gómez Ulla" and HU "La Paz"), performed in a model in vitro platelet transfusion. After ethics committee approval and informed consent, 3 samples of 10 ml of blood from a patient with non-autoimmune thrombocytopenia who were placed in 3 citrate tubes were obtained. Of each of the samples the number of platelets was quantified as baseline. Then an equivalent volume of transfusion 1.4 U/10 Kg weight FP, FzP and FzP* was added to the first, second and third sample respectively. Finally the same determinations count (number of platelets) and ROTEM® DELTA (CT Extem, MCF Extem, MCF Fibtem) in the three tubes were made. Statistical analysis was performed by comparing the data obtained in the three samples.
Results and Discussion: The number of baseline platelet three blood samples was: 86,000 i.u, 85,000 i.u and 82,000 i.u respectively. The number of platelet units FP, FzP and FzP* was 811,000 i.u, 1,372,000 i.u and 1,335,000 i.u respectively. The values of platelet count, CT Extem, MCF Extem, MCF Fibtem was FP: 92,000 i.u, 67 s, 65 mm, 26 mm; FzP: 97,000 u.i, 44 s, 37 mm, 29 mm; and FzP*: 96,000 u.i, 53 s, 18 mm, 16 mm.
Conclusion(s): In vitro frozen platelet transfusion (FzP and FzP*) increased platelets counts compared to in vitro fresh platelets transfusion (FP). ROTEM analysis indicates a reduced frozen for fresh platelets functionality.
References: Hunt H, Hyde C, Stanworth S, Curry N, Perel P, Woolley T. Thromboelastography (TEG), and thtomboelastometry (ROTEM) for trauma induced coagulopathy in adult trauma patientes with bleeding. Cochrane Database of Systematic Review 2013, Issue 3.

1AP6-7

Patient blood management in knee arthroplasty

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Background: The increasing evidence on transfusion-associated morbidity and mortality, blood donor demographics and elevated costs have resulted in a shift from the old to a new transfusion paradigm, known as Patient Blood Management. This approach is developed in three items: optimising preoperative anaemia, which is common in some procedures and the factor most strongly associated to transfusion; minimizing hemorrhage; and applying a restrictive transfusion strategy.
Materials and Methods: We analysed 236 patients in three different periods of time. 51 cases before implementing a tranexamic acid protocol constituted Group A. 82 patients made Group B, once we had implemented the standardized use of tranexamic acid (TXA) and filtered blood salvage in cases of TXA contraindication. Group C was constituted by 103 cases in which we added a restrictive transfusion trigger and the optimization of preoperative anaemia with IV iron, vitamins and erythropoiesis stimulating agents, if present preoperative anaemia. We compared preoperative status, postoperative blood loss and perioperative transfusion between the three groups.Statistical analysis was carried out by t-Student and Pearson i tests.
Results and Discussion: There were no differences among the three groups in ASA status, CIM, renal function index and preoperative haemoglobin.
71 % of patients in Group B were treated with TXA, and 73 % in Group C. Perioperative blood salvage was used in 12 % of patients in group B and 7% in Group C. Finally, 13 % of cases in Group C needed preoperative treatment for anaemia. Postoperative bleeding was significantly reduced in Group C compared to Group A (334 ± 403 cc vs 651 ± 374 cc; p:0,000). Day 1 postoperative haemoglobin was significantly higher in Group C compared to A (12,2±1,3 g/dl vs 11,5±1,6 g/dl; p:0,04) and B (11,5±1,5 g/dl; p: 0,02).
Postoperative transfusion was significantly reduced in Group C compared to Group A (9,7% [IC95:3,5-15,9] vs 27,5% [IC95:14,2-40,7]; p:0,004), and Group B (9,7% [IC95:3,5-15,9) vs 23,5% [IC95:13,6-33,3]; p: 0,011). The three pillars approach to Patient Blood Management in Group C resulted in being a protective factor for transfusion with an OR 0,28 (IC95: 0,12-0,70).
There were no differences in discharge haemoglobin values.
Conclusion(s): A Blood Patient Management programme seems to be, step by step, a useful tool in reducing transfusion in knee arthroplasty.

1AP6-8

Red cell and coagulation factor usage following introduction of thromboelastography in orthotopic liver transplantation

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Background and Goal of Study: Orthotopic liver transplantation (OLT) frequently requires high red cell concentrate (RCC) and coagulation factor usage. Factor transfusion thresholds may vary with monitoring modality, with no agreed ´gold standard´. Thromboelastography (TEG) provides point of care data on clot formation, strength and lysis, while conventional lab haemostasis data (platelets/INR) provide information only on procoagulant activity. We studied the impact of TEG-based monitoring on transfusion practices and lab parameters in a national liver transplant programme.
Materials and Methods: We examined baseline clinical and lab parameters and RCC, plasma, platelet (PLT) and cryoprecipitate/fibrinogen (Fg) usage (latter expressed as Fg equivalent (FgE)) during/after OLT in primary transplants before (PRE, n=137) and after (TEG, n=99) the introduction of TEG-based coagulation monitoring in 2011. PRE/TEG patient/transfusion data and univariate and multivariate predictors of high blood loss and high RCC usage (> 75% centile) were analysed using the Kruskal-Wallis test and logistic regression as appropriate. Data are presented as medians (IQR) or mean (SE).
Results and Discussion: Pre-OLT MELD was unchanged during TEG relative to PRE (16 (9, 21) vs. 15 (1, 20), P=0.82); ICU stay (days) was similar (1.5 (1,3) vs. 1 (1,2), P=0.33). Baseline INR and Fg were more abnormal in the TEG period (P< 0.03). Intraoperative blood loss, RCC usage and frequency of high RCC use were unchanged from PRE to TEG, while PLT (0 (0, 1) vs. 1 (0, 3)) and plasma usage (2 (0, 4) vs. 4 (0, 7)) were lower during TEG (P< 0.01). FgE use decreased during TEG (0 (0,0) vs. 0 (0, 1.05), P= 0.0001).
End-OLT lab data were similar in both periods. ICU RCC and factor usage were unchanged. Compared to other patients, high RCC use patients had greater abnormalities in baseline Hb/INR/PLT/Fg, but similar TEG parameters. The sole multivariate predictor of high blood loss / high RCC usage was admission MELD (OR 1.08 (0.02)/point, P<0.001); OR 1.05 (0.02)/point, P=0.013).
Conclusions: Introduction of TEG was followed by large decreases in intraoperative plasma/PLT/FgE usage, with no detectable impact on RCC transfusion, end-OLT lab haemostasis, post-OLT factor replacement or ICU stay. These data suggest that in primary transplantation for moderate ESLD, blood loss/RCC usage is no different with TEG- or lab-guided haemostasis management, despite very different factor replacement thresholds.

1AP6-9

Reliability of thromboelatometry (ROTEM®) to detect the safe limit for surgery or invasive procedures in patients taking acenocumarol

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Background and Goal of Study: INR value below 1.5 is considered safe to perform surgery and other invasive procedures. It has been reported that patient on warfarin anticoagulation therapy show a long coagulation time when assessed by thromboelastometry (TEM)[1]. However, no correlation has been yet established between such TEM-derived result and the INR, what would be useful to check the correct reversion of anticoagulation just before surgery. This study was aimed at assessing the reliability of ROTEM® to detect INR values below the 1.5 threshold in patients on acenocumarol therapy.
Materials and Methods: Patients on oral anticoagulation with acenocumarol, either on routine treatment or scheduled for elective surgery were prospectively included in the study. Both the INR and the TEM parameters were measured simultaneously in the same blood sample just after collection. TEM was performed using a ROTEM® device and included the rate and extent of clot growth: coagulation time (CT), clot formation time (CFT), angle, and maximal clot firmness (MCF) after tissue factor activation (EXTEM). Correlation between INR and the TEM derived results was analyzed by the Spearman test.
Results and Discussion: The study population consisted of 54 consecutive patients (40 male; median age 67 years). Coagulation time (CT) was the parameter that best correlated with INR (r=0.809); with a sensitivity and specific-

ity of 100% and 80%, respectively, to detect an INR below 1.5. For the same INR threshold, a CT ≥ 84 seconds had a predictive positive value of 93%, and a predictive negative value of 100%.
Conclusion(s): Our preliminary results suggest that a CT ≥ 84 seconds in the EXTEM ROTEM® test is predictive or an insufficient reversion of the oral anticoagulant therapy in patients submitted to surgery or other invasive procedures.
References: 1.- In vitro comparative study of hemostatic components in warfarin-treated and fibrinogen-deficient plasma. Brady Rumph, Daniel Bolliger, Nikhil Narang, Ross J Molinaro, Jerrold H Levy,Fania Szlam, iDOI: 10.1053/j.jvca.2009.07.012.

1AP6-11

What is the effect of artificial hemodilution on the Sonoclot signature?

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Background and Goal of Study: Point of care coagulation tests provide rapid information that may be essential for clinical decision making during surgery. Viscoelastometry however is affected by hemodilution, independently from coagulation status and this may complicate interpretation of the test results both in clinical practice and in research. We hypothesized that standard processing of blood samples towards a fixed hematocrit would eliminate this confounder and reduce between subject variability.
Materials and Methods: Blood samples were collected from 20 young healthy, female volunteers. Citrated blood (3.6 ml, 3.2 % citrate (109mM)) was used for the Sonoclot analysis; 1 ml of citrated blood was transferred to a plastic cuvette and 40 μl $CaCl_2$ was added to reactivate coagulation. 330 μl was pipetted to a gbACT+ (glass bead Activated Clotting Time) Sonoclot cuvette. One blood sample of each volunteer was diluted with autologous plasma to a fixed hematocrit (Hct) of 30 % (CV: 29.5-30.5 %). Plasma was obtained after double high-speed centrifugation. The diluted sample was recalcified and processed for Sonoclot analysis as compared to the non-diluted sample.
Results and Discussion: Control samples (Hct 36.6% (CV: 35.6-37.5 %) and processed samples (Hct 30%) did not differ with regard to gbACT (162 s (20.2) vs 163 s (19.4); p = 0.727), maximum amplitude (MA) (73 units (9.3) vs 80 units (12.2); p = 0.2162). However, CR (clot rate) increased (from 28 units/min (5.4) to 33 units/min (7.4) ; p = 0.01208); and PF (platelet function) increased from 3.1 (1.09) to 3.9 (1.01); p = 0.01718) after processing of the blood samples to a standard Hct of 30% and TTP (time to peak) decreased from 9.9 min (3.25) to 8.5 min (6.19); (p = 0.01923).
Conclusion: Processing of whole blood samples to a fixed hematocrit did not reduce between subject variability in Sonoclot POC coagulation parameters in healthy volunteers. Our data show that hemodilution with autogolous plasma produced consistent changes suggestive for in vitro activation of coagulation.

1AP6-12

Does type of pharyngeal packing during sinonasal surgery have an effect on postoperative nausea, vomiting and throat pain? A prospective randomised controlled study

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is a common problem that affects up to 30% of all surgical patients after general anaesthesia, which increases in sinonasal surgery due the potent emetic effect of ingested blood that is swallowed during the procedures. Therefore, a hypopharyngeal packing is commonly placed, in an effort to prevent blood ingestion. The primary aim of this study was to compare the efficacy of 3 different packing types in preventing PONV and to compare the results with patients who received no packing. The secondary aim was to compare the postoperative throat pain in all 4 groups.
Materials and Methods: After Institutional Review Board approval and written informed consent, 201 adult patients aged 18 to 60 years, scheduled for sinonasal surgery were randomized to this prospective, double-blind study. Exclusion criteria were patient refusal, allergy to agents used, history of difficult intubation, body mass index >35kg/m^2 and having another intervention at the same time. Patients were randomized to 4 groups to have a dry (Group I, n:52), soaked with water (Group II, n:48), with chlorhexidine gluconate and benzydamine hydrochloride (Group III, n:51) packings or without packing (Group IV, n:50). Postoperatively PONV and throat pain were assessed. Statistical analyses were performed with ANOVA, Kruskal-Wallis and chi-square test. p< 0.05 was considered as significant.
Results and Discussion: Demographic data, procedural characteristics and PONV risk scores were similar among groups. During the postoperative period PONV incidences, throat pain scores and analgesic use were comparable in all 4 groups (Table 1).

Groups	Group I (n=52)	Group II (n=48)	Group III (n=51)	Group IV (n=50)	P values
Total nausea attack during 24 hours	0 (0-1)	0 (0-4)	0 (0-1)	0 (0-1)	0.828
Total vomiting attack during 24 hours	0 (0-0)	0 (0-4)	0 (0-2)	0 (0-1)	0.281
Throat pain 30 min (VAS)	0 (0-5)	0 (0-10)	0 (0-8)	0 (0-4)	0.490

[Postoperative nausea, vomiting and throat pain]

Data are Median (min-max)
However, regarding PONV attacks and throat pain, using no packing showed minimum and using packing soaked with water showed maximum scores respectively, although statistically insignificant.
Conclusion: Neither placing different types of pharyngeal packing nor using no packing does not effect PONV incidences and throat pain, despite the common used practices.

1AP7-1

Cerebral "hyperautoregulation" assessed with near-infrared spectroscopy during pharmacological induced pressure changes

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Background and Goal of Study: Previous studies have observed the occurrence of a paradoxical increase in cerebral blood flow with blood pressure fall, and a paradoxical decrease with blood pressure rise. It has been suggested that these paradoxical responses are indicative for a functional cerebral autoregulation mechanism.[1] Accordingly, we hypothesized that paradoxical responses will occur exclusively in patients with intact cerebral autoregulation.
Materials and Methods: After ethical committee approval, data from 34 consenting elective cardiac surgery patients were included. Cerebral autoregulation was assessed with the near-infrared spectroscopy-derived cerebral oximetry index (COx), computed by calculating the correlation coefficient between MAP and cerebral saturation. COx < 0.30 was previously defined as functional autoregulation.[2] With the use of nitroprusside (SNP) and phenylephrine (PE), 20% changes in blood pressure were accomplished. Effects on COx were assessed. Data were analyzed using ANOVA, Kruskal-Wallis and Mann-Whitney U-test.
Results and Discussion: Thirty-five % of patients had a pressure passive circulation, with baseline and post-vasoactive agent COx of >0.30. In the remainder of patients (65%), cerebral autoregulation was intact at baseline (COx < 0.30). In 25% of these patients, administration of SNP induced a COx >0.30. In 25%, the classic pattern of autoregulation was observed, while in 50%, COx became negative after vasoactive drug administration (From -0.04 [-0.25,0.16] to -0.63 [-0.83,-0.26], p< 0.001 after PE, and from -0.05 [-0.19,0.17] to -0.55 [-0.94,-0.35], p< 0.001 after SNP). A negative COx implies a decrease in S_cO_2 with increase in pressure, and conversely, an increase in S_cO_2 with decrease in pressure. It has been speculated that these paradoxical reactions might be part of a normal physiological autoregulatory response, due to an overcompensation of the autoregulatory response when perfusion pressures change abruptly. This has been termed "hyperautoregulation".[1]
Conclusion: In the present study, paradoxical changes in S_cO_2 after pharmacological induced pressure changes occurred exclusively in patients with intact cerebral autoregulation. This observation supports the hypothesis that such paradoxical responses are indicative for a functional cerebral autoregulation.
References:
1. Jones S et al. Anesthesiology 2002; 97: 488-96
2. Ono M et al. J Thorac Cardiovasc Surg 2014; 147: 483-9

1AP7-2

Closed-loop delivery systems versus manually controlled administration of total intravenous anesthesia: a meta-analysis of randomized clinical trials

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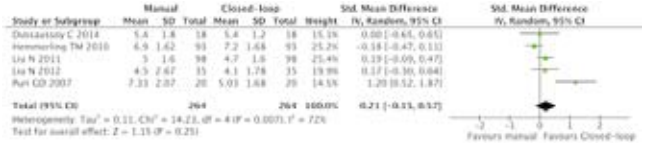
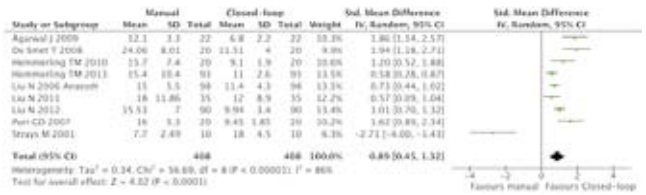
Backgroud and Goal of Study: Bispectral Index Monitor (BIS) guided closed-loop control of anesthetics administration has been deeply studied in the last decades. Electroencephalogram and auditory evoked potential indices have been described as controlled variables during automated controlled anesthetics administration in the past, but BIS seems to be the most appropriate variable to provide a pharmacodynamic feedback. We decided to perform a meta-analysis of randomized clinical trials on closed-loop delivery systems versus manually controlled administration of total intravenous anesthesia to evaluate their efficacy, performance and safety.
Materials and Methods: Scopus, PubMed, Embase and the Cochrane Central Register of clinical trials were searched for pertinent studies. Inclusion criteria were random allocation to treatment and closed-loop delivery systems versus manually controlled administration of total intravenous anesthesia in any surgical setting. Exclusion criteria were duplicate publications and non-adult studies.
Results and Discussion: The 12 included manuscripts randomized 952 patients. Use of closed-loop anesthetic delivery systems was associated with a significant reduction in the dose of propofol administered for anesthesia induction (SMD=0.64[0.18 to 1.11], p for effect< 0.01, p for heterogeneity< 0.01, I^2=84%) and a significant reduction in recovery time (SMD=0.32[0.12 to 0.52], p for effect< 0.01, p for heterogeneity< 0.07, I^2=45%). Moreover, desired anesthesia target was mantained more frequently in the closed-loop anesthetic delivery systems group than in controls (SMD=-1.07[-1.40 to -0.74], p for effect< 0.01, p for heterogeneity< 0.01, I^2=65%). No differences in time to anesthesia induction and total dose of administered propofol were recorded. Furthermore, use of closed-loop anesthetic delivery systems was associated with a significant improved performance. In fact, both median absolute performance error and wobble index were significantly lower in closed-loop anesthetic delivery systems group (SMD=0.89[0.45 to 1.32], p for effect < 0.01, p for heterogeneity < 0.01, I^2=86% and SMD=0.28[0.10 to 0.46], p for effect< 0.01, p for heterogeneity 0.18, I^2=30% respectively). No differences in safety profile were recorded.
Conclusions: Our meta-analysis proves the superiority of BIS-guided anesthetic delivery systems over manually controlled administration. Large, multicentric, randomized trials are mandatory to confirm these promising results.



[Figure 1. Forest plot for recovery time]



[Figure 2. Forest plot for BIS ± 10% of target]

1AP7-3

Dynamical changes in brain networks during propofol anaesthesia

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Background and Goal of Study: How does propofol induce a loss of consciousness? During general anaesthesia, the brain consequences of propofol administration and their relationship to unconsciousness are still poorly understood at the system level. In this study we scanned non-human primates in awake and anesthetized conditions and compared brain activityunder these conditions using two different modalities of functional MRI (fMRI), i.e.event-related fMRI (ER-fMRI) in response to auditory novelty and resting state fMRI (RS-fMRI).
Materials and Methods: Three rhesus macaques were included. All procedures were conducted in accordance with the European convention for animal care (86-406) and were approved by the institutional Ethical Committee. We varied consciousness levels in monkeys (awake, light anaesthesia, deep anaesthesia), using a target controlled infusion of propofol, while measuring electrical brain activity (EEG) during 3T fMRI. For the ER-fMRI study, we evaluated the encoding of auditory regularities in monkeys listening to first- and second-order sequence violations, using the ‚local-global' paradigm [1]which previously could demonstratethe existence of a prefronto-parieto-cingulate global neuronal workspace (GNW)in monkeys[2]. We employed dynamical functional connectivityto analyse the RS-fMRI (no stimuli) data.
Results and Discussion: The ER-fMRI studies demonstrated that, while the auditory stimuli robustly activated the auditory pathway whatever the condition (awake/anaesthetised), there was a progressive disorganisation of the monkey GNW during anaesthesia under increasing levels of propofol sedation. The RS-fMRI studiesdemonstrate that under anesthesia, the brain still exhibits distinct and rich connectivity patterns, but these patterns become related to the underlying white-matter structural map in a monotonic manner, while the awake state is characterized by a high degree of temporal flexibility which allows for a non-stereotyped exploration of a greater variety of brain states.
Conclusion: These results suggest that under anaesthesia, propofol disrupts higher-order functional networks in parietal and prefrontal cortex and alter the temporal dynamics of spontaneous brain activity, and specifically its departure from mere random fluctuations along established anatomical routes, leading to consciousness suppression.
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1AP7-4

Effect of desflurane on postoperative cognitive function compared with sevoflurane and propofol: a systematic review and meta-analysis

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Background and Goal of Study: Delirium and postoperative cognitive dysfunction are associated with unfavorable outcomes. A review article described that the use of sevoflurane might help prevent postoperative delirium. We hypothesized that desflurane might contribute to reduction of the incidence of cognitive dysfunction in comparison with other anesthetic agents because Desflurane facilitates earlier recovery for patients compared with sevoflurane. We conducted a systematic review and meta-analysis.
Materials and Methods: To identify randomized, controlled studies investigating the effect of desflurane on delirium and/or postoperative cognitive dysfunction compared with sevoflurane or propofol, a search was conducted in the PubMed database on June 13, 2014 using the following search terms: (delirium OR cognitive]) AND [desflurane] AND [sevoflurane OR propofol]). We also searched the cochrane library using the following search terms: ([cognitive] AND [desflurane], [delirium] and [desflurane]). We limited the search to publications in English that reported studies with human subjects aged ≥18 years and excluded animal studies.
Results and Discussion: Of the 41 articles identified, 19 remained after excluding case reports, non-English manuscripts, animal studies, and studies

of subjects <18 years old. The abstract review excluded 8 additional articles. One article was retracted by the editor. The 10 remaining articles included information regarding cognitive dysfunction resulting from administration of desflurane and sevoflurane and/or propofol, and were subjected to systematic review. The incidence of cognitive dysfunction was described in only 5 studies; 4 studies compared the effects of desflurane and sevoflurane and 1 study compared the effects of desflurane and propofol. The meta-analysis showed that the incidence of cognitive dysfunction at 1, 3, and 6 hours after operation did not significantly differ between patients administered desflurane and sevoflurane (1 hour: odds ratio = 1.06, P = 0.86; 3 hours: odds ratio = 1.33, P = 0.59; 6 hours: odds ratio = 0.98, P = 0.96).
Conclusion: The results of the present systematic review demonstrate that evidence is lacking regarding the effects of desflurane compared with those of sevoflurane and propofol on cognitive function in postoperative patients. Therefore, prospective, randomized trials investigating the role of desflurane on cognitive function in postoperative patients are warranted.

1AP7-5

Effect of systemic dexmedetomidine on the intraocular pressure during laparoscopic surgery with steep Trendelenburg position

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Background and Goal of Study: Steep Trendelenburg position during surgery is known to be associated with increase in intraocular pressure (IOP). It has been established that infusion of dexmedetomidine, a highly selective alpha-2-agonist, produces ocular hypotension in animal with normal and elevated IOP. The purpose of this study is to observe the efficacy of systemic dexmedetomidine for prevention of increase in IOP by Trendelenburg position.
Materials and Methods: After the approval of our institutional review board (approval number; KC14EISI0806), 45 ASA class I or II patients undergoing laparoscopic surgery under steep Trendelenburg position were included in this randomized, placebo-controlled, prospective study. The dexmedetomidine group (n = 23) received a 1.0 μg kg^{-1} IV loading dose of dexmedetomidine before the start of anesthesia, followed by an infusion of 0.5 μg kg^{-1} h^{-1} throughout the operation. The saline group (n=22) was infused with the same volume of normal saline. The mean arterial pressure (MAP), IOP and ocular perfusion pressure (OPP) were measured before anesthesia while supine and awake (baseline T1), after administration of bolus dose of study drug (T2), after administration of anesthetic induction agent (T3), right after tracheal intubation (T4), 1, 3, and 5 minutes after intubation (T5-T7), after Trendelenburg position (T8), 1, 2, and 4 hour after Trendelenburg position (T9-T11), before supine positioning (T12) and 10 and 30 minutes after supine position (T13, T14). The IOP was measured with Tono-Pen AVIA®. The OPP was defined as MAP - IOP.
Results and Discussion: In the saline group, IOP was 12.5 ± 3.6 (mean ± SD) mmHg higher at the end of the period of steep Trendelenburg position (T12) compared with baseline T1. Such increase in IOP was attenuated in the dexmedetomidine group, and IOP was only 3.2 ± 1.6 mmHg higher compared with baseline T1 (P = 0.008 vs. saline group). The steep Trendelenburg position was associated with decrease in OPP, and the degree of decrease was comparable for both group (27.3 ± 10.2 and 24.1 ± 9.3 mmHg in saline and dexmedetomidine group, respectively).
Conclusion(s): Dexmedetomidine infusion effectively attenuated the rise of IOP during laparoscopic surgery with steep Trendelenburg position. However, decrease in OPP associated with the position could not be prevented by dexmedetomidine infusion.

1AP7-6

The validity of entropy values obtained from a laterofacial electrodes

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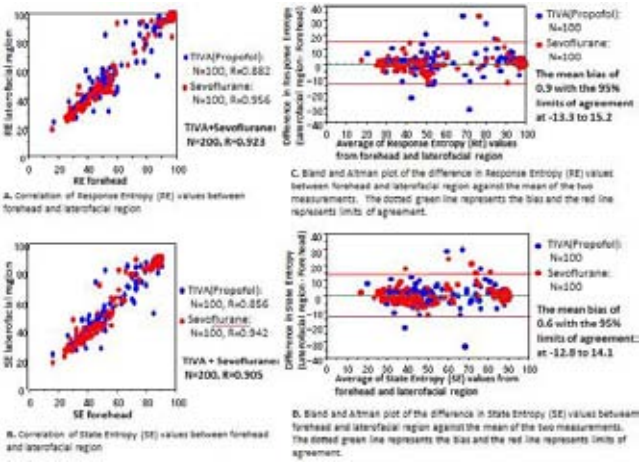
Background: When it is difficult to attach an entropy sensor on the forehead because of the surgical field, the sensor needs to be dislocated, however its credibility is not clear. The purpose of this study is to assess the entropy values obtained from a sensor attached on the laterofacial region.
Methods: With approval of the IRB, we recruited 20 ASA PS I-II adult patients scheduled for elective surgeries under general anaesthesia (Male/Female; 9/11, age; 16 to 81 years old). Before the induction, 2 Entropy EasyFit sensors (GE Healthcare Finland) were placed on the forehead as standard and the laterofacial region as dislocated: Electrode 1 on the mandible, Electrode 2 close to earlobe, and Electrode 3 on the outside corner of the eye. Anaesthesia was induced by propofol, fentanyl, remifentanil and rocuronium, and maintained with propofol (TIVA; 10 patients) or sevoflurane (10 patients). State Entropy (SE) and Response Entropy (RE) values from each sensor were recorded 10 times at the following anaesthetic states: awake, loss of response to verbal command, tracheal intubation, 10 minutes after intubation, start of surgery, 10 and 30 minutes after incision, end of surgery, eye opening, and after tracheal extubation. Statistical analyses were assessed by Spearman's rank-correlation coefficient and Bland and Altman analysis was also performed.
Results and Discussion: Strong correlation between entropy values of 2 sensors (RE: R=0.923, p< 0.001; SE: R=0.905, p< 0.001) and Bland-Altman plot are shown in the figure.



[Main Results]

Most of outliers were seen when the values of RE or SE were higher than 60, hence EMG is suspected to have caused those plots. It should be noted that standard entropy sensors indicated higher values in some cases with larger difference between laterofacial RE and SE values even though dislocated sensors were showing the values between 40-60.
Conclusion: RE and SE values from laterofacial region demonstrated high correlation with standard RE and SE values. It might support potential clinical usefulness of the dislocated entropy sensor. However, further studies are necessary to conclude on clinical usefulness and limitations of dislocated entropy sensor.

1AP8-1

A meta-analysis of the avoidance versus the use of neuromuscular blocking agents in combination with remifentanil for improving conditions during tracheal in adults

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Background and Goal of Study: A topical review concluded that remifentanil in combination with either propofol or inhaletion anaesthetics provided acceptable intubating conditions without the use of neuromuscular blocking agents (NMBA)[1]. Our aim was to meta-analyse the effect of avoiding versus using NMBA in combination with remifentanil on difficult tracheal intubation (DTI).

Material and Methods: Medline was searched for randomized clinical trials evaluating the avoidance of NMBA vs the use of NMBA for conditions of tracheal intubation of adults. The definitions of DTI in the individual articles was used. Two authors independently assessed trials for inclusion and extracted data. A random-effects meta-analysis and trial sequential analysis[2] (TSA) was performed. Risk of bias was evaluated according to the bias domains of ‚random sequence generation', ‚allocation concealment', ‚blinding', ‚incomplete outcome data' and ‚selective reporting'[3].
Results: We identified ten trials with 774 participants in which remifentanil was used. Avoidance of NMBA significantly increased the risk of a DTI with direct laryngoscopy (relative risk (RR) 3.64, 95 % confidence interval 1.04 to 12.91; P=0.005). However, in three trials remifentanil was only used in the control groups while no opioids were used in the intervention group and in three other trials the amount of remifentanil in the control group exceeded the amount used in the intervention group. In four trials with 372 participants an equal amount of reminfentanil was used in the intervention- and control groups with an increased risk of DTI when NMBA was avoided for intubation, with a RR of 15.86 (95% CI : 4.43 to 56.71 , P< 0.0001).
TSA confirmed the findings in both meta-analyses, however high risk of bias was present in nine of the trials.
Discussion: The definitions of DTI varied among trials contributing to both considerable clinical and statistical heterogeneity in the analysis. The overall risk of bias was high, and the number of trials and patients were limited in the meta-analysis on trials using equal amounts of remifentanil in the intervention- and control groups.
Conclusion: Despite a limited number of patients and trials and high risk of bias there was a strong association between avoidance of NMBA, thus using remifentanil for intubation and the occurrence of DTI.
References:
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1AP8-2

A randomized, single-blinded, phase II study of Xenon (Xe) or Desflurane (Des), combined with intraoperative Thoracic Epidural Analgesia (TEA) in major colorectal cancer surgery

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Background: TEA is a key component of the fast-track rehabilitation program in patients undergoing a major abdominal surgery. The concomitant use of halogenated gases induces important hemodynamic impairment that has adverse effects on rehabilitation (1). Xe is a noble anaesthetic gas with poor hemodynamic disturbances (2). We supposed that combination (Xe and TEA) improved hemodynamic stability.
Materials and Methods: As the tested combination was a first-in-man, a preliminary tolerance phase was carried out with sequential cohorts of 3 patients. Then additional patients were randomly allocated to receive TEA+Xe or TEA+Des (stratification on MAP at induction : <110 vs ≥110 mmHg). The primary endpoint was the variation of Mean Arterial Pressure (MAP) between induction and mean of intraoperative values (expected variation of -25 mmHg in Xe group *vs* -50 mmHg in Des group). Other perioperative parameters (oesophageal Doppler data and clinical outcome) were collected.
Results and Discussion: After validation of the safety data by an Independent Data Safety Monitoring Board, 28 patients (15 vs 13) were randomized from 02/2013 to 01/2014. Groups were comparable with respect to demography, comorbidities and clinical data. No significant difference was observed on MAP variation (Table). The use of vasopressive agents and colloids were lower in the Xe group. Clinical outcome (hospital length of stay, time to solid stools and oral feeding) was similar in the 2 groups. No related serious adverse event was reported.

	Xe (n=15)	Des (n=13)	p-value
MAP Variation (mmHg)	-25.4 (-72;-3)	-29.8 (-55;2)	0.747
Colloids (ml)	550.0 (200; 1500)	1000 (400;1800)	0.066
Ephedrine (nb of patients)	14 (93.3%)	13 (100%)	1.000
Phenylephrine (nb of patients)	2 (13.3%)	11 (84.6%)	<0.001
Noradrenaline (nb of patients)	0	2 (15.4%)	0.206

[Main Intraoperative data]

Conclusion(s): Despite no significant difference in MAP variation between groups, our study showed that Xe group required less colloids and less vasopressive agent. Further clinical investigations are needed to evaluate whether Xe associated to TEA is able to improve late clinical outcome and morbidity.
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1AP8-3

comparative study in the management of patients undergoing laryngeal microsurgery: suxamethonium vs rocuronium

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Background and Goal of Study: The aim of this study is to evaluate if the use of a neuromuscular blocking agent modifies the perioperative course of laryngeal microsurgery (LM) and the perceived quality of it by the surgeon.
Materials and Methods: We performed a prospective study where we selected two groups of 125 patients, one induced by suxamethonium and one with Rocuronium, being kept under balanced anesthesia and monitoring hemodynamic and BIS changes with the opioid agent (remifentanil). Perioperative hemodynamic changes, the TOF, the Domoaol scale of intubation, the dose of remifentanil, eduction time, postoperative respiratory events, and a range of perceived quality of surgery by the ENT created for this study were recorded (table1).
Results and Discussion: We analyze the data statistically and obtained that the kind of relaxing administered did not influence the scale of Domoaol tracheal intubation. However, statistically significant differences were shown in surgical quality scale with scores in the suxamethonium group (A) of 9.464 ± 2.073, and the rocuronium + sugammadex group (B) of 5.784 ± 1.527. Regarding postoperative hemodynamic and desaturation complications, there were no statistically significant differences. Regarding the dose of remifentanil, if there were statistically significant differences at doses of 0.202 ± 0.055 mcg / kg / min in group A, and 0.101 ± 0.039 in group B. Also the time eduction was also different in both groups, being of 13.720 ± 4.157 min in group A and 3.576 ± 1.898 in group B.
Conclusion(s): We can conclude that the use of a relaxing short duration, like suxamethonium implies a worse anesthetic management of the patient, requiring higher doses of anesthetic drugs to keep surgical conditions, and show a greater delay in waking up with a worse quality perceived by the surgeon. These problems are solved with the use of rocuronium-sugammadex tandem, reducing surgical stay and improving the management of these patients by both the anesthesiologist how the surgeon.

	1 Point	2 Points	3 Points
Cormack Lehane	I	II	III
Neck Stiffness	No	Slight	Moderate
Opening vocal cords	Full	Partial	Paramedian
Response to stimulus	No	Moving vocal cords	Cough

[Quality Punctation]

1AP8-4

Comparison of kinemyography and acceleromyography for monitoring neuromuscular transmission during endotracheal anaesthesia

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Background and Goal of Study: There are a limited number of studies that compared kinemyography (KMG) and most frequently used in the clinical practice acceleromyography (AMG). The aim of the study was to compare two methods of monitoring neuromuscular transmission (kinemyography vs acceleromyography) during multicomponent endotracheal anaesthesia with sevoflurane and cisatracurium.

Materials and Methods: After Ethical Committee approval and informed consent 31 patients, scheduled for elective laparoscopic surgery under general anaesthesia, were included in the study. The acceleromyography (BeneView T8, Mindray) was attached to one hand, while, kinemyography (Datex-Ohmeda A/S 5, Datex-Ohmeda) was attached to the other hand for simultaneous monitoring. After induction of anaesthesia (fentanyl 2 μg/kg, propofol 2 mg/kg) and AMG/KMG initial calibration, 0,05-0,15 mg/kg of cisatracurium was injected. The ulnar nerve was stimulated with train-of-four (TOF) stimulation. Anaesthesia maintenance was made by inhalation of sevoflurane in 50% oxygen-air mixture. Monitoring of neuromuscular transmission was carried out under the Stockholm criteria for pharmacodynamic studies of action of muscle relaxants.
Results and Discussion: There was significant difference in the prerelaxation TOF ratio monitored by the KMG (0,977±0,03) compared with AMG (1,048±0,07), p<0,001. But, there wasn't significant difference in the mean±sd onset time (s) or time to 0.25, 0.50, 0.75 TOF ratio recovery (min) measured by the KMG (217,8±92,1; 54,8±8,1; 61,9±9,9; 70,6±16,0) compared with AMG (235,7±90,3; 52,4±9,3; 59,7±8,6; 69,1±16,1), respectively. In addition, there was a good degree of agreement between EMG and KMG in measuring TOF ratio during induction of cisatracurium. Bias for TOF ratios onset of neuromuscular block was 0,096 (95% CI 0,072-0,121), the limits of agreement were -0,24 and +0,43. During recovery from neuromuscular block, the difference between the TOF ratios showed a bias of 0,053 (95% CI 0,031-0,075), and the limits of agreement were -0,13 and +0,24.
Conclusion(s): KMG showed a good degree of agreement with AMG for determination of onset and excellent degree of recovery of different doses of cisatracurium. KMG is easy to use and can guide the clinician in assessing onset and recovery of cisatracurium.

1AP8-5

Cytotoxicity of halogenated volatile anesthetics (desflurane, sevoflurane, isoflurane) on human bone marrow stromal cells and chondrocytes

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Background and Goal of Study: Previous in vitro experiments and in vivo animal studies have demonstrated that exposure to halogenated volatile anesthetics may cause cell damage and apoptosis to immune cells and brain cells. The effect of volatile anesthetics on human bone marrow stromal cells (BMSC) and chondrocytes are currently unknown.
Materials and Methods: Human BMSC and chondrocytes were harvested from six individuals. The cells were cultured and exposed to desflurane, sevoflurane and isoflurane in different concentrations (0.1 mM, 1 mM, 10 mM, 100 mM) each for 2, 8 and 24 hours. Lactate dehydrogenase (LDH) release was measured and the viability of cells was observed through inverted microscope.
Results and Discussion: Exposure to 0.1 mM, 1 mM, and 10 mM of volatile anesthetics did not increase the release of LDH in human BMSC and chondrocytes regardless of desflurane, sevoflurane or isoflurane at 2 and 8 hours. A trend of increased LDH release was observed after 24 hour exposure to each volatile anesthetic, but did not demonstrate statistical significance. However, at 100 mM concentration, exposure to sevoflurane and isoflurane demonstrated significant increase in LDH release at every time points in both BMSC and chondrocytes (p< 0.01). Exposure to 100 mM of desflurane did not increase the release of LDH at any time points.
Conclusion(s): Desflurane, sevoflurane and isoflurane at clinically relevant concentrations do not seem to cause cell injury to human BMSC and chondrocytes. Prolonged exposure to halogenated volatile anesthetics may have potential cytotoxicity.

1AP8-6

Deep sevoflurane anaesthesia with EEG suppression: is there silence in the brain?

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Background and Goal of Study: Recent EEG and fMRI studies revealed a decreased cortical feedback connectivity predominantly in higher frontoparietal networks as a neural correlate of anaesthesia induced unconsciousness [1,2]. However, the neural mechanisms during deep anaesthesia are poorly understood, e.g. "isoelectric" suppression episodes in EEG were assigned to a profoundly inactivated brain [3]. Based on the analysis of directed interaction in EEG the present investigation evaluates cortical information processing during wakefulness and deep sevoflurane anaesthesia, where episodes showing EEG burst and suppression where individually analysed.
Material and methods: Approved by the ethics committee, 22 healthy volunteers were enrolled into the study. 63-channel EEG was recorded in relaxed wakefulness (AW) and different levels of sevoflurane induced unconsciousness from light to deep anaesthesia. The present evaluation focuses on states AW, 3vol% concentration, and concentrations inducing EEG burst and suppression periods. For EEG analysis, symbolic transfer entropy (STEn) was used as a measure of directed interaction between frontal-parietal electrodes (0.5-70Hz bandwidth, transfer delay 35-60ms, embedding dimension m=5, time lag l=3) [4]. Effects of sevoflurane on STEn were estimated using the area under the curve (AUC) at corrected threshold p< 0.05 (bootstrap confidence intervals; CI).
Results and Discussion: STEn analysis showed predominant frontal-parietal feedback interaction during AW and feedforward interaction at states 3vol%, EEG burst and EEG suppression. Changes of STEn were observed between AW vs. 3vol% (AUC: 0.93; CI: 0.76-1.00), AW vs. burst (AUC 0.89; 0.68-1.00) and AW vs. suppression (0.86; 0.63-0.99). No changes were found between states of 3vol%, burst and suppression (p>0.05).
Conclusions: During light and clinical concentrations of anaesthesia, alterations of cortical feedback connectivity were reported [1,2]. The present results show loss of feedback along with preserved feedforward connectivity also during deep sevoflurane anaesthesia with EEG burst and, also surprisingly, during suppression periods. While suppression EEG was related to cortical silence, our findings support organised systemic brain activity with persistent processes from lower sensory to higher frontal areas.
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1AP8-7

Effects of memantine on recovery, cognitive functions and pain after propofol anesthesia in rats

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Background and Goal of Study: Postoperative cognitive dysfunction is a frequent complication after anesthesia. Propofol has been proved to cause cognitive dysfunction. Memantine has benefical effects on memory deficits and learning process. This study was designed to determine the effects of memantine on recovery, cognitve functions and pain after propofol anesthesia.
Materials and Methods: Twenty four Wistar rats were trained on radial arm maze (RAM) for 300 minutes everyday for three days. Then rats were divided into 4 groups randomly:
Group C (n=6) % 0,9 NaCl 1mL,
Group M (n=6) memantine 1mg/kg in 1mL SP,
Group P (n=6) 150 mg/kg propofol,
Group MP (n=6) 1mg/kg memantine in 1mL SF and 150 mg/kg propofol.
Memantine was applied 30 minutes before propofol injection in Group MP. Recovery of rats were evaluated by tail pinch test. Cognitive functions and pain were evaluated by RAM and hot-plate at 0, 1st, 2nd hours after recovery

respectively. Kruskal Wallis and Mann-Whitney-U tests were used for statistical analysis.
Results and Discussion: Recovery durations of the rats in Group MP was shorter compared with Group P ($p<0,05$). Cognitive functions of the rats in Group MP was higher than Group P at the first hour after recovery ($p<0,05$). The hot plate values were found to be signficantly increased in all measured time periods in groups M, P and MP when compared to Group C. Zhang et al.[1] showed memantine inhibits caspase-3 activation and apoptosis caused by ısoflurane. NMDA receptors have been shown to be involve in memory, neuronal formation during learning process and development, sınaptic plasticity and sinaps formation.The benefical effects of memantine on recovery and memory might have been carried through this pathway. Recent studies have shown the analgesic effects of memantine.[2,3]
Conclusion(s): Memantine provided shorter recovery time, better cognitive functions and reduced pain after propofol anestesia in rats.
References:
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2. Villetti G, Bergamaschi M, Bassani F et al. Antinociceptive Activity of the N-methyl-D-aspartate Receptor Antagonist N-(2-Indanyl)-glycinamide hydrochloride in Experimental Models of Inflammatory and Neuropathic Pain. Pharmacol Exp Ther 2003;306: 804-14.
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1AP8-8

Efficacy of neostigmine to antagonize residual neuromuscular blockade: a systematic data review

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Background: Cholinesterase inhibitors (ChEi) such as neostigmine are widely used to antagonize the effects of neuromuscular blocking agents (NMBAs). However, over the last decades the threshold for sufficient neuromuscular recovery has increased from a train-of-four (TOF) ratio of 0.7/0.8 to a TOF ratio > 0.9 and thus, the efficacy of ChEi in the treatment of residual neuromuscular block has become subject of discussion (1). The aim of this study was to evaluate the time to sufficient recovery when neostigmine was administered at different (i.e. deep, moderate or shallow) levels of spontaneous recovery. Evaluation was based on published data from clinical trials.
Methods: MEDLINE, EMBASE and Cochrane were searched for randomized controlled trials (1992 - December 2014) that measured reversal times following ChEi administration. Search was done with no language restrictions. Key words used in the search included 'neostigmine', 'sugammadex', 'edrophonium', 'pyridostigmine', 'neuromuscular block', 'reversal', and 'reverse.' Analysis was then focused on studies that investigated the use of neostigmine following intermediate acting NMBAs.
Results: Seventy articles matched the primary criteria. Data of 24 publications (1950 patients) were eligible for further analysis. When applied at deep residual block (T1< =10%) mean (± SD) recovery time to reach a TOF ratio ≥ 0.9 was 17.2 ± 14.8 min with a mean neostigmine dose of 70 mcg/kg. Recovery times for moderate (10% < T1 ≤ 25%) and shallow (T1 > 25%) residual block were 14.5 ± 13.0 min and 11.3 ± 13.9 min, respectively. Corresponding mean neostigmine doses were 55.5 and 37.8 mcg/kg, respectively. Reversal times tended to be longer if volatile anesthestics were used.
Conclusions: Available data confirm suggestions that only shallow residual neuromuscular blockade might be reversed succefully within 10 to 15 minutes following neostigmine administration. Use of volatile anesthetics may prolong recovery times.
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1AP8-9

Elemination kinetic of xenon in patient blood after xenon-based anesthesia

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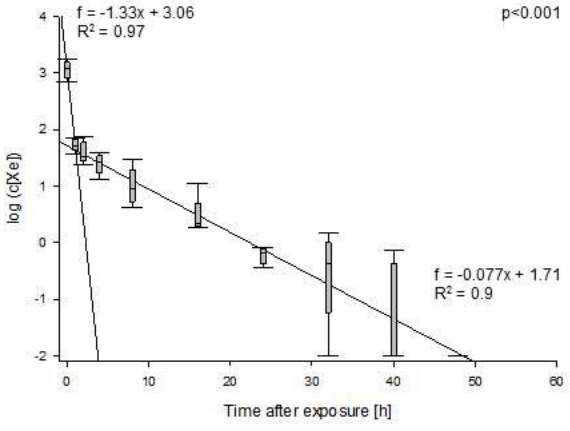
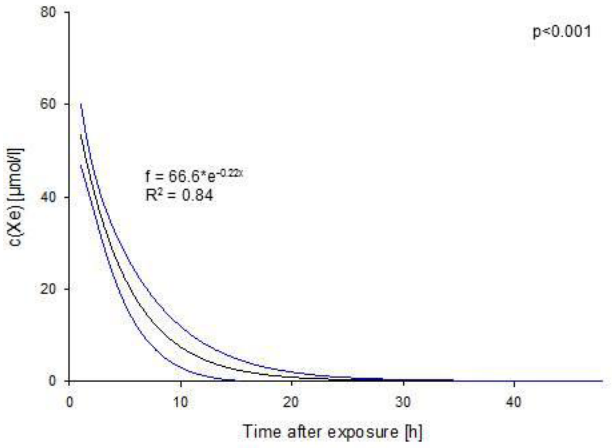
Background: Xenon is characterized by a very low blood gas partition coefficient associated with rapid weaning from xenon-based anesthesia. However, in spite of its initial rapid elimination, xenon can be traced up to 24 hours in plasma after xenon-based anesthesia.
Thus, we describe the elimination kinetics of xenon that might help to understand anesthesia related side effects.
Materials and Methods: Following local IRB approval (ID# 4635) and written informed consent, blood samples were drawn from patients undergoing xenon-based general anesthesia for endovascular aneurysm repair of the aorta. Anesthesia was induced with propofol (2 mg/kg), remifentanil (1 µg/kg), rocuronium (0.6 mg/kg) and maintained with propofol (8 mg/kg/h) and remifentanil (0.25-0.5 µg/kg/h) until completion of denitrogenation.
Subsequently, xenon (60% in oxygen) was applied and propofol was discontinued. Blood samples were drawn according to the following protocol: after anesthesia induction, during steady state before, as well as at 1, 2, 4, 8, 16, 24, 32, 40 and 48 hours after discontinuation of xenon administration. Samples were sealed air tight and stored at 4 °C for 18-32 hours until analyses. (Semi) quantification of xenon concentrations was conducted using gas chromatography/triple quadrupole tandem mass spectrometry with subsequent comparison to samples with known concentrations.
Statistics: Median [IQR], Friedman-test ($p< 0.05$) to test change in concentrations over time, linear regression analysis on log transformed values to characterize multi-phase elimination and non-linear, two-factor analysis to describe late elimination phase of xenon.
Results: Five consecutive patients (age 67 years [65;74]) with normal body mass index (22 kg/m² [20;25]) were included. Median duration of xenon application was 150 min [146;187]. During anesthesia, concentrations in patient blood were 1.2 mmol/l [0.93;1.3]. Xenon was detected in patient blood for 24 to 40 hours after discontinuation. Elimination was characterized by a biphasic pattern with an initial rapid phase, followed by a second slower elimination. Non-linear regression revealed a first order kinetic of the second elimination phase ($c[Xe] = 66.6*e^{-0.22x}$). Time after exposure could be estimated as $x=50*\ln(1.47/c[Xe]^{0.091})$.
Conclusions: Xenon was detected for up to 40 hours after anesthesia. Elimination follows a biphasic pattern, probably caused by initial rapid exhalation with subsequent delayed removal from deep compartments.



[Figure 1]



[Figure 2]

1AP8-10

Evaluation of train of four (TOF) stimulation after low doses of sugammadex: an observational study

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Background and Goal of Study: Residual neuromucular block (NMB) is a postoperative complication that is easily unnoticed if no monitoring is available being able to induce unpleasant respiratory effects to patients. Recently, sugammadex proved to be highly effective for reversal of NMB induced by steroidal agents, but it is not routinely used due to its higher cost compared to anticholinesterase drugs. The aim of this study was to determine the percentage of patients that would reach an adequate NMB reversal to allow a safe endotracheal tube (ETT) removal using sugammadex doses lower than recommended.
Materials and Methods: A prospective non-randomized study was conducted over ASA I-III patients who underwent major elective surgery. Patients with renal or hepatic failure, bronchoaspiration risk, predicted difficult airway and isolated cases were picked as exclusion criteria. All the patients were induced with propofol, fentanyl and rocuronium. Anesthesia was maintained with sevoflurane 1 MAC, fentanyl and rocuronium to ensure a stable depth of neuromuscular block with no responses to train of four (TOF) stimulation. Once surgery was complete and the monitor showed two twitch responses, the NMB was reversed by 1 mg/kg sugammadex. A new TOF response was assessed within 3 minutes and another 1mg/kg sugammadex dose was administered to all the patients in order to complete the currently recommended doses. ETT was removed when a TOF ratio ≥ 0.9 was registered.
Results and Discussion: A total of 20 patients were recruited including 14 (70%) females. The mean age of the sample was 63.45 years (SD=14.8). The mean maintenance dose of each drug was: 2.13 mg/Kg (SD=0.56) for propofol, 9 mcg/Kg (SD= 2.71) for fentanyl and 1.52 mg/Kg (SD= 0.4) for rocuronium. 3 minutes after the first sugammadex dose, 2 patients (10%) showed fewer than 4 twitch responses to TOF. The rest of the cases reached 4 responses, with a mean TOF ratio of 0.76
(SD = 0.29), including six (30%) whose TOF was greater than 0.9. A TOF ratio > 0.9 was registered in 18 patients 3 minutes after the second dose of sugammadex whereas 2 of them required another 1mg/kg dose for a safe extubation.
Conclusion(s): 30% of the sample reached a TOF ratio ≥ 0.9 3 minutes after a 1mg/kg sugammadex dose. Larger randomized studies will be necessary to extrapolate these results to the general population.
Reference: Thomas Ledowski, Laura Falke, Faye Johnston et al. Eur J Anaesthesiol 2014; 31:423-429.

1AP8-11

Transdermal oxytocin produces sedation in rabbits

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Background and Goal of Study: It has been described that oxytocin can induce sedation in experimental animals (1). In humans, oxytocin is used frequently for its mood changing effects mainly by intranasal way of administration (2). Recently, the advertising has appeared promising central effects by transdermal patches (3). Delivering anxiolytics via transdermal application could provide a rapid and convenient anxiety relief in various situations. The aim of our study was to determine in an animal experiment whether transdermal administration of oxytocin could be used as a base for further research concerning non-traditional ways of administration of anxiolytics.
Materials and Methods: After ethic committee approval, 10 rabbits were administered transdermal oxytocin 16 IU. Oxytocin was administered on the area of 10 square cm of shaved skin on the back of the head. Measured parameters were SpO_2, blood pressure (BP) and heart rate (HR) before administration and in 1 minute intervals (BP in 5 minutes intervals) and immobilisation time (loss of righting reflex). The measurements were performed for 20 minutes. ANOVAs test was used for statistical analysis of hemodynamic parameters.
Results and Discussion: Loss of righting reflex was present in 7/10 animals. Immobilisation time was 352.9±75.7s, the duration of effect was between 14 and 20 minutes. Cardiorespiratory parameters were stable during the study. We did not observe any signs of skin irritation.
Conclusion(s): To our best knowledge, this is the first study concerning transdermal way of administration of oxytocin for sedation. The results of our project indicate that transdermal oxytocin may be a suitable drug that can be used safely for anxiolysis, sedation mood enhancing effects. Further research in humans concerning the optimal dose continues.
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Acknowledgements: The study was supported by a scientific grant VG 20102015014

1AP9-1

A novel algorithm of ezPPV as arterial pressure respiratory variation determined with conventional noninvasive blood pressure cuff

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Background and Goal of Study: Respiratory variation in arterial blood pressure is widely used as an indicator of fluid responsiveness [1]. We developed a novel method termed enclosed zone pulse pressure variation (ezPPV) to determine respiratory variations in blood pressure with a conventional noninvasive blood pressure (NIBP) cuff. ezPPV findings were examined for their correlation with pulse pressure variation (PPV) based on invasive arterial blood pressure (IBP) to determine whether our method is an effective alternative indicator of fluid responsiveness.
Materials and Methods: Following approval from our institutional review board, 10 elective surgery patients were recruited for this prospective study after providing written informed consent. We induced general anaesthesia, then a radial artery was cannulated and an NIBP cuff was placed on the contralateral upper arm. Prior to performing measurements, the respiratory rate was set at 12 per minute and maintained throughout the measurement period.

Measurements were performed each 1 minute during surgery with intervals of 10 minutes or more. For the measurements, the NIBP cuff was inflated to 45 mmHg and kept at that pressure. The NIBP cuff pressure and IBP waveforms were recorded.
The NIBP cuff waveform amplitude for each pulse was obtained as a discrete data point. Each pulse amplitude value was divided by the average amplitude value of a measurement period and the percent variation of each heartbeat was obtained. The discrete pulse amplitude variation of each heartbeat was interpolated using the spline method and a continuous amplitude variation curve was obtained. ezPPV was defined as the peak of the power spectrum, calculated by fast Fourier transformation, between 0.18 and 0.22 Hz on this curve. Variations of IBP were defined as [a-b] / [(a+b)/2] at every 5 seconds, where “a” is the maximum pulse amplitude and “b” is the minimum pulse amplitude. PPV was calculated as averaged variations of IBP during each measuring period.
Results and Discussion: Of 317 measurements obtained (32±7 per subject), 95 were excluded from analysis because of excessive noise. For the remaining 224 measurements (22±9 per subject), ezPPV was 22.7±6.6% and PPV was 11±7%, showing a high correlation between them (r=0.65).
Conclusion(s): A novel algorithm of ezPPV was found to be highly correlated with PPV.
References: Michard F. Anesthesiology 2005; 103: 419-28

1AP9-2

A simple method for isocapnic hyperventilation evaluated in a lung model

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Background and Goal of Study: Isocapnic hyperventilation (IHV) has the potential to increase the elimination rate of anesthetic gases. The method is well studied in animals and humans and the results are unequivocal - it shortens time to wake-up and postoperative recovery time after inhalation anesthesia. In this bench test we studied if it was possible to achieve isocapnia during hyperventilation by adding carbon dioxide (CO_2) directly to the breathing circuit of a standard anesthesia apparatus.
Materials and Methods: In a mechanical lung model compliance was set to 50 ml/cmH_2O. The lung model was fitted with an adjustable CO_2 output, where the CO_2 was delivered via an electronic flow controller (VCO_2). The lung model was ventilated with an S/5 Anesthesia Delivery Unit Carestation®. From baseline ventilation (BLV), hyperventilation was achieved by doubling the minute ventilation and fresh gas flow at three different levels of VCO_2, 175, 200 and 225 ml/min and dead-space (DS) volume of 44, 92 and 134 ml. During hyperventilation CO_2 was added via the inspiratory limb of the anesthesia circuit via a precision flow meter (DCO_2).
Results and Discussion: During hyperventilation the alveolar ventilation increased with 113 ± 5%. There was a linear correlation between $ETCO_2$-level at BLV, volume of DS at BLV and the DCO_2 at IHV. DCO_2 varied between 113±6 and 250±10 ml/min. Low VCO_2 and large DS resulted in a greater DCO_2 flow to achieve isocapnia. The $FiCO_2$-level during IHV varied accordingly between 2.3 and 3.3 %.
Conclusion(s): It is possible to maintain normocapnia during hyperventilation by administering carbon dioxide through a modern anesthesia circuit without disconnecting it. From baseline minute ventilation, VCO_2 and dead-space, the amount of carbon dioxide that is needed to achieve isocapnic hyperventilation could be determined.
References: Sakata DJ, Gopalakrishnan NA, Orr JA, White JL, Westenskow DR. Rapid recovery from sevoflurane and desflurane with hypercapnia and hyperventilation. Anesthesia and analgesia 2007; 105: 79-82.
Katznelson R, Djaiani G, Naughton F, Wasowicz M, Ragoonanan T, Duffin J, Fedorko L, Murphy J, Fisher JA. Post-operative hypercapnia-induced hyperpnoea accelerates recovery from sevoflurane anaesthesia: a prospective randomised controlled trial. Acta anaesthesiologica Scandinavica 2013; 57: 623-30.
Acknowledgements: The Sahlgrenska Academy

1AP9-3

Accuracy of Captesia, an Android pulse pressure variation application

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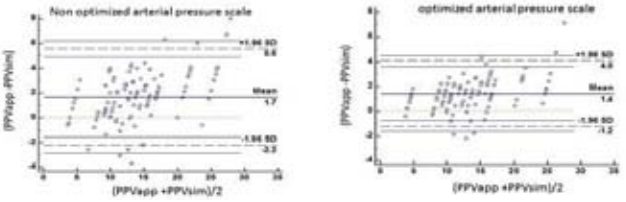
Background and Goal of Study: Pulse pressure variation (PPV) remains a good predictor of fluid responsiveness in the OR. However, PPV can be time-consuming to calculate (manual determination), is not always displayed on monitoring screens nor reliable through visual assessment and needs additional devices to be displayed. A new Android application (Captesia) automatically calculates the PPV utilizing a digital photograph of the arterial waveform from the monitor. The application determines the PPVapp by selecting peaks and troughs of the arterial curve. The aim of this pilot study was to test its accuracy against a hemodynamic simulator.
Materials and Methods: Capstesia was loaded on a Samsung Galaxy S4 phone. The first phase was designed to evaluate the precision error of the PPVapp using the same monitoring screen to capture four sets of 50 photos by four observers. Secondly, PPVapp was compared to PPVsim by altering PPVsim (4-24%), pulse pressure (30-45-60 mmHg), heart rate (60-80/min) and respiratory rate (10-15-20/min). The second phase was repeated after optimizing the scale of the arterial waveform. We evaluated the reproducibility of PPV by calculating the precision error and the variability between observers by comparing the median PPVapp values with a Kruskal Wallis test. Agreement between PPVsim and PPVapp was tested by a Bland-Altman analysis. A ROC curve analysis determined the ability of PPVapp to discriminate a PPVsim >13%.
Results and Discussion: The mean precision error of the PPV app was 8%, with significant inter-observers variability (p=0.003). 216 pairs of data were next obtained. Results are presented in figure 1 and 2. A PPVapp >15% could predict a PPVsim >13% with a sensitivity of 93% and a specificity of 94%. The amplitude of the pulse pressure and the heart/respiratory rate ratio had no impact on the accuracy of the PPVapp. Optimizing the arterial scale improved the agreement between PPVapp and PPVsim.



[Agreement between PPVapp and PPVsim]

Conclusion: With a low precision error and acceptable limits of agreement compared to a hemodynamic simulator, PPVapp could predict fluid responsiveness. Real conditions are warranted to test this application.

1AP9-4

Air Test: non invasive method for assessment of posteoperative atelectasis

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Background and Goal of Study: Pulmonary complications are frequent after surgery and can be associated with an increase in morbidity and mortality. General anesthesia and mechanical ventilation cause impairment of gas exchange due to airway closure and atelectasis where shunt fraction is increased. It would improve patients care to assess the presence of atelectasis at bedside. Determining the existence of atelectasis required image diagnostic. Pulse oximetry is an alternative method for assessing postoperative atelectasis based in the Iso Shunt curves and in the Oxyhemoglobin dissociation curve. At 96% periferical saturation we accomplish 15% of intrapulmonary shunt and the PaO_2 is about 90mmHg at FiO2 0.21. Most frequent etiology of shunt in the postoperative period is lung atelectasis. This situation is clinically relevant and can be evident by CT scan and ultrasonography.

Materials and Methods: 30 patients were mechanically ventilated under general anesthesia. All patients were haemodinamically stable. Mean Haemoglobyn was 11.4g/dL with normal pH and temperature. Once in the post anesthesia recovery room (PACU), patients with positive Air Test (SpO_2 equal or less than 96% with FiO2 0.21 for 5 minutes) were recruited. Basal lung ultrasonography and arterial gasometry was performed. After this, patients were encourage to repeat for ten times inspiratory maneuvers. At the end of the maneuvers, pulse oximetry, arterial gasometry and ultrasonography were repeated. CT scan was conducted at the moment of discharge from PACU.
Results and Discussion: We analyzed 18 women and 12 men. Mean age was 65 years. Mean saturation prior surgery was 96%. Median Ariscat score was 26. Visual analog pain scale was less than 3 out of 10. Basal condition was SpO_2 91%, $PaCO_2$ 41.8mmHg, PaO_2/FiO_2 298. After the maneuvers, SpO_2 96%, $PaCO_2$ 39.7mmHg, PaO_2/FiO_2 361. 25 patients showed atelectasis in ultrasonography and 29 patients on CT scan.
Conclusion: Air Test reveals masked postoperative atelectasis at bedside based on the clinical uses of the Iso Shunt curves and the Oxyhemoglobin dissociation curve. It´s cheap, fast and accurate.It will allow early diagnosis and treatment in order to reduce pulmonary complications and the length of stay.

1AP9-5

Analysis of the cost-effectiveness of low-flow anaesthesia on the basis of different anaesthetic strategies

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Background: Low-flow anaesthesia is an effective method to reduce operational charges of health care institutions. Using the adequate anaesthetic strategy, it can be applied on a wide range of patient population without risking patient safety. The primary aim of our study was to assess the differences among individual anaesthesiologists using low-flow anaesthesia on a machine that is capable to measure the exact gas consumption.
Methods: To manage the anaesthesia, Asys CS² anaesthesia machine, developed by Datex-Ohmeda, was used, allowing the measurement of the exact amount of the different anaesthetic gas components (inhalational agents, fresh gas flow). In this prospective study, we analyzed the data of 206 consecutive patients undergoing vascular surgery, anaesthetized by 20 anaesthesiologists in the Department of Cardiovascular Center, between February and July 2014. The examination focused on the hourly consumption of isoflurane, sevoflurane, nitrous oxide and oxygen. For statistical analysis, we used Student's T-test and one-way ANOVA as appropriate.
Results: The total length of anaesthesia was 28.647 minutes and the total gas consumption was 173,291.2 L (841.21±707.81 L). The totals of consumption were: O_2 39,615.42 L (19,753.97 L/h), N_2O 14,198 L (6858 L/h), sevoflurane 892 ml and isolurane 1615 ml. The hourly used quantities were: isoflurane 2.06±3.1 (ml), sevoflurane 3.6±5.4 (ml), N_2O 33.29±35.96 (L) and O_2 192±51.36 (L). We found significant differences regarding the hourly utilization of inhalational agents between anaesthesiologists ($p< 0.001$) and the used quantities per hour of isoflurane and sevoflurane (928 vs. 738 ml; $p=0.047$). The costs of isoflurane acquisition were significantly lower than those of sevoflurane. The application of nitrous oxide did not influence the financial indicators.
Conclusion: It is desirable to optimize the cost-effectiveness and environmental aspects of the use of volatile anaesthetics. Based on our findings, it is possible that clinicians have to be trained in the application of low-flow anaesthesia to be used in their daily routine.
References:
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1AP9-6

Are vaporizer-fresh gas flow sequences interchangeable between different anesthesia machines?

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Background: Vaporizer - fresh gas flow (F_D-FGF) sequences can help guide the administration of inhaled anesthetics and carrier gases, especially at reduced FGF. Because different anesthesia machines have different rebreathing characteristics, the sequences required to maintain a target agent concentration are bound to differ and thus may preclude their use with other machines from which they were originally derived. We therefore prospectively applied a model derived from an ADU (GE, Madison, WI, USA) to a Zeus machine (Dräger, Lübeck, Germany).
Methods: After IRB approval and informed consent, a FGF-F_D sequence that maintained the end-expired sevoflurane % ($F_A$sevo) at 2.2% in O_2/air with an ADU with 1 either 4, 2, or 0.75 L/min (see Table 1, [ref 1]) was applied to 57 ASA I-III patients (n = 19 in each FGF group) with a Zeus machine. Performance was assessed with Varvel's criteria: MDPE or median performance error (bias or "offset"), MDAPE or median absolute performance error (precision or "togetherness"), and divergence (drift) [ref 2]. The effect of age, height and weight was examined by linear correlation between MDPE and these parameters. Demographics of the different FGF groups were compared using ANOVA, with $p<0.05$ indicating statistical significance.
Results: See Table 2. Patient demographics did not differ between groups ($p>0.05$). Correlation between performance error and patient characteristics was poor.

Time interval					
0 - 4 min		4 - 15 min		15 - 60 min	
FGF	FD	FGF	FD	FGF	FD
4	4.0	0.75	5.4	0.75	4.4
4	4.0	2	3.8	2	3.4
4	4.0	4	3.3	4	3

[Table 1. Study groups. Three different vaporizer (FD, %) - fresh gas flow (FGF, L/min) sequences were prospectively tested]

		Varvel criteria (values in %)		
		MDPE	MDAPE	DIV
FGF (L/min)	0.75	9 (0, 18)	14 (5, 18)	-3 (-22, 8)
	2	9 (2, 14)	9 (5, 16)	-10 (-24, 3)
	4	9 (5, 11)	9 (7, 14)	-8 (-13, -3)

[Table 2. Performance characteristics]
MDPE = median performance error (%)
MDAPE = median absolute performance error
DIV = divergence
See text for details

Conclusion(s): A F_D-FGF sequence for the ADU performs well with the Zeus (MDPE and MDPE <20% is deemed acceptable for target controlled infusions). Remaining differences reflect differences in:
(1) rebreathing characteristics ;
(2) patient population; and
(3) vaporizer/injector output.
Performance at lower FGF and with other machines is warranted.
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1AP9-8

Bleeding and transfusion profile in complex spinal deformity surgery. Predictive value of hemostatic variables

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Background and Goal of Study: Blood loss in major spinal deformity surgery can be very high. The main objective of the study was to describe the related bleeding and transfusion profile. Hemostatic and blood volume variables were evaluated as possible predictive values of severe bleeding and high transfusion rate.
Materials and Methods: A single center retrospective review of prospectively collected data was performed. Spinal deformity patients >18 years with intraoperative bleeding >400ml were included. Preoperative condition, blood tests, total bleeding (additional 24h), transfusion registers and postoperative complications were analyzed. The sample was stratified in four quartiles of estimated blood loss (EBL, %): ≤15%, 16-30%, 31-50% and >50% (estimated blood volume: men 75ml/kg, women 65ml/kg). The transfusion risk was considered low (0-1 units), moderate (2-3), high (4-5) or very high (>5).
Results: 75 patients, 57 females, mean age 50.1 years (SD19.5), who underwent 88 operations, met inclusion criteria. Mean surgical time was 405.5 min (SD141.8), correlating with total transfusion and EBL, r=0.58 (p< .0001). Mean EBL was 57.43% (SD30.7) and 24.1% of the procedures >80% EBL. The transfusion rate was 68.2%, mean 2.1 allogenic units (0-11) and average cell saver volume 242.3ml (SD256.4). However, only 18.2% of surgeries were related to a high risk transfusion rate with no statistical differences between hemostatic variables and high versus low-moderate transfusion risk, only EBL (p=.0014). The mean preoperative Hb was 13.43 g/dL (9.4-17.4) and 9.94 g/dL (6.8-14.2) 24h post-surgery. None of the hemostatic variables was determined as a predictor of excessive bleeding or high transfusion risk. Mean preoperative fibrinogen was 3.16 g/L (SD0.75) and 3.04 g/L (SD0.84) 24h after surgery. Fibrinogen concentrate was administered in 14.8% of the cases (mean dose 2.23g) and one patient received 600 UI PCC. FFP was transfused in 15.9% of surgeries (mean 3.4 units) and 5.7% required platelets (mean 1 pool). Intraoperative EBL was related to more postoperative complications (p=.0081).
Conclusion: One in four patients undergoing complex spinal deformity surgery was related to a severe bleeding and 82% up to moderate transfusion. A goal driven coagulation and transfusion decision algorithm should be introduced in order to diminish hemorrhage, allogenic blood and complications. No association between hemostatic variables and bleeding or transfusion rate was found.

1AP9-9

Comparison and evoluation of the effects of administration of postoperative non-invasive mechanical ventilation methods (CPAP and BIPAP) on respiratory mechanics and gas exchange in patients undergoing abdominal surgery

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Background and Goal of Study: The aim of our study is to investigate the effect of two different methods of Continuous Positive Airway Pressure (CPAP) and Bilevel Positive Airway Pressure (BIPAP) and oxygen support under spontaneous ventilation on respiration mechanics, gas exchange and face mask lesion during early postoperative period in patients undergoing upper abdominal surgery.
Materials and Methods: Eighty patients undergoing elective abdominal surgery with laparotomy, between 25-75 years old and ASA status II- III with Chronic obstructive pulmonary disease (COPD) diagnosis were included to the study. Subjects were randomly allocated to four groups. During first postoperative hour, first group received BIPAP(Respironics Vision), second group received high flow CPAP, third group received CPAP with mechanical ventilator (Respironics Vision) and forth group received deep breathing exercises, respiratory physiotherapy and O2 therapy. Preoperative, postoperative before and after treatment PaO2, PaCO2, SpO2, expiratory tidal volume(ETV), respiratory rate(RR) levels were recorded. Subjects with face mask lesions were recorded. Oneway Anova test, variant analysis on repeated measures, Fisher Freeman Halton test on qualitative data were used in statistical analysis.
Results and Discussion: In all groups, PaO2 and ETV measurements were higher at first hour postoperatively compared to zero hours postoperatively. We found that CPAP with mechanical ventilator increased PaO2 and SpO2 values more and, TV levels were higher in postoperative period compared to preoperative period. PaCO2 levels were elevated at the zero hours postoperatively and at the end of first hour, they decreased approximately to preoperative values except in the fourth group.
Conclusion: In conclusion, administration of prophylactic respiratory support can prevent deterioration of pulmonary functions and hypoxia in patients with COPD undergoing upper abdominal surgery. In addition we found that CPAP with mechanical ventilator had better effects on PaO2, SpO2, ETV compared to other techniques.

1AP9-10

Effects of alpha 2 agonist drugs on alveolar macrophages

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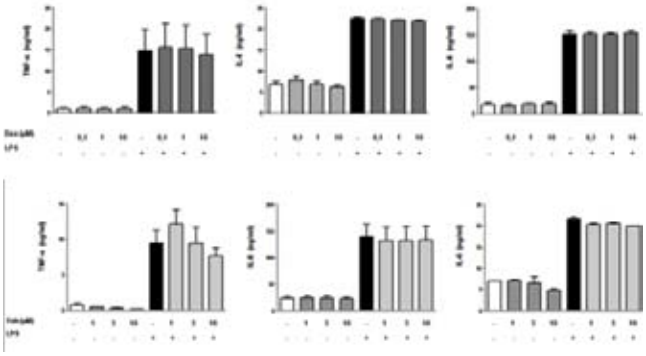
Background and Goal of Study: The autonomic nervous system has both pro and anti-inflammatory effects, depending on the peripheral receptor involved. Almost all immune cells, including macrophages, are equipped with adrenergic receptors. Therefore, adrenergic agonists and antagonists drugs may play a very important role in the regulation of inflammation. Aim of this work is to evaluating the immuno-modulatory activity of three alpha-2 agonist drugs (dexmedetomidine, medetomidine, clonidine) on pulmonary macrophages.
Materials and Methods: A model of LPS-induced inflammation in populations of alveolar macrophages (HLM) derived from macroscopically healthy human lung tissue was used for this study. We tested the expression of mRNA for the three isoforms of the α2 receptor and the corresponding protein synthesis. After isolation of macrophages, the cells were preincubated with dexmedetomidine, medetomidine, clonidine or yohimbine (an α2 antagonist), alternately, at various dosages, and then incubated with LPS. The release of pro-inflammatory cytokines (TNF-α, IL-8, IL-6) was assessed.
Results and Discussion: HLMs show $\alpha_{2A,}$ α_{2B} and α_{2C} receptors; the expression of the three subtypes differs among different individuals. Pre-treatment with dexmedetomidine does not significantly alter the secretion of the cytokines at any of the concentrations used (0.1 μM, 1 μM, 10 μM) for this study. Similar results were obtained by the use of other alpha-2 agonists drugs (medetomidine, clonidine) and with yohimbine.



[Dexmedetomidine and yohimbine have similar effects]

Conclusion: Selective α2-adrenergic receptor agonist drugs do not have effect on HLM cytokines release but they may protect the cells by other mechanisms and inhibit the secretion of noradrenaline in the brain and then affecting the release of pro-inflammatory cytokines *in vivo*.
Reference: Gu J, et Al. Acta Anaesthesiol Scand. 2011 Nov;55(10):1272-8.

1AP9-11

Evaluation of an oxygen nasal cannula-based capnometry device for respiratory monitoring in patients extubated after abdominal surgery: a prospective observational study

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Introduction: The accuracy of end-tidal carbon dioxide concentration ($EtCO_2$) as a predictor of partial pressure of carbon dioxide in the arterial blood ($PaCO_2$) is well established in intubated patients, but whether it is clinically acceptable during spontaneous breathing in non-intubated patients remains undetermined. Therefore, we aimed to compare $EtCO_2$ measured by capnometry using an oxygen nasal cannula with a carbon dioxide sampling port (capnometry-type oxygen cannula) and $PaCO_2$ in extubated subjects who had undergone abdominal surgery. Furthermore, we investigated whether spontaneous breathing with the mouth closed consciously and spontaneous deep breathing affected dissociation between $PaCO_2$ and $EtCO_2$.
Methods: After institutional ethical approval and informed consent, 20 adult post-abdominal surgery patients (13 men, 7 women) with a mean age of 66 y (interquartile range of 61-72 y) and BMI of 20-24kg/m^2 who were admitted to the intensive care unit were studied. After extubation, oxygen was supplied at 4L/min using capnometry-type oxygen cannula. Respiratory rate, $EtCO_2$, and $PaCO_2$ were measured every 30 minutes.The correlation between respiratory rate of capnometer (RR C) and respiratory rate of direct measurement (RR D) was analyzed.Furthermore, bias, precision, and limits of agreement between $PaCO_2$ and $EtCO_2$ were calculated using the Bland-Altman method during various breathing patterns, such as resting (RE), breathing with the mouth closed consciously (MC) and deep breathing (DB) conditions.
Results: The correlation (r) between RR D and RR C was 0.659. Compared with $PaCO_2$, the bias and limits of agreement were 14.8 (-1.3 to 30.9) for $EtCO_2$ RE, 10.2 (-2.3 to 22.7) for $EtCO_2$ MC and 7.7 (-3.2 to 18.6) for $EtCO_2$ DB.DiscussionIn 3 of 20 (15%) subjects, we could not measure $EtCO_2$ RE, probably because those patients exhaled CO_2 through the mouth. However, breathing under closure of mouth consciously enabled measurement of $EtCO_2$ in all patients.The difference between $PaCO_2$ and $EtCO_2$ DB was smaller compared with $EtCO_2$ RE and $EtCO_2$ MC. However, it is difficult to predict the precise value of $PaCO_2$ under these breathing conditions because the limits of agreement were wide.
Conclusion: In post-abdominal surgery extubated patients, the capnometry-type oxygen cannula may be useful for continuous CO_2 and respiratory rate monitoring under various breathing patterns. However, precise estimation of $PaCO_2$ from $EtCO_2$ may be difficult.

1AP10-1

Effects of intraoperative protective ventilation on lung epithelial marker sRAGE, the soluble form of the receptor for advanced glycation end-products, in patients without preexisting lung injury: ancillary findings from the IMPROVE randomized trial

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Background and Goal of Study: The soluble form of the receptor for advanced glycation end-products (sRAGE) is elevated and correlated with severity in acute respiratory distress syndrome (ARDS). However this marker of lung epithelial injury has been poorly investigated in patients without ARDS, and whether an intraoperative lung-protective ventilation strategy influences its levels remains underinvestigated.
Our goal was therefore to assess the effects of a multi-faceted lung-protective ventilation strategy (combining low tidal volume, positive end-expiratory pressure and recruitment maneuvers), as compared with a non-protective approach (with high tidal volume and zero end-expiratory pressure), on plasma sRAGE in patients without lung injury but at risk of postoperative pulmonary complications during the first week after major abdominal surgery.
Materials and Methods: Measurement of plasma sRAGE levels from 95 subjects enrolled in a large randomized controlled trial of lung-protective ventilation for major abdominal surgery. Plasma sRAGE levels were measured in duplicate ELISA on preoperative day, immediately after surgery, and on postoperative days 1, 3 and 7.
Results and Discussion: Early postoperative plasma levels of sRAGE were significantly lower in the lung-protective ventilation group than in the non-protective group, and intraoperative changes in plasma sRAGE were associated with postoperative development of ARDS and the risk for postoperative hypoxemia.
This intraoperative decrease in plasma sRAGE under lung-protective ventilation could reflect a lesser degree of epithelial injury and inform on the risk of postoperative hypoxemia and ARDS, prompting future validation studies.
Conclusions: Use of a lung-protective ventilation strategy in intermediate to high-risk patients undergoing major abdominal surgery markedly decreased plasma sRAGE during the operative period, as compared with non-protective ventilation.
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Acknowledgements: This work was supported by grants from the Auvergne Regional Council ("*Programme Nouveau Chercheur de la Région Auvergne*" 2013), the French *Agence Nationale de la Recherche* and the *Direction Générale de l'Offre de Soins* ("*Programme de Recherche Translationnelle en Santé*" ANR-13-PRTS-0010).

1AP10-2

Effects of intravenous lidocaine infusion in orthognathic surgery

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Background: Intravenous (IV) lidocaine showed its efficacy as co-analgetic in abdominal surgery by reducing peroperative opioid consumption and postoperative hyperalgesia[1]. Lidocaine showed anti-inflammatory properties gynecological surgery[2]. Orthognathic surgery is characterized by long procedures with high intraoperative opioid requirements and important facial edema[3]. The aim of this study was to evaluate the effect of IV lidocaine on perioperative opioid consumption and it's effect on inflammatory response.
Materials and Methods: 20 patients were randomly allocated into 2 groups for a prospective, double blind trial. In **group L (gr-L)**, patients received 1.5 mg/kg Lidocaine at induction of general anesthesia and a continuous infusion of 2mg/kg/h until the end of surgery. The control group received equal volumes of NaCl 0.9% instead. A standardized anesthesia protocol consisted of target-controlled infusion of Propofol and Remifentanil. Propofol was adjusted according to the Entropy depth of anesthesia monitor. Starting at 0.25mcg/kg/min, Remifentanil was adjusted by steps of 0.05mcg/kg/min every 5 minutes if heart rate or blood pressure varied more than 15 and 20% respectively from baseline. Postoperative analgetic requirements were assessed by intravenous patient controlled morphine administration. Recorded variables: total doses of remifentanil and morphine, postoperative plasma levels of fibrinogen, CRP and leucocytes. Statistical analysis included Student's T and Wilcoxon's tests. Data are presented as mean ± standard deviation (SD) and $p<0.05$ was considered significant.
Results: Total opioid consumption during surgery was lower in gr-L (3549,40±631 *vs* 5788±2703,86 mcg; *p=0.03*). Pain scores and postoperative opioid consumption were comparable between groups. 2 Hours after surgery, Leucocyte count was lower in gr-L (13.16±2.44 *vs* 17.97±5.01; p=0.02) Other inflammatory markers did not differ; however CRP although not significant was lower in gr-L, 24h after surgery (10.49±47.01 *vs* 57.12±40.56; *p=0.052*).
Conclusion: In our study settings, intravenous Lidocaine infusion reduces peroperative opioid requirements in orthognathic surgery. A potential, early, moderate, anti-inflammatory effect should be confirmed by a study including a larger number of patients.
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1AP10-3

Effects of low dose midazolam on bradycardia and sedation during dexmedetomidine infusion

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Background and Goal of Study: Dexmedetomidine is a sedative which does not cause respiratory depression. But the initial loading dose of dexmedetomidine can lead to bradycardia which requires intervention. We tried to evaluate the effect of low dose midazolam on bradycardia and sedation during dexmedetomidine infusion.
Materials and Methods: 72 patients were randomly assigned to the Dex 1.0 or Dex 0.5 group. After intrathecal anesthesia, the Dex 1.0 group received an initial loading dose of 1.0 ug/kg of dexmedetomidine. The Dex 0.5 group was given midazolam 0.025mg/kg and 0.5ug/kg of dexmedetomidine. Heart rate (HR), blood pressure, respiratory rate, bispectral index (BIS), and the Observer's Assessment of Alertness/Sedation Scale (OAA/S) were recorded at ten time points (baseline, after anesthesia, before dexmedetomidine administration, 5, 10, 15, 20, 40, 60, 80 min after dexmedetomidine administration).
Results and Discussion: The incidence of bradycardia requiring atropine was significantly higher in the Dex 1.0 group than in the Dex 0.5 group (15/33 vs. 5/32, p = 0.009). The Dex 0.5 group had a significantly lower BIS and OAA/S score than the Dex 1.0 group (p = 0.002 and p = 0.000, respectively) 5 min after dexmedetomidine administration. HR was significantly lower in the Dex 1.0 group (p = 0.003) 10 min after dexmedetomidine administration. But BIS and OAA/S score were lower in the Dex 0.5 group (p = 0.034 and p = 0.001, respectively). Other hemodynamic variables at other time points were similar between the two groups.
Conclusion: Low dose midazolam with halved loading dose of dexmedetomidine was superior in terms of bradycardia and sedation than dexmedetomidine alone.

1AP10-4

Comparison between two strategies of fluid management on blood loss and transfusion requirements during liver transplant, a retrospective matched case control study

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Background: Although central venous pressure (CVP) is supposed not to be used for making clinical decisions regarding fluid management[1], low CVP continues to be a recommended technique as it decreases blood loss and transfusion requirements during liver transplant (LTx)[2].
Aim: To compare the effect of low CVP and transesphageal Doppler (TED) fluid management on blood loss and blood transfusion during LTx.
Methods: Two groups of recipients :GI, control, n=46, where CVP was decreased by 40%, relative to the preoperative value in the preanhepatic phase with mean arterial pressure kept >60 mmHg by vasoconstrictors, and GII; n=45, where TED guided protocol[3] based on corrected flow time (330-360 msec.) and stroke volume (60-100ml) (SV) was followed with systemic vascular resistance kept >750 $dyns^{-1}sec.\ m^{-5}$ by noradrenaline. Fluids given were; Ringer acetate $6ml^{-1}kg\ h^{-1}$, 6% HES 130/0.4 and albumin 5% which were manipulated according to both protocols. Coagulation defects were corrected only when there is uncontrolled surgical bleeding following thromboelastometry. Intraoperative blood loss, blood and fluids requirements, urine output (UOP), creatinine (preoperative, day 1, 3, 5), and lactate (preoperative, end anhepatic, end surgery, day 1, 3) were compared.
Results: The 2 groups were comparable regarding MELD score, preoperative hemoglobin, international normalized ratio, platelet count, creatinine, and lactate. Prior the anhepatic phase, CVP was significantly lower in GI (5.8± 0.9 vs 9.3 ± 1.2; p<.001). 4 patients in GI and 11 in GII received noradrenaline. GII tended to have less but not significant blood loss (ml^3) (2327± 686 vs 2396± 680, p; .6), packed red blood cells units (3.6 ± 2.1 vs 3.9 ± 2.2, p; .5) and plasma units (3.6± 2.2 vs 4± 3, p; .5). GII received less colloid (liter) (3.3 ± .73 *vs* 3.8 ± 1.07, P; .01).
Lactate was significantly higher in GI at end anhepatic phase and end surgery (p<.001, 0.01 respectively). UOP in anhepatic phase but not total UOP was significantly lower in GI (p<.001). Creatinine was significantly lower in GII in postoperative day1, and 3 (p; .02, .04 respectively). No significant correlation between CVP and SV at any measuring point in GII.
Conclusion: During LTx, TED guided optimal fluid management was comparable to low CVP technique regarding blood loss and transfusion requirements and had better impacts on creatinine and lactate.
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2. Liver Transpl 12:117-123, 2006
3. Br J Anaesth 2006;97:4-11

Variable		CVP baseline	CVP preanhepatic	CVP 30 min post reperfusion	CVP end surgery
SV baseline	Pearson Correlation	.165	.178	.150	.168
	Significance (2-tailed)	.279	.243	.325	.270
SV preanhepatic	Pearson Correlation	.072	.103	.054	.136
	Significance (2-tailed)	.636	.501	.727	.373
SV 30 min post reperfusion	Pearson Correlation	-.037	.103	.015	.037
	Significance (2-tailed)	.811	.499	.924	.810
SV end surgery	Pearson Correlation	.204	.300	.096	.037
	Significance (2-tailed)	.180	.045	.528	.807

[Correlation between stroke volume and CVP in GII]

1AP10-5

Comparison of palonestron, granisetron, and ramosetron to prevent postoperative nausea and vomiting after laparoscopic gynecologic surgery: a prospective observational trial

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Background and Goal of Study: Selective 5-hydroxytryptamine type 3 (5-HT3) receptor antagonists are reported to have potent antiemetic effects for postoperative nausea and vomiting(PONV). The purpose of this study was to prospectively evaluate the efficacy of palonosetron, granisetron, and ramosetron for the prevention of PONV in patients undergoing laparoscopic gynecologic surgery.
Materials and Methods: In this prospective, randomized controlled study, 89 healthy female patients who were undergoing laparocopic hystectomy under general anaesthesia were enrolled. Patients were divided into three groups: the palonostron (0.075 mg i.v.; n=29), the granisetron group (3 mg i.v.; n=30), and the ramosetron group (0.3 mg i.v.; n=30). The treatments were given before the end of surgery. The incidence of PONV, severity of nausea, and the use of rescue antiemetic requirements during the first 48 h after surgery were evaluated.
Results and Discussion: The overall incidence of PONV was 19.3% for this series. The incidence of nausea was similar in the ramosetron (16.6%), palonostron (20.6%) and granisetron group (20.7%) without statistical significance (p = 0.21). In addition, the need for rescue antiemetics between 0 and 48 h was also similar for the all groups without statistical significance(p = 0.320). The incidences of the adverse events, such as headache and dizziness, were similar among the three groups. The numbers of complete responders were the same for all groups (p = 0.74): 22 (75.8%) for palonosetron, 21 (72.4%) for granisetron, and 22 (73.3%) for ramosetron.
Conclusion(s): There were no significant differences in the overall incidence of nausea and rescue drug administered for palonosetron, granisetron and ramosetron group.
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1AP10-6

Swallowing action immediately before intravenous fentanyl at induction of anaesthesia prevents fentanyl-induced cough: a randomized controlled study

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Background and Goal of Study: Fentanyl is a strong mu-opioid analgesic, which attenuates the response of the stimulation by surgical invasion and tracheal intubation. However, the intravenous fentanyl often induces cough (fentanyl-induced cough [FIC]) during the induction of anaesthesia.[1] We found that swallowing action attenuated FIC, when it was asked at induction of anaesthesia to reduce pharyngeal discharge for facilitating laryngoscopy. In the current study, we investigated the relation between occurrence of FIC and swallowing action.
Materials and Methods: Ethical approval was obtained from the ethical committee of Kyushu University Hospital and St. Mary's Hospital. Patients (20-64 year-old, ASA I or II, undergoing elective surgery) were recruited for this study. After getting written informed consent, they were divided into two groups; immediately before intravenous fentanyl, S group was urged to do swallowing action, and non-S group had no swallowing action. They received intravenous fentanyl 2 or 4 micro-g/kg first, and were observed for 90 seconds. Patient´s background, dose of fentanyl and occurrence of cough were recorded, and the motion pictures were also recorded. The incidence of FIC was evaluated by the Chi-square test, and severity was tested by the Wilconxon rank-sum test. A $p<0.05$ was considered statistically significant.
Results and Discussion: The incidences of FIC in the S and non-S groups were 14.0% and 40.4%, respectively. The risk of FIC was reduced in the S group by 75%; risk ratio (95% confidence interval) was 0.35 (0.20, 0.60). Number of times of coughs in the S group was less than that in the non-S group ($P< 0.0001$). This method is simple and easy, but effective without requiring medicine or extra time. In addition, it may facilitate Laryngoscopy by reducing pharyngeal discharge.
Conclusion(s): Swallowing action immediately before intravenous fentanyl is simple and clinically feasible method for preventing FIC effectively.
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1AP10-7

The effect of anaesthetic on acid-base status and blood gas composition

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Background and Goal of Study: The aim of the study was to analyze the effect of multicomponent general anesthesia on the basis of such drugs as isoflurane, sevoflurane and propofol on the parameters of gas composition of venous blood.
Materials and Methods: 125 patients aged 21 to 81 years scheduled for operations in abdominal surgery, were enrolled in the prospective randomized study. All patients were divided into three groups. In group I (n=40) and group S (n=40) anesthesia maintenance was made by inhalation of isoflurane or sevoflurane respectively in a mixture with N_2O and O_2 (FiO_2= 33%). In the group P (n=45) - intravenous titration of propofol and inhalation of O_2-air mixture (FiO_2= 33%). Premedication and induction anesthesia in patients of all groups were performed by the same scheme.
The venous blood samples were performed at 6 stages: 1st - before anesthesia, 2nd - 5 min after tracheal intubation, 3rd - 10 min after intubation, 4th - 20-30 min after tracheal intubation, 5th - the end of the operation, 6th - before extubation.
Results and Discussion: On the 1st stage the pCO2 level was increased about 51 mmHg. At stages 2-5 pCO_2 level was about 38-41 mmHg ($p>0,05$, no statistically significant differences between groups). Authentic changes pO_2 level was received in Group I vs Group P and Group S vs Group P (Mann-Whitney U test, * - $p< 0,001$) at 3-5 stages. In Group I: 1- 28,5±8,7; 2- 71,7±26,2; 3- 81,3±27,7*; 4- 84,9±28,6*; 5- 77,2±30,9*; 6- 48,9±16,7 mmHg. In Group S: 1- 27,6±10,5; 2- 74,6±28,4; 3- 70,8±23,7*; 4- 78,6±25,4*; 5- 66,0±21,3*; 6- 43,4±13,4 mmHg. In Group P: 1- 27,4±8,7; 2- 59,2±18,5; 3- 46,8±14,3; 4- 46,8±10,8; 5- 47,2±13,0; 6- 43,9±13,1 mmHg. Similar changes were revealed for venous oxygen saturation. Significant differences were received between isoflurane vs propofol and sevoflurane vs propofol at 3-5 stages.
In Group I: 1- 42,9±17,4; 2- 88,8±10,1; 3- 89,9±12,5*; 4- 91,9±10,6*; 5- 88,9±11,9*; 6- 72,9±16,3%.
In Group S: 1- 41,2±19,1; 2- 90,0±10,7; 3- 89,5±8,7*; 4- 93,1±7,5*; 5- 87,1±10,3*; 6- 67,7±19,4%.
In Group P: 1- 41,1±817,9; 2- 85,2±11,9; 3- 13,4±74,1; 4- 75,2±12,2; 5- 73,0±14,1; 6- 68,8±16,4%.
Conclusion: Application volatile anesthetics or propofol for anaesthesia maintenance differently influences on the oxygen in venous blood.

1AP10-8

The effect of different degree of Trendelenburg position on the optic nerve sheath diameter during laparoscopic surgery

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Background and Goal of Study: Change of intracranial pressure (ICP) during laparoscopic surgery is associated with intraabdominal pressure, arterial concentration of carbon dioxide ($PaCO_2$) or positional changes. Recently, many reports documented that ICP has correlation with optic nerve sheath diameter (ONSD), which was measured using ultrasonography and was a noninvasive rapidly applicable technique [1-6]. The aim of this study is to investigate the change of ONSD according to positional change associated with laparoscopic surgeries.
Materials and Methods: After the IRB approval, female patients who are scheduled to undergo laparoscopic surgery were enrolled. 56 patients were randomly assigned to 2 groups [group 1: 30° Trendelenburg position (TP), n=26 vs. group 2: 30° Reverse Trendelenburg position (RTP), n=30]. Respiratory rate was controlled to maintain End-tidal concentration of carbon dioxide ($ETCO_2$) below 40 mmHg. Ultrasonographic analysis of ONSD was measured at 5 time points: before CO_2 pneumoperitoneum in the supine position (T0), 5, 10, 15 min after CO_2 pneumoperitoneum with each group's position (T5, T10, T15), and 5 min after returning to supine position without CO_2 pneumoperitoneum (T_{END}). $PaCO_2$, $ETCO_2$, and mean arterial pressure were also measured at the same time points.
Results and Discussion: While ONSD was 4.45 ± 0.27, 4.6 ± 0.36, and 4.44 ± 0.41 mm at T0, T5, and T_{END} in group 1, it was 4.45 ± 0.33, 4.45 ± 0.39, and 4.44 ± 0.42 mm in group 2. There were no significant changes of ONSD with 30° TP or RTP. ONSD at T5 was significantly more increased in comparison with that at T0 in group 1 ($P=0.032$). The incidences of ONSD above 5.2 mm were 3.8% and 0.0% in group 1 and 2, respectively, except 0% and 6.7% at T5, without significant difference between groups. This cut-off point was used for determination of raised ICP above 20mmHg[1]. In TP, some authors demonstrates an increase in ONSD and confirmed ICP rises to ≥20 mm Hg during laparoscopic surgery [1, 3], while another authors Suggested that they did not find any changes in ONSD even though ICP was increased [2]. RTP is useful in helping to decrease ICP [4]. In addition, the ONSD was rapidly changed in response to $ETCO_2$ [6].
Conclusion(s): Both positions are not associated with the increase of ONSD in the condition below $ETCO_2$ of 40 mmHg during laparoscopic surgery except 5 minute in Trendelenburg position.

1AP10-9

The effect of intraoperative use of esmolol on anesthetic requirement and postoperative outcomes

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Introduction: A number of investigators have identified antiemetic, antinociceptive and anesthetic sparing [4,5] effects of esmolol. We aimed to evaluate the impact of esmolol on anesthetic requirement and postoperative outcomes in patients undergoing genecology cancer surgery.
Methods: 80 adult women undergoing extended abdominal hysterectomy, were randomized into two groups: 1) control group (C) n=40 (midazolam, propofol, N_2O, fentanyl), 2) esmolol group (E) n=40 (midazolam, propofol, N_2O, fentanyl, esmolol). All patients received midazolam 0,1 mg/kg only for anesthesia induction. In Group E, before endotracheal intubation, patients were intravenously administered with esmolol 0,96±0,13 mg/kg. After anesthetic induction they were continuously infused with esmolol 0,59±0,24 mg/

kg/h. The BIS value was maintained at 50-60. The postoperative outcomes (incidence of PONV, extubation time,degree of pain, total dose of postoperative opioids) were assessed for 24 hour postoperatively.
Results: The total dose of fentanyl and rocuronium were not different between the two groups, but at the E group, the total dose of propofol (1,54±0,57 mg/kg/h) was significantly decreased versus C group (1,92±0,62 mg/kg/h, p=0,007). In our study we did not find significantly differences between the groups in postoperative outcomes. Exact mechanisms by which continuous esmolol infusion has an anesthetic sparing effect is unclear [1].
Conclusions: Intraoperative esmolol infusion significantly decreased requirement of propofol.
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1AP10-11

The effects of intra-operative dexmedetomidine on postoperative inflammatory responses in patients undergoing robotic-assisted radical prostatectomy: a double-blind randomized controlled trial

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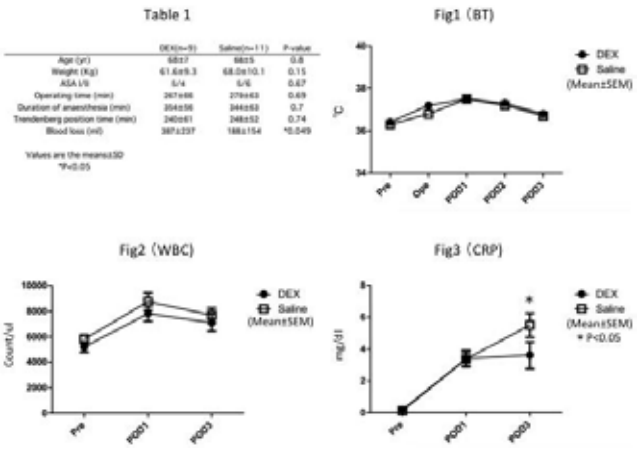
Background and Goal of Study: Dexmedetomidine(DEX) is a highly selective α2-receptor agonist that has been studied in relation to ischaemia/reperfusion injuries, and has been suggested to exhibit anti-inflammatory properties. Robotic-assisted laparoscopic radical prostatectomy(RARP) requires pneumoperitoneum in a steep Trendelenburg position. This combination is considered to decrease perfusion of the intra-abdominal organs and lower extremities by reducing perfusion pressure that may be associated with ischaemia/reperfusion injuries. We evaluated the effects of intra-operative DEX on postoperative inflammatory responses in patients undergoing RARP.
Material and methods: After obtaining institutional review board approval and informed consent, patients scheduled for RARP were included in the study from June to November 2014 consecutively. Enrolled patients were randomized into a DEX(D) group or a control(C) group. Patients and investigators were all blinded to group allocation. Anaesthesia was administered and maintained with propofol, remifentanil, and rocuronium. In the D group, DEX was administered at 0.4μg/kg/hr immediately after the induction of anaesthesia until the end of the surgery. While in the C group, physiological saline was administered at a relevant rate to the treatment group. The CRP, WBC counts and highest body temperature(BT) were measured before surgery(Pre), and also on the first and third postoperative days(POD 1 and POD 3, respectively). Both groups were compared using a two-way ANOVA with Bonferroni post hoc tests.
Results and Discussion: Of the twenty-one patients enrolled, one patient was excluded from the analysis because of postoperative infection. Patient characteristics are presented in Table 1. BT and WBC counts did not differ among groups (Fig1 and 2). The CRP level on postoperative day 3 was significantly lower in the D group(D:3.6±0.8,C:5.5±0.7,mg/dl,Fig3). The anti-inflammatory mechanism of utilized by DEX is unclear. However, DEX may modulate the production of cytokines by macrophages and monocytes.
Conclusion: Our results suggest that intra-operative DEX may decrease the magnitude of inflammatory response during RARP.

Table 1

	DEX(n=9)	Saline(n=11)	P-value
Age (yr)	68±7	68±5	0.8
Weight (Kg)	61.6±9.3	68.0±10.1	0.15
ASA I/II	5/4	6/6	0.67
Operating time (min)	267±66	279±63	0.69
Duration of anaesthesia (min)	354±56	344±53	0.7
Trendenberg position time (min)	240±61	248±52	0.74
Blood loss (ml)	387±237	188±154	*0.049

Values are the means±SD
*P<0.05



[Table and Figures]

1AP11-1

Anaesthetic support for emergency endoscopy for peptic ulcer bleeding. A nationwide population-based cohort study

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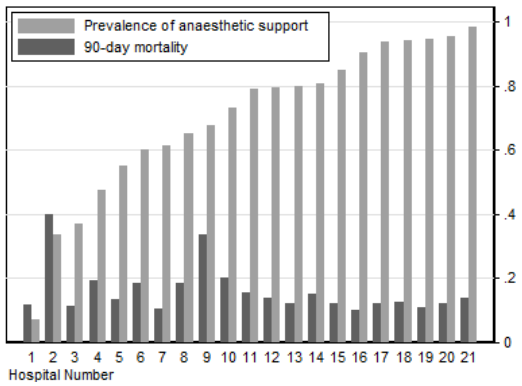
Background and Goal of Study: Peptic ulcer bleeding carries a 10% risk of death within 30 days. Most patients undergo emergency esophago-gastro-duodenoscopy (EGD), but no standard approach exists to the level of monitoring or presence of staff with anaesthetic expertise required during the procedure. We describe the prevalence and inter-hospital variation of anesthetic support in Denmark, identify clinical predictors for choosing anaesthetic support, and assess the association between anaesthetic support and mortality.
Materials and Methods: This nationwide, population-based cohort study included all emergency EGDs for PUB in adults during 2012-2013. Clinical predictors of anaesthetic support were identified and 90-day all-cause mortality after EGD was estimated by logistic regression and adjusted for potential confounders.
Results and Discussion: 3,056 EGDs performed at 21 hospitals were included; 2,074(68%) received anaesthetic support and 982(32%) were sedated under supervision of the endoscopist. The prevalence of anaesthetic support varied between hospitals, median=78.9%(range 6.9%-98.6%). Independent predictors of anaesthetic support were high ASA score with odds ratios(OR) and 95% confidence intervals(CI) of 3.58(1.50-8.56) for ASA scores >=4, compared to ASA=1; low CCI score, OR=0.71(0.57-0.90) for CCI scores >=3, compared to CCI=0; and shock at admission, OR=3.76(1.93-7.31). Of patients who had EGD with anaesthetic support, 16.7% died within 90 days after the procedure, compared to 9.8% of patients who had no anaesthetic support, adjusted OR=1.51(1.25-1.83). Comparing the two hospitals with the most frequent (98.6% of all EGDs) and least frequent (6.9%) use of anaesthetic support, both receiving unselected patients, 90-day mortality was 13.7% and 11.7%, respectively (Figure), adjusted OR=1.22(0.55-2.71).



[Figure. Use of anaesthetic support and mortality per hospital]

Conclusions: At the hospital level, use of anaesthetic support for EGD varied greatly, but was unrelated to mortality. At the individual level, anaesthetic support was associated with high mortality, most likely because it was the preferred choice for high-risk patients. Future studies should examine which patients might benefit from anaesthetic support.

1AP11-2

Arteriovenous differences in coagulation parameters and thromboelastographic (TEG) values in the perioperative evaluation of patients with tumor pathology

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Background and Goal of Study: The different rheological characteristics of the arterial blood and his influence on the activation of the plasmatic coagulation makes the TEG user manuals and the scientific literature [1,2] recommends the use of venous blood sample for TEG realization. Recent emergence of research that question the existence of differences between patterns of arteriovenous coagulation leads us to consider the possibility of using indiscriminately both arterial and venous samples for the coagulation approach. The goal of this study is to evaluate possible differences between these samples in patients undergoing surgery for removal of a tumor.
Materials and Methods: This study consists of a prospective cohort of 40 patients .Selected patients in our study underwent surgical removal of a tumor in the HGUA and starting from values of normal coagulation. Inclusion criteria were being > 18 years old which require central venous catheter insertion and invasive arterial monitoring.After induction of anesthesia, jugular or subclavian venous catheter was inserted and a radial arterial access. Then, extraction of the samples was performed, before using the accesses to infuse any drug and always before the start of surgery.Determining coagulation parameters by TEG is based on the study of the viscoelastic properties of the fibrin thrombus. The TEG values analyzed were: CT = time to initial fibrin formation (s) CFT = time to clot formation (s) MCF = maximum amplitude (mm), absolute clot strength.
Results: Forty patients (16 fem. and 24 male) were included in this study (30 underwent thoracic surgery, 5 neurosurgery and 5 abdominal surgery). Comparability of the samples was performed by calculating the intraclass correlation coefficient (ICC).The ICC values of our samples were: CT Extem Venous Vs Arterial : 0.27; CFT Ext: 0.57; A10 Ext:0.82; MCF Ext: 0.61; CT Int: 0.2; CFT Int: 0.2; A10 Int: 0.6; MCF Int:0.35; MCF Fibtem: 0.64.
Conclusion: Differents results between the values of the thromboelastographic parameters of blood samples both venous and arterial, our study shows that perhaps the activation of factors and pathways of coagulation are not similar and comparable both venous and arteria.Taking into account the limitations of a follow-up study with such a small sample and in some of the parameters studied we obtained inconclusive results, our research serves to highlight an issue that has received little attention so far.

1AP11-3

Assessment of response to noxious response using the qNOX nociception index

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Background: The purpose of this study was to validate whether an EEG based index, the qNOX, (Quantium Medical, Barcelona, Spain)[1] was able to predict response to laryngoscopy and LMA insertion.
Methods: After IRB approval and written informed consent data was recorded from 140 patients at the Hospital Clinic of Barcelona. The surgical patients were scheduled for general anaesthesia with a combination of propofol and remifentanil using a TCI system. The surgeries were ambulatory procedures including inguinal hernia repair, laparoscopic cholecystectomy, gynecologic laparoscopy and other minor gynecologic procedures. The qNOX was recorded during the complete procedure. Movement as nociceptive response to laryngoscopy and LMA were recorded by an observer.
Two versions of the qNOX were compared, the qNOX1 which is implemented in the commercial device and a new version qNOX2 not yet released. Both pre- and post -stimuli values of the qNOX were recorded. The prestimuli value of the qNOX was defined as the mean value in a 1 min interval before stimulation and the post stimuli was the value in the 1 min interval after stimulation. The prediction probability, Pk, was used to assess the performance of the qNOX to predict movement / no movement to the noxious stimuli. A t-test was used to test for significant difference between qNOX values for movers and non-movers ($p<0.05$).
Results: The results are shown in table 1. There were significant differences ($p< 0.05$) for placement of LMA for both pre and post stimuli values of qNOX. This was not the case for laryngoscopy, where also lower Pk values were observed.

	LMA Placement				Laryngoscopy			
	Pre Stimuli		Post Stimuli		Pre Stimuli		Post Stimuli	
	qNOX1	qNOX2	qNOX1	qNOX2	qNOX1	qNOX2	qNOX1	qNOX2
NonMover Mean (SD)	57 (19)	63 (15)	49 (17)	57 (15)	43 (17)	50 (18)	43 (17)	48 (19)
Mover Mean (SD)	78 (27)	80 (18)	74 (25)	77 (14)	58 (27)	64 (23)	63 (27)	70 (17)
Pk (SE)	0.75 (0.12)	0.77 (0.11)	0.79 (0.09)	0.82 (0.08)	0.63 (0.14)	0.66 (0.13)	0.73 (0.12)	0.82 (0.09)
p-value	0.010*	0.014*	0.001*	0.002*	0.156	0.163	0.068	0.022*

[Table 1. qNOX prediction to noxious response]

Conclusions: Both the qNOX1 and qNOX2 were able to predict the response to the LMA placement. For prediction of response to laryngoscopy, only the qNOX2 was able to predict movement with post stimuli values. Further studies using other clinical endpoints than movements should be carried out to validate the clinical usefulness of the qNOX index.
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1AP11-4

Safety of extended use of breathing anesthesia circuits

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Background and Goal of Study: Breathing system filters are intended to prevent cross-infection during anesthesia.[1] Daily change of breathing circuits in the operating theatre requires a lot of resources and is time and labour consuming. The extended use of these circuits could reduce the workload of the staff and health care costs.[2,3] The aim of the study was to evaluate the degree of bacterial contamination of breathing circuits after 6 hours of use and after five days.
Materials and Methods: This was a prospective, observational, multicenter study, performed on 12 mechanical ventilators: 5 in the Hospital of Ravenna, 4 in Lugo and 3 in Faenza. Three breathing filters were interposed between ventilators and patients: one in the inspiratory line, one in the expiratory line and one closer to the patient. Breathing circuits were changed on Monday morning, before starting the operating session. Microbiological samples were taken from the two sides of the filter interposed between the expiratory part of the circuit and the ventilator, at the change of the circuit (baseline), on Mondays (6 hours of use) and Fridays (5 days of use). Samples were analysed using microbiological standard techniques; quantitative determination was performed by counting the colony-forming units on the agar plates. Statistical analysis was performed using Wilcoxon test and Fisher test for nonparametric variables and t-test for continuous ones; the significance level $\alpha=0.05$ was chosen. The incidence of postoperative respiratory infections was recorded.
Results and Discussion: 726 samples were finally tested for bacterial contamination: 3.3% resulted positive for coagulase negative gram positive. A non-significant contamination rate was observed with the extended use of breathing circuits: 3.9% after 6 hours and 2.8% after 5 days of use. No postoperative respiratory infections were highlighted.
Conclusion(s): The extended use of breathing circuits for 5 days seems to not increase significantly the risk of bacterial contamination, provided that patient filter is changed every time. Further research is needed to confirm these results.
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1AP11-5

Safety of magnesium sulfate as adjuvant before general anesthesia

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Background and Goal of Study: Magnesium can potentiate the effect of analgesics and neuromuscular relaxants. The goal of our research was to determine the safety of magnesium sulfate single dosing (45 mg/kg) before the induction into general anaesthesia.
Materials and Methods: 50 patients were included into a prospective randomized trial. All patients underwent the same laparoscopic surgery. Patients were divided into 2 groups. In the 1st group there was introduced magnesium sulfate in the dose 45 mg/kg during 5 minutes, the patients of the 2nd group was introduced the same volume of saline solution. Induction of anaesthesia (phentanyl, propofol, atracurium) was started 5 minutes after the introduction of magnesium/placebo. Anaesthesia maintenance was made by sevoflurane in the 50% O_2-air mixture. We studied the level of magnesium ions in patients' plasma before the introduction of Mg^{2+}/placebo and in 10 min after it. The indices of hemodynamic, entropy, neuromuscular transmission (TOF mode) were registered before the introduction of Mg^{2+}/placebo, in 1 min after it and every 5 min during the anaesthesia.
Results and Discussion: In 1 min after the introduction of magnesia there was observed the reduction of the mean arterial pressure (from 109,1±16,3 to 102,1±17,1 mmHg ($p<0,01$, Wilcoxon Pairs Test) at the expense of diastolic pressure (from 81,7±12,1 to 77,3±13,5 mmHg, $p<0,01$); systolic pressure didn't change (157,3±23,9 vs 150,7±25,4 mmHg, $p>0,05$). In 1 min after the introduction of Mg^{2+} there was observed the increase of heart rate (from 78,9±15,1 to 101,9±17,4 bpm ($p<0,01$). After the introduction of Mg^{2+} there was no reduction of state entropy (89,3±2,6 vs 88,8±2,3, $p>0,05$). There was also the decrease of the TOF from 97,0±3,5% to 94,5±3,2% ($p<0,01$). At the subsequent stages the parameters of hemodynamic and entropy didn't differ between two groups. The initial level of Mg^{2+} in plasma of both groups did not differ (0,89±0,16 in the 1st group and 0,94±0,18 mmol/l in the 2nd group, $p>0,05$, Mann-Whitney Test). In 10 min the level of Mg^{2+} was increased only in the 1st group (1,64±0,34 mmol/l, $p<0,05$). In the 2nd group it didn't change (0,94±0,16 mmol/l, $p>0,05$). The maximal level of Mg^{2+} in 1st group was 2,01 mmol/l.
Conclusion(s): The introduction of magnesium in the dose of 45 mg/kg leads to a temporary reduction of the mean arterial pressure and the increase of heart rate. The level of Mg^{2+} in 10 min after the introduction did not exceed the safe limits.

1AP11-6

Sex-related differences in the effects of dexamethasone pretreatment on postoperative pain and morphine consumption in patients undergoing laparoscopic cholecystectomy

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Background and Goal of Study: Sex differences in the efficacy of dexamethasone on pain intensity and opioid consumption have not been demonstrated to date. This study was aimed to investigate sex differences in the effects of dexamethasone on pain intensity and morphine consumption.
Materials and Methods: 392 ASA 1-2 patients aged 18 to 45 years old were randomly allocated into one of two groups(males=98 and females=98, in each groups) undergoing laparoscopic cholecystectomy. Each groups received intravenous normal saline or dexamethasone (0.1 mg/kg) 1 hour before induction of general anesthesia. Visual analog scale (VAS) for pain and cumulative patient-controlled analgesia (PCA) containing morphine for 24 h after surgery, mean morphine consumption when considering body weight, time to first analgesic administration and any episode of postoperative nausea or vomiting (PONV) were measured.
Results and Discussion: Females in both groups were significantly higher in pain VAS (1 and 6 h), mean morphine consumption and PONV for 24 h after surgery and shorter time of first analgesic administration than males ($P<0.05$). In dexamethasone group, females appeared to be less changed in pain VAS (1 and 6 h), time of first analgesic administration, cumulative PCA consumption and mean morphine consumption and greater changed in PONV for 24 h after surgery than males ($P<0.05$).
Discussion: In our study, female showed higher pain VAS and mean morphine consumption when considering body weight and shorter time to first analgesic administration. Taken together, female exhibited higher pain sensitivity and morphine consumption. In our study, a lower cumulative PCA consumption in females may due to higher incidence of postoperative nausea or vomiting induced by morphine in control group. A higher cumulative PCA consumption in females in dexamethasone group may result from a greater reduction of PONV induced by dexamethasone in females than in males. Opioid side effect perception such as PONV may have affected the use of PCA device. In our study, females showed attenuated effects of dexamethasone on pain intensity and morphine consumption. The interaction between gonadal hormones and dexamethasone in pain intensity and morphine consumption may exist and acted negatively.
Conclusion(s): Female showed higher pain intensity and morphine consumption compared to males. Gonadal hormones may affect the effect of dexamethasone on pain intensity and morphine consumption.

1AP11-7

Short and long-term effects of ketamine exposure in the development of the animal model zebrafish - first outcomes

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Background and Goal of Study: Ketamine has been considered hemodynamically safe, although concerns have been raised regarding its use in children or even during pregnancy[1,2]. Zebrafish is a very interesting and useful model to study development because they are easy to mantain and produce high numbers of embryos. Therefore we intend to study the effects of ketamine on caspase activity during segmentation and its long-term effects on memory in adult zebrafish.
Materials and Methods: AB zebrafish were randomly exposed to 0.2%, 0.4% and 0.8% of ketamine 10 hours post-fertilization (hpf)- segmentation phase. Twenty-four hpf, caspase-3 and 9 activities were determined by a colorimetric assay based on the incubation of samples with enzyme-specific substrates (Ac-DEVD-pNA and Ac-LEHD-pNA) to release free chromophore p-nitroanilide, which was measured at 405 nm on a Biotek XS2 microplate reader; n= 4 for treatment groups and n= 6 for control (100 embryos/replica). Seven months later, zebrafish were individually placed in a T-maze where it had to learn the correct arm (food rewarded) during 13 sessions of 6 trials for 5 days; n= 5 for control, n= 6 for 0.4%, and n=10 for 0.2% and 0.8%.
Kruskall-Wallis was used to analyse differences between groups, while Friedman's test with pairwise comparisons was used for differences between days regarding T-maze test performance. All hypotheses were two-tailed tested and significance was set at $p \leq 0.05$.
Results and Discussion: In the end of the segmentation phase, the activity of caspase-3 and 9 was similar in embryos exposed to different concentrations of ketamine and control group. There were no differences between groups in adult zebrafish regarding T-maze test performance, but there were differences detected between days (day 1 and 2 vs day 4 and 5; day 3 vs day 5; $p\leq 0.02$). More zebrafish were already exposed to increase the number of animals tested in the T-maze to confirm these results.
Conclusion(s): This pilot test indicates that ketamine administered in developmental zebrafish (segmentation stage) did not seem to affect apoptosis 24hpf (14 hours post-administration), nor induce long-term effects in the learning process of a simple task in adult zebrafish.
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1AP11-8

Shoulder tip pain after low-pressure laparoscopic cholecystectomy with deep neuromuscular blockade: a randomized clinical trial

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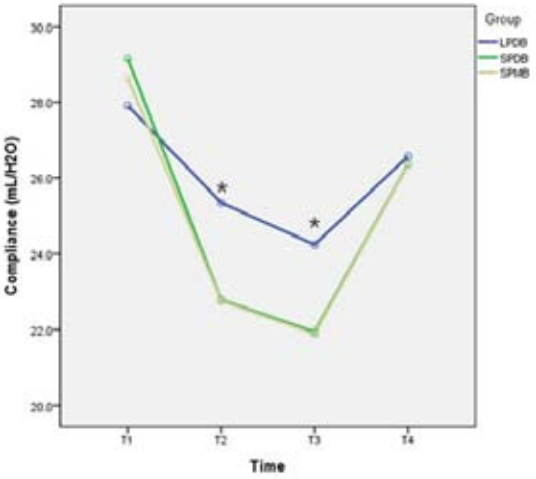
Background and Goal of Study: Low-pressure pneumoperitoneum has been proven to be sufficient to perform laparoscopic cholecystectomy (LC) and reduce shoulder tip pain after LC. However, the degree of neuromuscular blockade (NMB) was not adequately monitored in the previous studies. We investigated the presence of shoulder tip pain after low-pressure (8 mmHg) LC with deep NMB (post-tetanic count <3) compared to standard-pressure (14 mmHg) LC with moderate (train-of-four count 1-2) or deep NMB.
Materials and Methods: After the approval of the institutional IRB, 88 adults scheduled for LC were randomly allocated to one of the groups: low-pressure pneumoperitoneum with deep NMB (LPDB), standard-pressure pneumoperitoneum with deep (SPDB)/moderate NMB (SPMB). Primary end-point was the presence of shoulder tip pain during 24 hours after surgery. Dynamic pulmonary compliance and working intra-abdominal space (distance from the skin to the promontory) were evaluated during LC. The degree of surgeon's satisfaction about surgical space condition (numeric rating scale; 1 = unacceptable, 5 = optimal) and operative time were recorded at the end of surgery.
Results and Discussion: Twenty-one of 88 patients (24%) complained of shoulder tip pain. There was no difference in the incidence of shoulder tip pain among the groups (Table 1). The dynamic pulmonary compliance during pneumoperitoneum was less decreased in LPDB group (Fig. 1, P<0.001). The level of surgeon's satisfaction was lower in LPDB group (Table 1, P=0.000), although working intra-abdominal space and operative time were not different among three groups. There were no differences in any variables between SPDB and SPMB groups.
Conclusion(s): Low-pressure pneumoperitoneum with deep NMB did not reduce the incidence of shoulder tip pain after LC, compared to standard-pressure pneumoperitoneum with deep/moderate NMB. Low-pressure pneumoperitoneum with deep NMB improved the dynamic pulmonary compliance during pneumoperitoneum but lowered the surgeon's satisfaction.

	LPDB (n = 28)	SPDB (n = 30)	SPMB (n = 30)	P-value
Surgeon's satisfaction	3.0 (1-5)	4.0 (2-5)	4.0 (3-5)	0.000
Shoulder tip pain (overall)	5 (18%)	8 (27%)	8 (27%)	0.66

[Table 1. Clinical data]



*[Fig. 1. Dynamic pulmonary compliance. The dynamic pulmonary compliance during pneumoperitoneum was less decreased in LPDB group. *p<0.001 versus SPDB and SPMB group. T1, after anesthesia induction (baseline); T2, after the maintenance of intra-abdominal pressure as of 14 mmHg or 8 mmHg following CO_2 insufflation; T3, 15 minutes after CO_2 insufflation; T4, after the removal of CO_2 pneumoperitoneum; LPDB, low-pressure pneumoperitoneum with deep neuromuscular blockade; SPDB, standard-pressure pneumoperitoneum with deep neuromuscular blockade; SPMB, standard-pressure pneumoperitoneum with moderate neuromuscular blockade]*

1AP11-9

Successful intraoperative diagnosis and management of an inferior vena cava compression due to implanted liver graft

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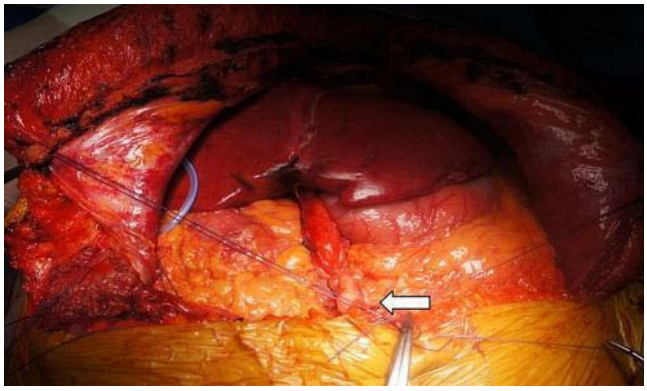
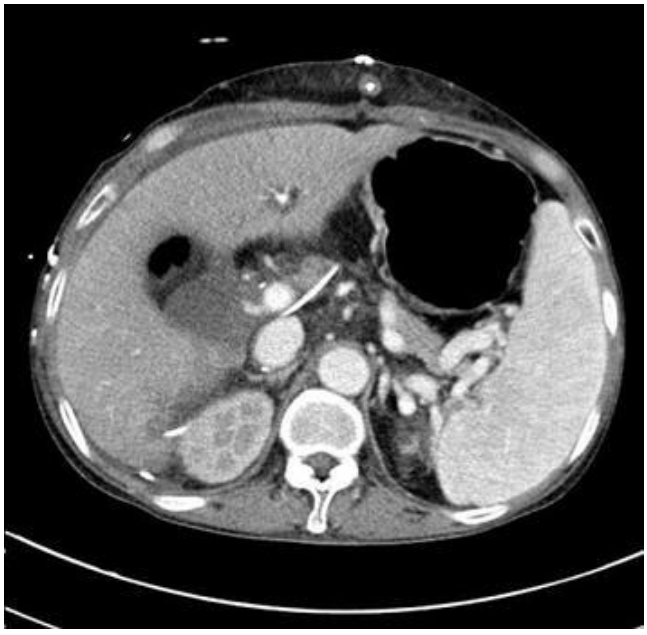
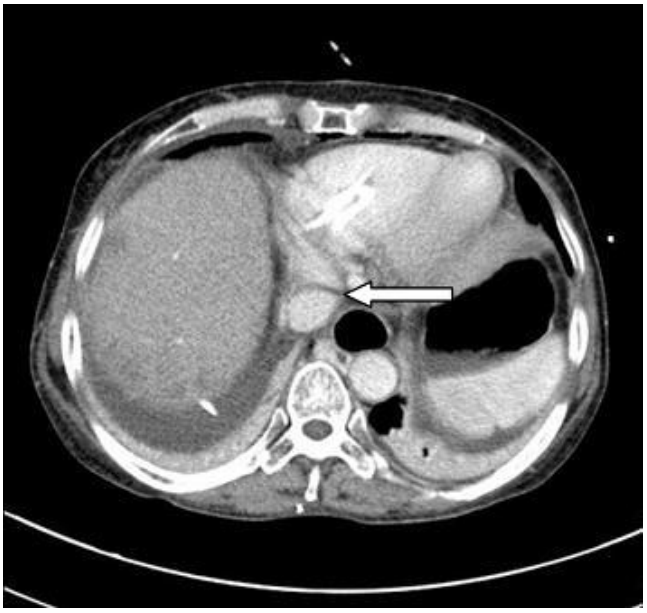
Background: Venous complications involving the portal vein and the inferior vena cava (IVC) are uncommon events after deceased donor liver transplantation (DDLT). Stenosis or occlusion of the IVC is especially associated with serious life-threatening complications that sometimes requiring urgent retransplantation soon after liver transplantation. Early detection and treatment of these complications can provide better outcomes.
Case report: A 55-year-old woman underwent deceased donor liver transplantation for advanced liver cirrhosis. She experienced persisting significant hemodynamic changes after the liver implantation. Through various diagnostic tests, we determined that the hemodynamic changes were caused by inferior vena cava obstruction. We directed the falciform ligament downward and anchored it to the anterior abdominal wall to reduce the mechanical obstruction-induced pressure in the inferior vena cava.
Discussion: When hypotension persists after reperfusion despite adequate treatment, other causes should be considered. Compression of the IVC by the donor liver can be the most important cause. Early detection of IVC compression can improve the patient outcome and can be accomplished by various experiences and monitoring (Table 1).



[Anchoring the falciform ligament]



[No evidence of stenosis or occlusion of IVC]



[Mild narrowing of the suprahepatic IVC (arrow)]

References:
1. Tokai H, Eguchi S, Soyama A, Hidaka M, Takatsuki M, Kawashita Y, Tajima Y, Kanematsu T. Compressive stenosis of the inferior vena cava due to localized ascites after living-donor liver transplantation. J Hepatobiliary Pancreat Surg. 2008;15:528-30.
2. Biais M, Nouette-Gaulain K, Cottenceau V, Vallet A, Cochard JF, Revel P, Sztark F. Cardiac output measurement in patients undergoing liver transplantation: pulmonary artery catheter versus uncalibrated arterial pressure waveform analysis. Anesth Analg. 2008;106:1480,6, table of contents.
Learning Points: We were able to anchor the falciform ligament to the anterior abdominal wall in a patient with IVC compression by the donor liver through early recognition, using our personal experience and monitoring.

1AP11-10

Use of the McGRATH MAC video laryngoscope reduces the incidence of hypertension after tracheal intubation when compared to that using the Macintosh laryngoscope: a retrospective study

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Background and Goal of Study: The occurrence of hypertension after tracheal intubation may lead to rare but serious complications such as myocardial infarction or brain hemorrhage. The Macintosh laryngoscope may increase the incidence of hypertension because it requires the forcible alignment of the oral and pharyngeal axes in order to view the glottis. In contrast, the McGrath video laryngoscope does not require this manipulation. Therefore, we hypothesized that a lower incidence of hypertension after tracheal intubation is observed with the McGrath laryngoscope compared to that observed using the Macintosh laryngoscope.
Methods: Data were obtained retrospectively from the medical and anesthetic records of 360 patients who underwent general anesthesia from July 1, 2014 to October 3, 2014. Hypertension was defined as an increase in systolic blood pressure of more than 20% as compared to that observed immediately before intubation. The following 18 variables were used as potential predictors: use of the McGrath laryngoscope, age, gender, body mass index, systolic blood pressure on admission, diabetes mellitus, current smoking status, ASA-PS, use of atropine after induction, use of vasopressor, intubation operator, intubation tube size, time to intubation, Cormack grade, fentanyl dose, propofol dose, and remifentanil dose. In order to perform logistic regression using these 18 variables, 360 cases were required, assuming the incidence of hypertension as 50%. Stepwise logistic regression with AIC (Akaike's information criterion) was used to select the final model to predict the incidence of hypertension. In addition, an alternative analysis to calculate the odds ratio of the use of the McGrath laryngoscope for the incidence of hypertension was performed using propensity score with inverse probability weighting as a sensitivity analysis.
Results: Logistic regression revealed that age, current smoking status, fentanyl dose, use of the McGrath laryngoscope, and remifentanil dose are associated with the incidence of hypertension after tracheal intubation. The odds ratio of the use of the McGrath laryngoscope was 0.52. In the propensity analysis, the odds ratio (95% confidence interval, P value) of the incidence of hypertension of the use of the McGrath laryngoscope was 0.40 (0.18-0.88, P=0.021).
Conclusion: Using the McGrath laryngoscope reduces the incidence of hypertension after tracheal intubation as compared to that observed using the Macintosh laryngoscope.

1AP11-11

Vasopressin ameliorates the hypotension induced by beach chair positioning in a dose-dependent manner in patients undergoing arthroscopic shoulder surgery under general anesthesia

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Background and Goal of Study: The beach chair position (BCP) is associated with a hypotension that may lead to cerebral ischemia. Arginine vasopressin (AVP), a potent vasoconstrictor, has been shown to prevent the hypotension on BCP. It also improves cerebral oxygenation in different animal models. The present study examined the effect of escalating doses of AVP on systemic hemodynamics and cerebral oxygenation during a surgery in BCP under general anesthesia.
Materials and Methods: Sixty patients undergoing arthroscopic shoulder surgery in BCP under general anesthesia were randomly allocated to receive either saline (control, $n=15$) or three different doses of AVP (0.025, 0.05, or 0.075 U/kg; $n=15$ each) 2 minutes before BCP. Mean arterial pressure (MAP), heart rate (HR), regional cerebral oxygen saturation ($SctO_2$) and jugular venous oxygen saturation ($SjvO_2$) were measured after induction of anesthesia and before (presitting in supine position) and after BCP.
Results and Discussion: AVP *per se* given before BCP increased MAP, and decreased $SjvO_2$, $SctO_2$ and HR in all ($P<0.05$). BCP decreased MAP, the magnitude of which and hence the incidence of hypotension were decreased by AVP in a dose-dependent manner. While in BCP, every dose of AVP reduced HR and $SctO_2$. Accordingly, it increased the incidence of cerebral desaturation (>20% $SctO_2$ decrease from baseline) with no differences in $SjvO_2$ and the incidence of $SjvO_2$ < 50% or $SjvO_2$ < 40% among the groups.
Conclusion(s): AVP ameliorates the hypotension associated with BCP in a dose-dependent manner in patients undergoing shoulder surgery under general anesthesia. However, AVP may have negative effects on $SctO_2$ before and after BCP and on $SjvO_2$ before BCP.

1AP11-12

The effects of perioperative ventilation on cognitive function following laparoscopic cholecystectomy

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Background and Goal of Study: The moderate hyperventilation and increased FiO_2 result in hypocapnia and hyperoxia, respectively, and are common features of ventilation during general anesthesia. However, these changes can cause cerebral vasoconstriction and decrease in cerebral blood flow. In addition, high concentration of oxygen can produce reactive oxygen species and activate lipid peroxidation. The aim of this ongoing study was to explore the effect of ventilation on early postoperative cognitive function and behavioral follow-up during laparoscopic cholecystectomy.
Materials and Methods: Totally 115 patients scheduled for laparoscopic cholecystectomy were enrolled into a prospective study and randomized to four groups: 1) normoxia-normocapnia (nO_2-nCO_2), 2) hyperoxia-normocapnia (hO_2-nCO_2), 3) normoxia-hypocapnia (nO_2-lCO_2), and 4) hyperoxia-hypocapnia (hO_2-lCO_2). Normoxia was defined as PaO_2 within 70-140 mm Hg, hyper-

oxia within 150-300 mm Hg, respectively. Normocapnia was referred to $PaCO_2$ of 35-48 mmHg, and hypocapnia - of 25-35 mmHg. All patients were tested for cognitive function using Montreal Cognitive Assessment Score (MoCA) 12 hrs before the intervention and postoperatively at 6 and 36 hrs. The intervention was conducted under total intravenous anesthesia (propofol/ fentanyl). We registered parameters of hemodynamics, ventilation and arterial blood gases at different stages of surgical intervention.
Results and Discussion: 61 patients strictly met the two-step inclusion criteria of targeted gas exchange. We did not find any baseline differences between the groups. The initial MoCA value was 26 (23-27) points. The total durations of intervention and mechanical ventilation were 35 (25-40) min and 65 (60-80) min, respectively. The age of patients correlated with MoCA score at all study stages (rho = -0,30 to -0,59, $p<0.005$). We observed a tendency to decreased MoCA ($p = 0.06$) at 6 hrs after surgery in the hO_2-lCO_2 group and a significant increase in lactate concentration at the end of the intervention in the hO_2-lCO_2 and the nO_2-lCO_2 groups ($p<0.05$).
Conclusion(s): The short-term combination of hyperoxia and hypocapnia during laparoscopic cholecystectomy increases blood lactate at the end of intervention that might reflect an additive effect on tissue perfusion resulting in a trend for the transient postoperative decline in cognitive function.
Acknowledgements: We thank E.Fot and M.Kryigina for their valuable assistance during the study.

1AP12-1

Surgeons' productivity change evaluated by Malmquist index

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Background and Goal of Study: Operating room efficiency is an important concern in most hospitals today. The most significant factor of the operating room efficiency is considered to be surgeons. The goal of this study is to compute surgeons' productivity change before and after the revision of fee schedule.
Materials and Methods: We focused on the revision of fee schedule implemented on April 1, 2014. We collected data of all the surgical procedures performed at Teikyo University Hospital from April 1 through September 30 in 2013 (Period 1) and in 2014 (Period 2).We employed Malmquist model under the constant returns-to-scale assumptions. We defined the decision making unit (DMU) as a surgeon with the highest academic rank in the surgery. Inputs were defined as
(1) the number of medical doctors who assisted surgery, and
(2) the time of surgical operation from skin incision to skin closure.
The output was defined as the surgical fee for each surgery determined.We added all the inputs and outputs for each DMU during these study periods, and computed his/her MI, catch-up effect (CU) and frontier-shift effect (FS). The natural logarithms of the MI, CU and FS allow us to interpret these results as percent changes. The natural logarithm of MI > 0 indicates progress in productivity of the DMU, while that of MI = 0 and MI < 0 respectively indicate the status quo and deterioration in the productivity. Similarly, a natural logarithm for CU and FS measure of greater than 0 implies that there is efficiency progress and frontier technology progress, respectively.
Statistical analysis was conducted using student t-tests. A p-value < 0.05 was considered statistically significant.
Results and Discussion: We analyzed 5,315 surgical procedures performed by 108 surgeons.The percent change of MI was not significantly different from 0 ($p = 0.23$), which demonstrated that the productivity did not change significantly. However, the percent change of CU was significantly greater than 0 ($p = 0.041$), which demonstrated the surgeons significantly improved efficiency. The percent change of FS was significantly smaller than 0 ($p<0.000$), which indicated regress in the frontier technology.

Productivity	- 2.8 ± 39.6 %	p = 0.230
Catch-up	+ 6.8 ± 40.2 %	p = 0.041
Frontier-shift	- 9.6 ± 3.1 %	p < 0.000

[Percent changes from Period 1 to 2]

Conclusion(s): Japanese surgeons performed surgery more efficiently to compensate for the reduced reimbursement.

1AP12-2

Surgical neck hematoma after thyroidectomy. Antiplatelet/anticoagulant drugs or coagulopathies as a risk factor? A case control study from a single center on 3150 patients

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Background and Goal of Study: Antiplatelet/anticoagulant drugs (A) and coagulopathies(B) are reported to be risk factors for development of surgical neck hematoma(NH)after thyroidectomies [1]. We evaluated the possible role of A and B in NH.
Materials and Methods: Between January 2008 and July 2014 data of all patients scheduled for thyroidectomy in one Universitary Center were prospectively collected, identifying patients to be included in group A/B. Analysis on retrospective basis of postoperative course was performed, comparing the rate of NH in A/B and control group(CG)groups. Within group A, subgroups were defined dependent from different type of drugs (Aspirin, Clopidogrel, Vitamine K Antagonits(VKA), prophylactic LMWH). Univariate and multivariate analysis were performed to define any association between A/B and development of NH.
Results and Discussion: There were 56 NH on 3150 patients (1.8%) operated during the study period. No NH related death was reported. NH developed respectively in 38/2832 patients into CG and in 18/318 patients into A/B group (5.7%). Subgroup analysis for NH in A reported: 2/116 Aspirin (1.7%), 2/63 Clopidogrel (3.1%), 13/97 VKA(13.4%), 0/28 prophylactic LMWH and 1/14 in group B (7.1%). Statistically significant differences were found comparing CG versus whole A/B ($p< 0.00001$) and CG versus subgroup VKA ($p< 0.00001$). No statistically significant differences were found comparing CG neither to Aspirin ($p=0.7$) nor to Clopidogrel ($p=0.2$) patients. Reoperation for NH into CG and A/B group was necessary in respectively 36/38(95%) and 9/18(50%) patients within the first 24h and 2/38(5%) versus 9/18(50%) after 24hours (range 24hours-23 days) ($p< 0.000001$). Of the latter group, 8 patients were under VKA.
Conclusion(s): The rate of NH after thyroidectomy is roughly increased 4 fold in patients of A/B group. Statistical analysis did not show significant difference for the subgroups of Aspirin (median posology 75 mg), Clopidogrel, prophylactic LMWH (enoxaparin, median posology 20mg) use and for group B. VKA subgroup reported a 10-fold higher incidence compared to CG. Half of the NH reported in group A/B developed after 24 hours from surgery, with a maximum delay of 23 days.
A strict postoperative and post-discharge surveillance is mandatory for A/B group patients, given the late NH occurrence. Moreover outpatient surgery is contraindicated.
References: 1. Surgery 2014; 156 : 399-404

1AP12-3

The case report of type II persistent left superior vena cava: implications for anesthesiologists

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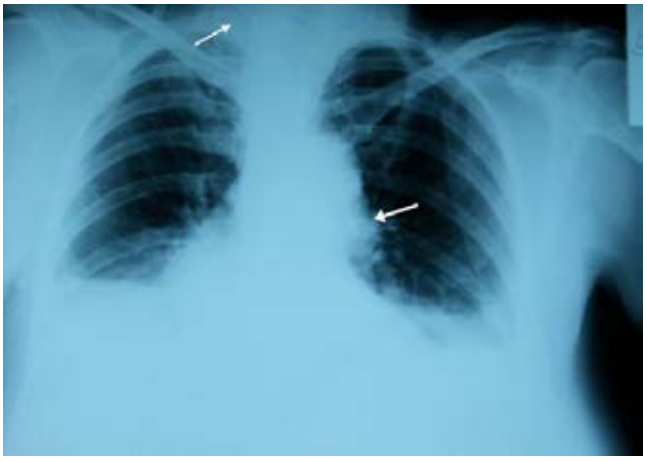
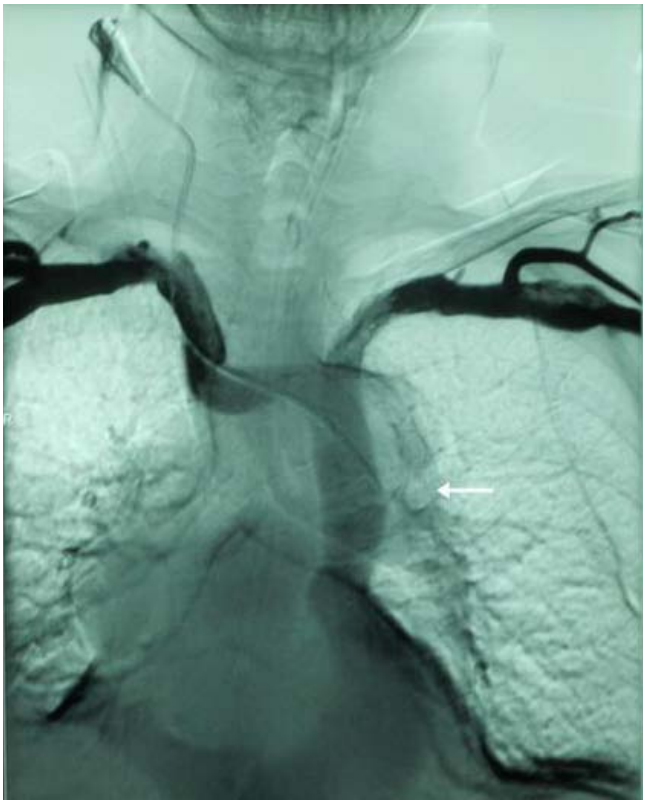
Background: Persistent left superior vena cava (PLSVC) is anatomical variation with incidence of 0,5% in general population and 10% in patients with congenital cardiac abnormality. Although hemodynamically benign, cannulation of unrecognized PLSVC can provoke serious complications[1].
Case report: A 70 year old woman was admitted in hospital with diffuse abdominal pain. Physical exam, laboratory investigation and computed tomography (CT) of abdomen confirmed the diagnosis of acute pancreatitis. After insertion of central venous catheter (CVC) through right internal jugular vein, chest radiography showed atypical location of the CVC.



[The P-A chest radiogram]

Transthoracic echocardiogram and thoracic CT confirmed intra-vessel position of the CVC, with the catheter tip located in projection of pulmonary veins. Intravenous cavography was performed which revealed anomalous left-sided SVC.



[Intravenous cavography]

The catheter was left in vein and used without complication, and after resolution of disease the patient was discharged home.
Discussion: Normally, during early embryologic period two anterior cardinal veins fuse together to give rise to right superior vena cava (Type I morphology). Rarely, Type II morphology can exist, with single left SVC and obliterated right SVC, or type III, with doubled SVC. Catheterization of anomalous types can be complicated with various cardiac dysrhythmias, heart or coronary sinus perforation. Diagnosis of PLSVC can be made with MRI, multislice CT or TEE. However, when those are unavailable or contraindicated, the use of intravenous cavography can be invaluable tool for diagnosing PLSVC.
References: 1. Azocar RJ,et al. Persistent left superior vena cava identified after cannulation of the right subclavian vein. Anesth Analg 2002;95:305-7.
Learning Points: Anesthesiologists should be aware of this thoracic vascular anomaly and diagnose it before potentially serious complications could occur.

1AP12-5

Utility of NO-BITE V in inserting the gastric tube via mouth in anesthetized and intubated patients. Experience of use in 25 consecutive cases

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Background and Objectives: NO-BITE V (NB) is a novel device developed in the US for the purpose of suctioning secretion in the oral cavity. By controlling the depth of the device-edge and the angle of inserting NB into the mouth, the catheter tip is able to be located at the entrance of esophagus. When using NB, the catheter was rarely flexed in the oral cavity since the force to advance the catheter was transmitting straightforward to the tip. In this case series, we aimed to examine the use of NB in inserting the gastric tube via mouth during anesthesia.
Subjects and Methods: We planned the study for 25 consecutive ASA PS 1~3 patients who would be scheduled to surgery under general anesthesia. After tracheal intubation, the tracheal tube was fixed at the angle of mouth. Then, NB was inserted from the center of the mouth to guide the gastric tube to the stomach. When the gastric tube was advanced about 55cm from the distal inlet of NB, correct placement of the gastric tube was confirmed by aspiration or auscultation after injecting air into the gastric tube. Success rate, the number of attempted insertion, time required for inserting gastric tube, method of confirming the position of gastric tube, and whether there were any complications in the procedure were recorded.
Results: Successful gastric tube placement was achieved in all patients. In 23 cases successful placement was obtained at first time, only 2 cases at second time. Time required for insertion is 28.2±10.3 seconds.(In 24 cases, insertion was achieved within 60 seconds.) Gastric fluid was aspirated in 23 cases while the position was confirmed by auscultation in 2 cases.
No complications (such as mucosal or dental injury etc.) were recognized related to the use of NB.
Conclusion(s): By using NB, gastric tube was correctly placed in the stomach in a smooth and safe manner. NB is a very useful device for inserting the gastric tube via mouth during general anesthesia.

1AP12-6

Validation of a new index for nociception monitoring - NoL™ - during surgery and anesthesia

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Background and Aim: Anesthetised patients cannot communicate pain; hence an objective monitor is needed to assess intraoperative nociception and guide treatment. Based on a combination of physiologic parameters, the Nociception Level (NoL) index was developed (0-100 scale). The study set to validate NoL index during surgery and anesthesia and to compare its performance to other nociception related parameters.
Materials and Methods: 69 adults scheduled for surgery under general anesthesia (GA) were recruited. After induction (Entropy< 60), subjects were subjected to two identical tetanic stimulations, without analgesia (TET1) and after 2mcg/kg fentanyl (TET2). Before skin incision subjects were randomized into two groups of remifentanil TCI: 2/4ng/ml. TET1, TET2, intubation (TP1), skin incision/first trocar insertion (TP2), and no pain (TNP) were annotated for analysis. Compared parameters: NoL, heart rate (HR), plethysmograph amplitude (PPGA), surgical pleth index (SPI). Pre-stimulus, post-stimulus, and reaction median values were calcualted. p-value< 0.00625 after Bonferroni correction.
Results and Discussion: 58 subjects were valid for analysis. NoL changed significantly after TET1, TET2. SPI failed to identify TET1 but changed significantly after TET2. HR and PPGA failed to identify TET1,TET2. All parameters correctly graded the intensity of response to tetanics as: TET1>TET2 and identified administration of fentanyl prior to TET2. All parameters reacted significantly to TP1 and TP2 except HR, which failed to respond to TP2. NoL was the only parameter to grade correctly TP1>TP2>TNP. In ROC analysis for the ability of parameters to discriminate noxious (TP1, TP2) from non-noxious stimuli (TNP) NoL reached an AUC of 0.93 outperforming all other parameters. With 90% specificity, NoL´s sensitivity is 86.67%. NoL post-stimulus was the only parameter to reflect a different basal level of remifentanil during noxious stimulus. NoL, PPGA, NIBP and SPI´s reaction to TP2 reflected the

different analgesic states of subjects in the high and low dose groups (2ng/ml-significant reaction; 4ng/ml-insignificant reaction). HR changed insignificantly after TP2.
Conclusions: Study results validated the NoL index: identification and discrimination of noxious/non noxious stimuli; high sensitivity and specificity; grading the response by intensity of stimulus and analgesic state. The NoL index was found to be superior in comparison to all other parameters tested in this study.

1AP12-7

When will I see you again? Probability based operating room scheduling

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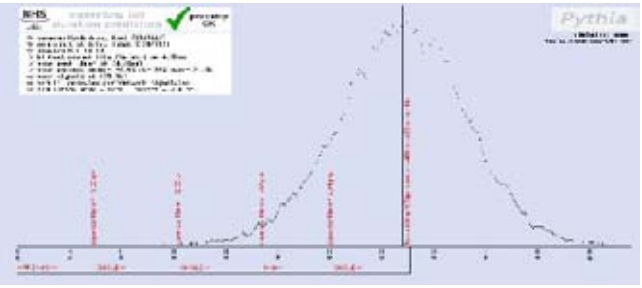
Background and Goal of Study: Operating room (OR) sessions are an expensive commodity (£391/hour). Under-runs and over-runs are undesirable. Improving under-run sessions will increase productivity thereby reducing the time to treatment for patients. Over-running OR lists result in patient cancellations. Patient safety may be compromised.
Our goal is to provide evidence based information for OR scheduling.
Materials and Methods: Pythia is novel software written by the main author in PHP and MySQL.
Pythia interprets operating theatre data contained within our Operating Room Scheduling Office System (**ORSOS**) database by performing multiple simulations of operating lists. Simulations are specific to surgeon, anaesthetist and location. *Pythia* categorises the OR lists´ probability to *over-run, under-run* or finish *within-time*.



[Example of probability curve created by Pythia]

Results and Discussion: We performed simulations on 12889 OR lists with each list simulated 5000 times. By comparing predicted against actual outcomes we created predictive data to analyse the performance of *Pythia*.

Specialty	Number of lists	Test	Sensitivity	Specificity	PPV	NPV	LR+	Prevalence (%)	Post-test Probability (%)
Gynaecology	1274	Overrun	0.250	0.983	0.087	0.995	15.071	1	9
Gynaecology	1274	Underrun	0.970	0.375	0.992	0.136	1.552	98	99
Orthopaedics	1075	Overrun	0.463	0.828	0.403	0.860	2.687	20	40
Orthopaedics	1075	Underrun	0.817	0.599	0.612	0.808	2.037	44	61
General Surgery	1099	Overrun	0.522	0.835	0.349	0.912	3.166	14	35
General Surgery	1099	Underrun	0.855	0.575	0.774	0.701	2.013	63	77
Pythia - all	12889	Overrun	0.559	0.883	0.451	0.921	4.767	15	46
Pythia - all	12889	Underrun	0.911	0.574	0.814	0.759	2.137	67	81

[Preliminary performance data from Pythia]

Preliminary work suggests *Pythia* provides valid predictive data across all surgical specialties. Under running OR lists predominate (67%) with only 18% of all OR lists running “on time”. Therefore, with LR+ values of 4.767 to identify over booked OR lists, and 2.137 for under booked lists, over all surgical specialties, *Pythia* will correctly identify 46% of over booked and 81% of under booked OR lists.
Conclusion(s): Using Pythia to schedule OR list will improve productivity, identify and minimise under/over-runs and improve patient safety.

1AP12-9

Is there a relationship between controlled intraoperative hypotension and postoperative delirium?

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Background and Goal of Study: This study aims at researching the frequency of observing postoperative delirium (POD) after middle ear surgery applying controlled hypotension.
Materials and Methods: Having obtained the required approval from the clinical research ethics committee of Bezmialem Foundation University, 20 patients from the ASA categories 1-2 with scheduled tympanoplasty, tympanomastoidectomy and mastectomy surgery were included in the study. The anesthesia was continued with propofol and remifentanil infusion, set to ensure BIS values of 40-60 and a mean arterial pressure (MAP) of 55-65 mmHg. All patients were ventilated in volume control mode, after intubation. In the intraoperative period, the bispectral index score, heart beat frequency, systolic, diastolic, and MAP, peripheral oxygen saturation, and end-tidal carbon dioxide concentration were recorded in intervals of 10 min. After at least 30 min surveillance post-op, in the recovery unit PONV were assessed using a numerical rank score, pain was measured with a visual analogue scale, and in case of POD, the delirium assessment scale was applied.
Results and Discussion: Delirium is an acute-onset, transient organic mental syndrome characterized by alteration in the state of consciousness, attention deficit, increased or decreased psychomotor activity[1]. In a study researching delirium in old-age patients after urological surgery, it was shown that a large proportion of the patients had developed intraoperative hypotension[2]. In tympanoplasty and tympanomastoidectomy surgery, controlled hypotension is generally induced to widen the visual field and reduce the blood loss as much as possible. Though in the literature hypotension has been specified as a significant risk factor for POD, no case in our study has displayed POD. Given that the average age in our patient group was not very high, we believe that in order to eliminate the impact of the age factor, research needs to be undertaken with a more elderly patient group.
Conclusion(s): In conclusion, we believe that especially in a middle-aged patient group the intraoperative application of controlled hypotension does not constitute a risk of POD.
References:
1. Winawer N. Postoperative delirium. Med Clin North Am 2001; 85: 1229-1239
2. Tognoni P, Simonato A, Robutti N et al. Preoperative risk factors for postoperative delirium (POD) after urological surgery in the elderly. Arch Gerontol Geriatr 2011; 52: 166- 169

1AP12-10

May gender influence real blood concentrations of propofol during TCI?

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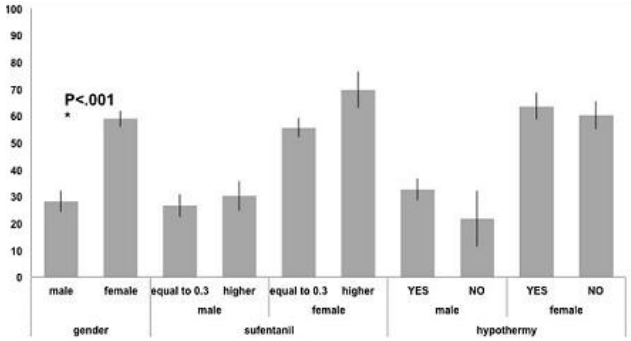
Background and Goal of Study: The influence of gender on anaesthesia remains poorly understood, nevertheless there is growing evidence suggesting that gender may be an independent factor influencing the PKs. The purpose of this study was to investigate the influence of gender on real blood propofol concentrations during TCI.
Materials and Methods: 20 euthyroid patients, aged 18-70 year, ASA I to II, scheduled for elective thyroid surgery were included. Level of hypnosis was monitored with Neurosense monitor and analgesic level was monitored with an ANI index . A radial arterial catheter was inserted in the contralateral arm of infusion, for blood sampling and for continuous monitoring of BP and CO. A TCI of sufentanil was started with a target effect (Ce)of 0.3 ng/ml (PK Gepts) followed by the TCI of propofol, targeting a predicted blood concentration (Cp) of 4 μg/ml (PK- Schnider). The Cp of propofol was increased or decreased if the neurowave index was >60 or <40 and the Ce of sufentanil was increased or decreased if the ANI was <50 or >70. Arterial blood samples were collected at at well defined timepoints. At each time point, the PE was calculated as PE(%) = (Cm-Cp)/Cpx100 where Cm and Cp are the measured and predicted blood concentrations.
Results and Discussion: 7 men and 13 women were included in this study. No difference in age was found between men and women, 56.71 (st.dev. 11.07)

and 55.38 (7.59) years respectively (P=0.754). Repeated measures ANOVA showed a significant drop in CO at 15 and 30 min after start TCI compared to baseline in women (p = 0.00004 and p =0.004) . On average women showed a significant higher PE (M= 58.93, SE 2.95) than men (M= 28.18, SE 3.88). PE increases slightly with increased sufentanil Ce and these increase was higher in women (14.16% vs 3.61% respectively). Light hypothermy had higher influence on PE in man compared to women (increase 11.12% vs 3.42%).



[Figure 1]

An inverse relation between CO and propofol Cp may explain the higher bias observed in women.
Conclusion(s): Gender seems to have an impact on propofol PKs in our thyroid population.

1AP12-11

Does acute intraoperative blood loss alter QT-interval in patients undergoing general anaesthesia?

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Background and Goal of Study: Prolonged heart rate-corrected QT interval (cQT) is associated with increased risk of myocardial infarction and cardiovascular disease-related deaths in patients with known coronary heart disease. Anaemia and hypovolemia may prolong cQT. We hypothesized that acute blood loss (BL) during general anaesthesia induces cQT-prolongation and may be a trigger for transfusion and volume resuscitation.
Materials and Methods: After local ethical committee approval and obtaining informed consent, 39 male patients (63-83 years) scheduled for major urological surgery were recruited. Patients with known co-morbidities affecting cQT or cardiac disease were excluded. All patients received thoracic epidural analgesia. General anaesthesia was induced with propofol (0.8-2 mg/kg) and sufentanil (0.3 μg/kg), and maintained with desflurane (group DES; n=20, 0.7-0.9 MAC) or propofol (group PRO; n=19, 4-6 mg/kg/h). Standard anaesthesia monitoring was applied. Patients received 2-4 ml/kg/h of a crystalloid infusion. Intraoperative hypovolemia was treated using crystalloids and blood transfusions, if indicated. Following cQT parameters were evaluated between time points and groups: cQT, changes (ΔcQT), dispersion (cQT_{disp}), and variability index (QTVI). Mann-Whitney U test was used to compare between and Wilcoxon rank test to compare within groups. $p< 0.05$ was considered significantly different.
Results and Discussion: Patient characteristics, intraoperative blood loss, amount of infused crystalloids and transfusion requirements were not significantly different. cQT, ΔcQT, cQT_{disp} and QTVI increased significantly in DES compared to PRO (p=0.006, p<0.001, p=0.014, p<0.001, respectively). Within groups, cQT increased significantly in DES (p=0.017), whereas in PRO it did not. This increase was further pronounced in case of acute blood loss (p=0.025 for cQT, p=0.036 for ΔcQT).
Conclusion(s): Propofol blunts changes in QT-parameters whereas they are altered by desflurane. Our data suggest that changes in cQT during inhalational anaesthesia are more pronounced during acute blood loss. Further studies in a larger patient population should evaluate its value as transfusion trigger.

1AP13-1

A forgotten pioneer from Berlin: Dr. Heinrich Brat (1867-1909) and his influence on international oxygen therapy, anaesthesia- and ventilation technology

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Background / Material and methods: As part of a historical research project conducted in the archives of the firm Dräger, Lübeck, Germany, we re-appraised the significance of the physician Dr. Heinrich Brat (1867-1909) for the wider History of Anaesthesia and the History of Medicine in Berlin.
Results: Brat took a keen interest in emergency medicine, notably gas-intoxications and published extensively. Shortly after 1900 he was one of the leading German (and probably also international) pioneers of oxygen as a therapeutic agent. He subsequently also designed and marketed a number of devices for the use of inhaled oxygen as a therapeutic (co-)agent in different settings: The “H. Brat Oxygen-breathing Apparatus with Injector” (1905), the “Heinrich Brat Resuscitation Apparatus” (1906) and the “Heinrich Brat Apparatus for Anaesthesia and Ventilation” (1908). Having been able to research these devices in detail, it becomes clear that they had an extremely important impact on subsequent (inter)national developments [1]. In addition we illustrate now that - and to what remarkable extent - the German Capital was around 1900 the (inter)national “hot-bed” and centre of “oxygen therapy”, with many individuals from the Jewish community playing a particularly noteworthy role. We analyse and illustrate, to what extent these findings pose challenges to previous research, notably concerning claims of originality and priority of historically famous and internationally successful developments on the fields of Anaesthesia and its related technology.
Conclusion: These findings confirm, yet again, our general impression and experience over recent years, that present research into the history of anaesthesia and its related sciences and technology generally needs to be much more careful with alleging or ascribing questionable claims of priority and originality. Instead, it seems advisable to increasingly focus on “reciprocal influences” and on overcoming the methodological and historiographical problems arising out of a lack of international and trans-disciplinary co-operation and co-ordination.
Key Reference: 1. M. W. M. Strätling, Stephanie Grösch, Christian Niggebrügge. Dr. Heinrich Brat (1867-1909) - a forgotten German pioneer of international Oxygen therapy, Ventilation and Anaesthesia-Technology. In: History of Anaesthesia VIII - Proceedings of the 8th International Symposium on the History of Anaesthesia, Sydney, Australia, 22nd - 25th January 2013: In Print.

1AP13-2

Analysis of body composition changes between patients with and without special needs undergoing dental surgery under general anesthesia

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Background and Goal of Study: Patients with special needs (PSN) can encompass a wide range of disabling conditions including intellectual disability, dementia, physical limitation, and behavior disorders. We sometimes experienced their hemodynamic instability during general anesthesia. In this study, we compared the changes of body composition and hemodynamics between PSN and patients without special needs (non-PSN) undergoing dental surgery under general anesthesia retrospectively.
Materials and Methods: The anesthesia records of patients, over 20year-old, ASA-PS I or II, were investigated. The patients underwent dental treatment or oral maxillofacial surgery under general anesthesia from Jan. 2013 to Nov. 2014. They were divides into 2 goups; PSN (S-group) and non-PSN (C-group). We recorded patient’s background (gender, age, height, weight, BMI, duration of anesthesia). We checked the following values by Bioelectrical Impedance Analysis (MP Japan) and Aescuron mini (Heiwa Bussan, Japan) for 3 hours after the start of the anesthesia; fluid balance and intercellular water (ICW), extercellular water (ECW), stroke volume variation (SVV), heart rate (HR).
Results and Discussion: S-group was 11 (7 males and 4 females) and C-group was 10 (5 males and 5 females). There were no significant differences in patient’s background, except in height; S-group (153±10 cm)

and C-group (163±7.8 cm) (p=0.03). At the induction of anesthesia, ICW was 15.4±3.3 L in S-group while it was 20.2±4.8 L in C-group (p=0.02). In S-group, ECW was 13±3.9 L, while it was 17.4±4.2 L in C-group (p=0.04). In S-group, ICW and ECW had been maintained significantly lower than those of C-group at least for 3 hours. In S-group, HR was 85±13 (beats/min), while it was 64±10 (beats/min) in C-group at the induction (p=0.04). In S-group, SVV was maintained higher than that in C-groups during surgery, although it did not reach the significant level. During induction, vasopressors were required in 3 patients of S-group due to hypotension, while no vasopressors were administered for C-group.
It may be difficult for patients with decreased activity of daily living to take food and/or beverage by themselves everyday. Therefore, ICW and ECW might be lower in S-group, which might lead to hemodynamic instability during general anesthesia.
Conclusion(s): We should pay attention to changes of hemodynamics due to body fluid imbalance especially for PSN during general anesthesia.

1AP13-3

Anesthesia in patients with mucopolysaccharidosis: 7 years series review

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Background and Goal of Study: Mucopolysaccharidosis (MPS) are a group of rare genetic disorders of connective tissue metabolism characterized by the lack or deficiency of specific lysosomal enzymes that leads to the storage of partially degraded glycosaminoglycans (GAG) causing progressive cellular, organ and multisystemic damage. There are 7 major types of MPS and every one is characterized by progressive craniofacial, articular, and skeletal deformities, cardiac, pulmonary and neurologic involvement. The aim of this study was to review the anaesthetic approach and complications in these patients during a period of 7 years.
Materials and Methods: Retrospective audit performed at our institution with patients with MPS underwent surgical procedures between 01/01/2007 and 31/12/2013. Medical records obtained via informatics clinical process. Data collected: gender, age and ASA classification at the time of surgery, type of surgery, type of anaesthesia and complications in the per operative period.
Results and Discussion: 11 patients were evaluated: 1 with Hurler syndrome (type I MPS); 3 with Hunter syndrome (type III MPS), 2 with Morquio syndrome (type IV MPS) and 5 with Maroteaux-Lamy syndrome (type VI MPS). Sex: Female (F): Male (M): (45%: 55%); 38 procedures requiring anaesthesist were performed; 7 patients (63 %) underwent more than one intervention. 34 surgeries (87 %) were performed under 18 years. Pediatrics Surgery was the dominant surgical speciality with eleven (28%) interventions, followed by Ear Nose and Thorat surgery (8/21 %), Orthopedics (6/ 8%) and Neurosurgery (5/13 %). General balanced anesthesia (25/66 %) and sedation (7/18%) were the most commonly used techniques followed by spinal anesthesia (2/5 %). Regarding the type of induction, 20 (65%) were inhalation and 11 (34%) intravenous. 18 procedures required intubation and problems were reported in 6 (32%). There were no complications reported to the ventilation.
Conclusion(s): This review suggests that patients need a early referentation to surgical specialties with most of all requiring more than one surgery so its essential a multidisciplinary approach to their disease regarding the multisistemic nature of the same. All problems reported in this case series were related to the airway so when feasible we should avoid the airway manipulation and favored an inhalation induction.

1AP13-4

Changes of skin resistance after midazolam administration and during recovery from anaesthesia

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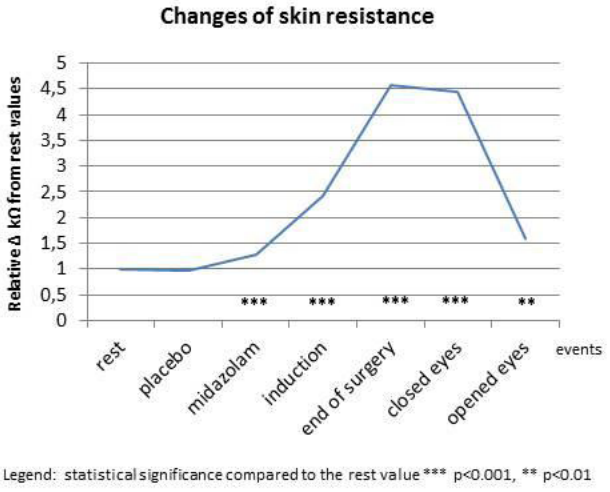
Background and Goal of Study: Changes in electrical skin resistance (SR), may be used to assess the adequacy of general anaesthesia (1). Our prospective study investigated how far measurements of SR can help determine level of sedation induced by intravenous midazolam.
The secondary aim was to investigate if changes in SR can be used for assessing recovery from anaesthesia.
Materials and Methods: After ethic committee approval and patient´s consent, 27 patients scheduled for arthroscopy or minor plastic surgery under general anaesthesia were included. Patients were told that they would be administered by a random order placebo (NS) or sedative agent. Multimeter Mastech M3900 was used for SR measurements. Two ECG electrodes were attached to the palm side of the 2nd and 3rd finger of the non-dominating hand. The degree of sedation was measured by the Observer's Assessment of Alertness and Sedation (OAAS) scale. After 10 min. break the rest value was noticed and next they were administered placebo first and after 5 min period midazolam 2 mg i.v. After next 5 minutes patient were administered standard general anaesthesia with propofol, oxygen, nitrous oxide 60 % and isoflurane 1 MAC via laryngeal mask and sufentanil as needed. SR values before placebo administration, 5 minutes after placebo, 5 minutes after midazolam, 5 min. after induction, at the end of surgery, 0 isoflurane level after anaesthesia with closed eyes and after eyes opening were used for analyses using paired t-test.
Results and Discussion: SR significantly increased after administration of midazolam an induction of anaesthesia (Fig. 1). All patients had initial OAAS 5 and OAAS 5 or 4 after midazolam. There were no significant changes in SR between end of surgery and end of anaesthesia with closed eyes but SR significantly decreased (p< 0.01) after eyes opening.



Legend: statistical significance compared to the rest value *** p<0.001, ** p<0.01

[Figure 1]

Conclusion(s): The results indicate that skin resistance may be an objective and suitable tool for assessing of sedative effects of various drugs. Our research with different doses and other drugs continues.
References: 1. Winterhaltera M et al. EJA 2009,26:589-596
Acknowledgements: The study was supported by a scientific grant VG 20102015041

1AP13-5

Cold ischemia time in renal transplantation: the shorter the better?

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Background and Goal of Study: Kidney transplantation (KT) is the first choice cost-effective treatment for end-stage renal disease. Cold ischemia time (CIT) has been associated with high level of ischemia/reperfusion injury and graft dysfunction, mainly in the early postransplant period[1]. The aim of this study was to assess the impact of CIT on graft function after KT.
Materials and Methods: Retrospective observational study. Data collected from medical records of KT patients, January 2010-December2012. The main outcome was graft function evaluated by glomerular filtration rate (GFR) and Creatinine values (Cr), at 7th day, discharge, 1st, 3rd and 6th month, and 1st and 2nd year postransplant. Spearmen's correlation was used to analyze the association between GFR and Cr with CIT (IBM SPSS Statistics v.21). Statistic significance was set as p<0.05. Data presented as mean values±standard deviation.

Results: 193 patients included, mostly men (63.2%). Age 47.6±13.0 years. Donors were mainly deceased (76.2%) and women (52.2%). CIT was 707.0±464.9 min. CTI was significantly higher for grafts coming from deceased donors (924±357 min) than from alive donors (212±247 min) ($p<0.001$).
We found a significant negative association between CIT and GFR at discharge ($r=-0.479$; $p=<0.001$), 1st month ($r=-0.490$; $p<0.001$), 3rd month ($r=-0.501$; $p<0.001$), 6th month ($r=-0.434$; $p< 0.001$), 1st and 2nd year ($r=-0.445$, $p<0.001$). For Cr values we found a statistically significant positive association for the same times of follow-up ($p<0.05$). When we analyzed the sample according to whether the donors were alive or deceased, the association remained significant for GFR in both groups ($p<0.05$), until 6th month postransplant. For the 1st and 2nd year postransplant, it seems to be only a tendency for each group.
Discussion and Conclusion: We found that reduced CIT was associated with better outcome until the 2nd year postransplant. Our results are according to the literature in what concerns the early postransplant period, and underline the need to reduce renal grafts CIT. Moreover, the negative impact of CIT in outcome remained significant after the early postoperative period. Although CIT from deceased donors is significantly higher than from alive donors, the relation between CIT and GFR remained significant for both groups separately, until the 6th month postransplant but not after. The small sample size might explain this phenomenon.
References: CurrOpin Organ Transplant.2013;18(2):174-8.

1AP13-6

Comparison of patient-controlled analgesia versus continuous infusion of tramadol after laparoscopic bariatric surgery

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Background and Goal of Study: Acute postoperative pain management in patients undergoing laparoscopic bariatric surgery can be challenging, as obese patients are more predisposed to opioids-related respiratory side effects.[1-2] Tramadol is a valid opioid-sparing alternative in these patients, due to its lower respiratory impact. We sought to evaluate if a tramadol postoperative pain therapy with patient controlled analgesia (PCA) has the same results in terms of pain control and need for rescue dose when compared to a continuous infusion regimen (CI).
Materials and Methods: Prospective observational study. All consecutive patients scheduled for laparoscopic gastric bypass and laparoscopic sleeve gastrectomy were enrolled. Exclusion criteria were: history of chronic opioid treatment; intolerance to NSAID, paracetamol, tramadol, or other opioids.
Postoperative analgesia was prescribed for the first 24 hours as a standard intravenous (iv) paracetamol (1 gr q8), and tramadol infusion. The latter was achieved either by PCA or CI, according to the decision of treating physician.
PCA group received iv tramadol through a PCA device (Gemstar Hospira, Lake Forrest, Illinois, USA) at a 5 mg/h basal rate, a 20 mg bolus injection, and a 30-min lockout interval.
CI group received continuous infusion of tramadol at 12 mg/h.
Visual analgesic scale (VAS) was evaluated after surgery (0 h), at 1, 2, 4, 6, 12 and 24 hrs.
A rescue therapy with iv ketorolac 30 mg was prescribed if VAS>4.
Results and Discussion: Forty-two patients met the inclusion criteria (table 1). VAS scale was similar among the two groups at all time points. The total tramadol consumption was significantly lower in PCA compared to CI group (157.1±40.8 mg vs 300 mg, $p<0.01$). Rescue therapy was required at least once in 5 patients among PCA group and 14 among CI group (22,7% vs. 72%, $p<0.001$).
Conclusion(s): Tramadol analgesia is safe and effective both in PCA and CI regimen. PCA lowers the total consumption of both tramadol and ketorolac in these patients.
References:
1. Stephan AS, Alexander Raymann. Postoperative pain management of the obese patient. *Best Practice & Research Clinical Anaesthesiology* 2011; 25: 73-81
2. Servin F. Ambulatory anesthesia for the obese patient. *Curr Opin Anaesthesiol* 2006; 19: 597-9.

1AP13-7

Dissociative general anaesthesia in a patient with Eisenmenger syndrome

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Background: Eisenmenger syndrome (ES) occurs when an unrepaired congenital left-to-right (L-R) shunting cardiopathy, with increased blood flow to the pulmonary circulation results in severe pulmonary hypertension (PH) and shunt inversion (right to left: R-L). Patients present signs and symptoms of chronic hypoxemia, platelet dysfunction and coagulation defects. Perioperative risk is high because physiological changes induced by anaesthesia and surgery can increase R-L shunt and hypoxemia. We describe the anaesthetic management of an ES patient for an urgent surgery.
Case report: 22-year-old male, proposed for surgical repair of incarcerated inguinal hernia. Antecedents: ES, Trisomy 21, Hypothyroidism - ASA IVE. Physical exam: poor cooperative, agitated patient, cyanotic, systolic murmur and bibasilar rales at auscultation; short neck, macroglossia, Mallampati IV. SpO_2 (room air): 84%, blood pressure (BP) 105/60 mmHg, heart rate 95 bpm. Laboratory tests: Hb 23g/dL, hematocrit 72%, prothrombinemia 36%. Patient was observed by cardiologist and hematologist; endocarditis prophylaxis and prothrombinic complex concentrate were administrated and therapeutic phlebotomy performed until prothrombinemia was 60% and hematocrit 64.7%.
Surgery was performed under dissociative general anaesthesia. Induction: Midazolam 1mg iv, Ketamine 2mg/kg iv, local anesthetic infiltration (ropivacaine, lidocaine). Maintenance: Ketamine boluses (total 250 mg). Spontaneous ventilation was maintained, with oxygen by facemask. Adequate fluidotherapy was assured. Hemodynamic and ventilatory stability were maintained. Patient stood at PACU for 3h, uneventfully.
Discussion: ES patients may survive to adult age and present for non-cardiac urgent surgery. Hypovolemia, decreased systemic vascular resistance (SVR) and increased pulmonary vascular resistance must be avoided, as they favour R-L shunt, worsening cyanosis, hypoxemia and cardiac failure. This patient was uncooperative, with coagulation defect, unsuitable for regional anaesthesia. As the patient had difficult airway predictors and PH, tracheal intubation and mechanical ventilation were avoided and, in order to maintain SVR, ketamine was our agent of choice.
References: [1]Br J Anaesth 2004; 93: 129-39
Learning points: ES poses a high anaesthetic risk. Multidisciplinary work is crucial. Ensuring good oxygenation and avoidance of factors that increase R-L shunt should be taken into account in all perioperative period.

1AP13-8

Surgical hijacking of an anaesthetic disease

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Background: We report the case of a patient at high risk of malignant hyperthermia (MH) susceptibility undergoing a ‚MH-safe' anaesthetic but becoming exposed to a recognised trigger of MH, ether, by the intraoperative surgical use of a pack soaked in an ether-solvent.
Case report: A 30-year-old man was booked for biopsy and debridement of a palatal lesion under general anaesthesia. History revealed two family members had died under anaesthesia due to MH, while the patient had never been investigated for MH-susceptibility.
He was thus treated as a MH-susceptible patient. A ‚MH' anaesthetic machine was prepared, volatiles removed from the theatre, and a ‚MH-safe' anaesthetic with a total intravenous anaesthetic technique of propofol and remifentanil was used.
As the case was approaching completion, it was noticed that the surgeon was sewing in a Whitehead's varnish pack. Whitehead's varnish is an antiseptic and haemostatic mixture of various agents dissolved together in ether, and is used for packing nasal and jaw cavities and exposed unerupted canine teeth. The first cases of MH were described following ether exposure, thus the surgeon was immediately requested to remove the pack.
The patient was febrile postoperatively but developed no significant features suggesting a full MH crisis.
Discussion: MH is a rare pharmacogenetic disorder, caused by exaggerated and uncontrolled release of calcium within muscular sarcoplasmic reticulum

upon exposure to volatile anaesthetic agents including ether or suxamethonium. Although a high-risk history was elicited in this patient and an appropriate anaesthetic technique chosen, intraoperative triggering of MH was only considered from an anaesthetic perspective. Severity of MH is dose-dependant, which was limited in this patient, but surgeons must be aware of the risks associated with the substances they apply. To our knowledge MH triggering by Whitehead's varnish has never been reported in the literature.

References:

Frafjord R, *et al*. Walter Whitehead: A brief history of the man and his varnish. *Br J Oral Maxillofac Surg* 2007; **45:** 622

Hopkins PM. Malignant hyperthermia: pharmacology of triggering. *Br J Anaesth* 2011; **107:** 48-56

Learning points:

1. Anaesthetists must be aware of what therapeutic agents their surgical colleagues are using while surgeons must recognise life-threatening risks of the substances they apply.
2. Whitehead's varnish contains ether and can trigger MH in the susceptible patient.

1AP13-10

Patient satisfaction with low-opioid anaesthesia in breast cancer surgery

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Background and Goal of Study: Evidence suggests higher dose opioids intra and post-op may negatively impact cancer recurrence or metastasis, particularly in breast cancer. Opioids have multiple deleterious effects, including the stimulation of tumour cell angiogenesis, Natural Killer cell dysfunction and reduced apoptosis.[1] Our anaesthestic practice has embraced low dose opioid techniques, exploiting opioid sparing adjuncts. We used a well-validated scoring system to assess patient satisfaction with our current protocols.

Methods: Analysis was collected prospectively on patients undergoing breast surgery during Autumn 2014. As part of an ongoing service improvement programme formal consent was not required. A low opioid anaesthetic technique utilised Fentanyl, Paracetamol, Parecoxib, Clonidine and IV Lignocaine. No patient received Morphine. Post-op, Fentanyl and Oramorph were available as rescue analgesia. A patient satisfaction questionnaire, based on the UK SNAP-1 study (including Bauer and modified Brice questionnaire), was completed within 24 hours post-op.

Results: Thus far, complete data is available for 31 patients, all female (median age 63), with median operation duration of 95 minutes. The median Fentanyl dose was 50mcg (IQR 27.5-75), with 5 patients receiving Propofol TIVA and the rest a Desflurane inhalational anaesthetic, all receiving 50% N2O. Scores were as follows; 22 (71%) reported no pain, with 9 (29%) citing only moderate pain, none classed as severe. In terms of PONV, 27 (87%) reported no symptoms, with 4 (13%) exhibiting moderate PONV. The most common complaint was of drowsiness, moderate or severe in 22 (71%) and thirst, moderate or severe in 21 (68%). Overall, no patient reported dissatisfaction with the anaesthetic technique.

Conclusions(s): Anxiety is common in breast cancer patients, however, we have shown that a low-opioid anaesthetic technique is not associated with adverse post-operative pain and minimal PONV, thus providing an acceptable patient experience. We were surprised that drowsiness and thirst are such common negative anaesthestic sequelae. The national SNAP-1 audit reports soon, allowing us to benchmark these outcomes against the national picture and where appropriate, facilitate improvement in our service provision.

References:

1. Effect of anaesthetic technique on the natural killer cell anti-tumour activity of serum from women undergoing breast cancer surgery: a pilot study. Br J Anaesth 2014 Jul;113 i56-62.

1AP13-11

Positive publication bias in the anaesthesia literature

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Background and Goal of Study: Because of the logistics and costs of large randomised trials (RCTs), much of our evidence base in anaesthesia is provided by small, single-centre studies. This is potentially prone to publication bias (1). Positive publication bias has its origins at many points in the research process (2) and has been shown to be more prevalent among the highest impact anaesthesiology journals (3). We sought to determine whether publication bias exists more broadly, by comparing findings of studies presented as anaesthesia conference abstracts which do not progress to full journal publication, *versus* those that do.

Materials and Methods: All abstracts presented at the 2001-2004 American ASA and Australian Annual Scientific Meetings were reviewed. All abstracts of studies performed as RCTs in humans were included. Positive (rejection of null hypothesis) or negative (non-significant finding) results were documented. A PubMed search then identified any subsequent journal publication of the study. The odds ratio (OR) for journal publication of positive and negative studies was calculated. The quality of the conference abstracts and the journal abstracts were compared using a 13 point scoring system, and study size was compared.

Results and Discussion: 1135 conference abstracts met inclusion criteria. 607 (53%) of these subsequently went on to publication. The Odds Ratio for journal publication of the study if the abstract had positive results was 2.08 (CI 1.59 - 2.71, $X^2 = 29.66$, $p<0.0001$). Abstract quality was similar between unpublished conference and published abstracts, scores (IQR): Published 8 (7 - 8); Unpublished 8 (8 - 9). Median study size was 20% smaller in the conference abstracts n (IQR): Published 50 (30 - 91); Unpublished 40 (26.25 - 72). $p=0.0007$ on Wilcoxon rank sum test. This may be partly due to a lower study completion rate at conference abstract stage.

Conclusion(s): Approximately one half of abstracts at major anaesthesia scientific meetings proceed to journal publication. A study with a positive result is twice as likely to be published as one with a negative result. The presence of significant positive publication bias in the anaesthesia literature needs to be considered when assessing the evidence base in this field.

References:

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1AP13-12

The incidence of awareness during high, low and minimal flow anesthesia

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Background and Goal of Study: During low and minimal flow anesthesia, sevoflurane concentration may be too low and cause awareness.

Materials and Methods: One hundred four patients, ASA physical status I-II, aged 18-65, weighing between 50-100kg, scheduled for elective maxillofacial surgery under general anesthesia that was expected to last from 1-4 hours, were enrolled in this prospective, randomized, double-blinded study.

Patients were randomly allocated in three groups: group HF n=34 using High Flow (4.0L/min), group LF n=34 using Low Flow (1.0L/min) and group MF n=34 using Minimal Flow (0.5L/min) anesthesia with sevoflurane. Unable to use the BIS protocol, we were oriented with End Tidal Anesthetic Agent Concentration (ETAC) protocol from 0.7 to 1.3 MAC, adjusted all the time according to the patient's hemodynamic profile. Blinded structured interview modified from Brice et al. 1 were conducted by research staff in the postanaesthesia care unit, and in 2 day postoperatively.

Results and Discussion: There were no significant differences between groups with respect to demographic data, ASA score and duration of anesthesia. In the question what is the last thing you remember before going to sleep, in to the highest percentage in all three groups, patients answered-venous puncture, 79.4% in HF, 64.7% in LF and 67.6%in MF, followed by the mask of oxygen, 20.6% in HF, 26.5% in LF and 23.5% in MF.
In the question what is the first thing you remember waking up, in the first and the third group 100.0% of the patients do not remember anything when they wake up , whereas in the second group 94.1%.
Asked whether remembered something that happened while they had been under anesthesia until the moment they wake up, or dreaming during anesthesia, the patients of all three groups do not respond memory (100.0%).
In the question what was the worst thing about your operation, in to the highest percentage in all three groups, patient's answered-venous puncture, 58.8% in HF, 32.4% in LF and 41.2% in MF, followed by nothing bad, everything was OK in 32.4% in HF, 50.0% in LF and 35.3% in MF.
Conclusion(s): There is no incidence of awareness in neither group, according to awareness categorization 2.
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1AP14-1

Increase of genetic damage in professionals recently exposed to trace concentrations of waste anaesthetic gases

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Background and Goal of Study: There are many studies in the literature regarding the occupational exposure to anaesthetics and genetic damage in professionals exposed for long periods. However, any study so far has evaluated the frequency of micronuclei (MN) in exfoliated buccal cells in professionals recently exposed to volatile anaesthetics. The use of the buccal MN is a minimally invasive approach that can be used without establishing cell culture for human biomonitoring. The purpose of the study was to evaluate the frequency of buccal MN in professionals recently exposed to waste anaesthetic gases and to measure these trace concentrations in the operating theatres.
Materials and Methods: After the approval of the study from the Ethical Committee, the study was performed at the Hospital of Botucatu Medical School (Brazil) in 30 medical residents, who were allocated in two groups of 15. The exposed group consisted of anesthesiologists and surgeons exposed for three years to halogenated anaesthetics (isoflurane and sevoflurane) and nitrous oxide. The control group consisted of physicians from internal medicine. Both groups were matched by age and sex. Exfoliated buccal cells were collected from both groups and slides were stained and analysed. Two thousand differentiated cells of individual were analysed and the MN frequency was presented per thousand. In addition, measurements of trace concentrations of waste anaesthetic gases were obtained in the anaesthetist area in the operating theatres by a sensitive infrared spectrometry analyser.
Results and Discussion: There were no significant differences between groups in relation to demographic data ($P>0.05$). The average length of exposure to waste anaesthetic gases among medical residents was around 30 h/week. MN frequencies were statistically significant higher in the exposed group compared to the control ($P< 0.0001$). The mean trace concentrations of halogenated anaesthetics were 7.2 ppm and 150.3 ppm for nitrous oxide. The values were higher than recommended by USA-NIOSH threshold values (2 ppm and 25 ppm, respectively).
Conclusion: The study showed an increase of MN frequency in medical residents recently exposed to volatile anaesthetics. Thus, the buccal MN was a sensitive marker of genome damage in young adults exposed to high trace concentrations of waste anaesthetic gases.
Acknowledgements: This study was supported by FAPESP (grant #2013/05084-8) and CNPq (grant #471604-2013-5).

1AP14-2

Influence of body fat distribution on intraoperative temperature changes

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Background and Goal of Study: Age, sex, room temperature, method of operation, and amount of bleeding have effects on perioperative body temperature changes. However, it is not clear what effects visceral and subcutaneous fat distribution might have on perioperative body temperature. The purpose of this study was to examine how abdominal fat distribution affected body temperature changes in patients under general anesthesia.
Materials and Methods: The subjects were 111 patients undergoing elective surgery (57 abdominal surgery, 16thoracic surgery and 38tympanoplasty). The area of subcutaneous abdominal fat and the area of abdominal visceral fat was measured by body fat measuring equipment HDS-2000™ (OMRON, Tokyo, Japan) using bioimpedance analysis before anesthesia was administered. The temperature measured by the bladder or esophagus thermometry continuously after anesthesia was administered until the end of the operation. The temperature management was to set room temperature from 25°C to 26°C, warming the upper or lower body with a warm air humidifier from 38°C to 40°C, and using a thermal insulation material cover on the precordium and head and neck. The sum of visceral and subcutaneous fat area, and the ratio of visceral to subcutaneous fat area (V/S ratio) was calculated, using these as median value to divide into 2 groups (obese and non-obese, visceral was fat type and subcutaneous fat type) respectively. We compared intraoperative temperature changes between 2 groups. Using the Mann-Whitney U test of statistical analysis, we concluded a significant difference of $P< 0.05$.
Results and Discussion: Obese and non-obese groups had comparable core temperature changes throughout the surgery (Obese group, +0.36°C vs. non-obese group, +0.26°C, $P=0.34$). Visceral fat type and subcutaneous fat type had comparable core temperature changes throughout the surgery (Visceral fat type, +0.37°C vs. subcutaneous fat type, +0.25°C, $P=0.46$).
Conclusion(s): We found that under present body temperature management, body fat does not affect intraoperative body temperature changes.
References: Sessler et al, Anesthesiology, 74: 226-232, 1991.

1AP14-3

Influence of depolarizing neuromuscular blockade on the bispectral index

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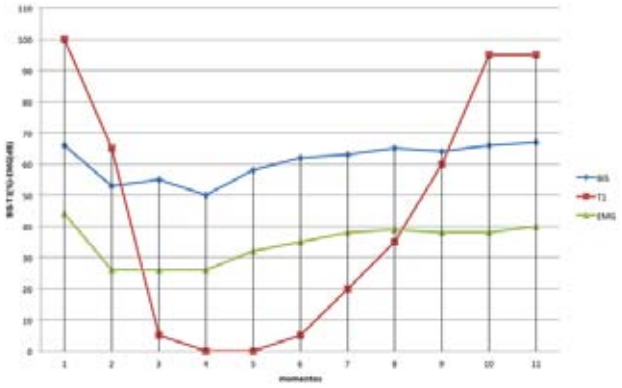
Background and Goal of Study: The bispectral index (BIS) is derived from EEG activity in the CNS and is used to measure depth of anesthesia. The BIS algorithm includes three major elements: burst suppression, spectral analysis and the bispectrum. In view of the overlap between the amplitudes and frequencies of electromyographical activity (EMG) and cortical electrical activity, the present study evaluated the influence of EMG on final BIS values following the administration of succinylcholine.
Materials and Methods: The sample consisted of 20 patients aged 20-45 years, ASA P1, with no history of BIS-altering medication, monitored with BIS Xp (A-2000), with an exploring electrode in the anterior temporal region and a reference electrode in the frontal region. Subsequent to venoclysis and tourniquet placement for the isolated-arm technique at 200 mmHg, all patients were sedated with propofol at the effector site until displaying a BIS value of 60-70. The patients were requested to move the arm with the torniquet; those who obeyed the command were excluded. At this point, $1 mg.kg^{-1}$ succinylcholine was administered i.v. and changes in BIS, EMG and T1 (first TOF response, ulnar nerve) were registered once a minute for 10 min. The patients were mask-ventilated with 100% oxygen and monitored with pulse oximetry, non-invasive blood pressure, cardioscopy and capnography.
Results and Discussion: In all patients, BIS was reduced to within the surgical range (50-55), T1 was zero and EMG was < 30 dB). During recovery from neuromuscular blockade, BIS was restored to previous values simultaneously with the recording of minimal T1 scores.
Conclusion(s): Although EMG activity is not a component of the BIS algorithm, NBA-induced reduction of EMG values affected BIS readings directly. This shows the importance of maintaining $T1\neq0$, thereby avoiding false-positive BIS readings and, possibly, intraoperative memory.



[Results]

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1AP14-4

Influence of epidural anaesthesia on the effect-site concentration at emergence from general anaesthesia

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Background and Goal of Study: Several studies suggested that epidural anaesthesia may reduce the requirement of anaesthetics in patients under the experimental settings before the start of surgery. The goal of the study to examine the influence of epidural anaesthesia on the effect-site concentration at emergence from general anaesthesia.
Methods: After obtaining the institutional ethics committee approval, we collected the following data retrospectively from the patients anaesthetised using propofol and or sevoflurane, and opioids with or without epidural anaesthesia: the effect-site concentration (Ce) of anaesthetics and opioids at the emergence from general anaesthesia (recovery of consciousness, ROC), patient characteristics, and BIS values at ROC.The opioid Ce was calculated as the remifentanil Ce plus the fentanyl Ce multiplied by 0.79. The anaesthetic Ce was calculated as the propofol Ce (using the Marsh model) plus sevoflurane Ce divided by 0.44. The Exclusion criteria were younger than 16, the operation time < 30 minutes or >15 hours, bleeding >3 L, body mass index >35, neurosurgeries and cardiac surgeries.The dataset included the same number of the patients with or without epidural anaesthesia using the matching criteria of both remifentanil and fentanyl Ce because opioid may influence the anaesthetic Ce at ROC.BIS value at ROC was compared between the patients with or without epidural anaesthesia using Mann-Whitney U test. Multiple regression analysis was applied to find the significant explanatory variables on anaesthetic Ce at ROC. Tested possible explanatory variables included age, sex, body weight, height, opioid Ce, and with or without epidural anaesthesia.Data was expressed as median [10-90 percentile]. P value < 0.01 was regarded as significant.
Results: We included 156 (64 [41-77] yr, 58 [46-73] kg, male: female=76:80) patients or 156 (65 [28-80] yr, 60 [44-76] kg, male: female=97:59) patients with or without epidural anaesthesia, respectively. The BIS values at ROC were comparable between the patients with and without epidural anaesthesia (85 [62-97] and 83 [61-97], respectively; p=0.920). The age (P< 0.001) and sex (P=0.001) but not epidural anaesthesia were significant explanatory variables to predict the anaesthetic Ce. The anaesthetic Ce was expressed as 1.24 - 0.0073 × (Age - 65) + 0.168 × Sex [0 for male or 1 for female].
Conclusion: Epidural anaesthesia did not influence on the effect-site concentration of anaesthetics at ROC.

1AP14-6

Influence of residency programs on the daily usage of muscle relaxants

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Background and Goal of Study: The use of muscle relaxants worldwide and their monitoring are not based on unanimous guidelines; a survey was carried out to assess the daily practice of Lebanese anaesthetists, and to evaluate the influence of the residency programs on the daily usage of muscle relaxants.
Materials and Methods: An online questionnaire was created based on the different guidelines concerning the use of muscle relaxants for tracheal intubation and surgery, the monitoring and antagonism of neuromuscular blockade. Residency programs were classified into French, English, Russian and Other.
Results and Discussion: One hundred and forty-five Lebanese anaesthetists completed the questionnaire, which represents 32% of the anaesthetists registered in Lebanon. The analysis of the results showed that 35.7% of them do not use Succinylcholine to facilitate tracheal intubation. It is being used more often by French-trained rather than English-trained anaesthetists (70.4% vs. 53.1% with p=0.088).
Rocuronium and Cisatracurium were used respectively by 48.3% and 39.7% of anaesthetists without significant difference between French and English groups (50% vs. 62.5% for Rocuronium, and 38.9% vs. 34.4% for Cisatracurium respectively, p=0.448).
Most doctors in the two latter groups do not measure Pseudocholinesterase levels before using Succinylcholine (89.4% and 89.7% respectively).
Russian-trained anaesthetists tend not to monitor the neuromuscular blockade, unlike French and English-trained anaesthetists (70%, 15.3% and 15.6% respectively, p=0.006).
Antagonism of neuromuscular blockade was systematic, frequent, episodic, or excluded respectively by 43.5%, 29.6%, 24.3% and 2.6% of responders, regardless of their training programs.
Presently, 8.5% of all Lebanese anaesthetists still use Pancuronium
Finally, even if Sugamadex was covered by all payers, 29.3% of all anaesthetists would not change their practice of antagonizing non-depolarizing neuromuscular agents, with no difference between groups.
Conclusion: There is no difference in the use of muscle relaxants, monitoring and antagonism of neuromuscular blockade between the different anaesthetists groups in Lebanon, no matter their training. There is a need for national recommendations regarding the use of muscle relaxants.
References: Eriksson LI. Evidence-based practice and neuromuscular monitoring. It's time for routine quantitative assessment. Anesthesiology 2003;98: 1037-9.

1AP14-7

Infusion flow rate is proportional to outer-bag feeding pressure

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Background and Goal of Study: The pressurization of the infusion bag is useful for rapid infusion. The flow rate of a steady laminar flow of Newtonian fluid through a tubular structure increases in proportion to feeding pressure driven by the outer bag structure, i.e., Hagen-Poiseuille's law. However, the properties of a pressurized infusion line have not been elucidated. We investigated the relationship of pressure and the flow rate of a pressurized infusion line with various intravenous (IV) catheter sizes and infusion solutions.
Materials and Methods:
Experiment 1: We infused normal saline through an infusion line with an 18-, 20-, 22-, or 24-gauge catheter at the tip. Infusion flow rate through the line and pressure at the mid-point (upstream pressure: P_U) were measured. The infusion bag was pressurized and P_U was set at 50 to 450 mmHg in 50-mmHg steps. We then obtained best fit constants and determination coefficients (R^2) by approximation of the curves of $Q = a \times P^{b1}$, where Q = flow rate, P = pressure, and b_1 = the constant of the entire system.
Experiment 2: We changed P_U from 50 to 300 mmHg and measured the pressure at the catheter connection (P_C). As in experiment 1, we computed the best fit constant and R^2 by approximation of $Q = a \times P^{b2}$, where b_2 = the constant of IV catheter. Pressure loss upstream was also calculated by $(P_U - P_C) / P_U$ for each IV line setting.

Experiment 3: Packed red blood cells (PRBC) were used with the same protocol as in experiment 1.
Results and Discussion: With normal saline, the b_1 values for the 24-, 22-, 20-, and 18-gauge tips were 0.96, 0.93, 0.95 and 0.96, respectively, while those for b_2 were 0.81, 0.71, 0.67 and 0.51, respectively. Upstream pressure loss rate values with the tips was 0.19, 0.28, 0.48 and 0.61, respectively. These results suggest that the pressure-flow rate relationship in the entire system was nearly linear, whereas the pressure-flow rate relationship in the IV catheter was nonlinear [Ref.1]. Because the effects of lower b_2 with the larger catheter were minimized by a higher rate of pressure loss upstream, the entire system become linear. With PRBC, the entire system was also nearly linear, as the b_1 values were 1.06, 1.06, 1.04, and 1.11, respectively.
Conclusion(s): Flow rate increased approximately proportional to the feeding pressure in our pressure infusion system regardless of the fluid employed.
References: Anesth Analg 2009; 108: 1198-202.
Acknowledgements: not applicable

1AP14-8

Intraoperative effect of dexmedetomidine infusion during living donor liver transplantation

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Background and Goal of Study: Dexmedetomidine hydrochloride (Dex) is a useful adjuvant for general anaesthesia. Aim is to evaluate the effects of Dex infusion during liver transplantation on the general anaesthetic requirements, haemodynamics, oxygen consumption (VO_2), CO_2 production (VCO_2) and cost.
Materials and Methods: A prospective, randomized, double-blind study. After Ethics Committee (0076/2014), Pan African Clinical Trial Registry of South Africa (PACTR201408000872245) and consent approvals, 40 recipients were equally divided to receive either Dex (0.2-0.7μg/kg/hr) or placebo (Control, C). Patient State Index (PSI), SEDLine (Masimo, Irvine, CA) monitored anaesthesia depth (25-50) with Desflurane (Des) % and fentanyl altered accordingly. Transoesophageal Doppler (TED) (CardioQ, Chichester, UK), invasive mean arterial blood pressure (MABP, mmHg) and heart rate (HR, beat/min) were monitoring any Dex side effects and altering infusion rate accordingly; TED was used for fluid optimization. Metabolic gas monitoring (VO2, VCO2) and Des consumption (GE Health Care, Finland) were recorded.
Results: Dex reduced Des and fentanyl consumption vs. C (120.0±30.2 vs., 248.0±38.8) ml, (440.0±195.74 vs., 1300.0±32) μg, respectively (P<0.01). Dex was delivered for 11.35±2.45 hr with comparable HR, MABP and TED variables vs. C and with similar mean noradrenaline support (5.63±2.44 vs. 5.83±2.57 mg, P=0.81). VO_2 was reduced with Dex vs. C during anhepatic, 30 min post-reperfusion and end of surgery (193.2±26.78 vs. 239±14.93) (172.1±28.14vs 202.7±18.03) and (199.7±26.63 vs. 283.8±14.83) ml.min^{-1}.m^{-2} respectively (P<0.01). VCO_2 was also reduced with Dex vs. C during the same periods (195.2±46.41 vs. 216.7±29.90, P=0.09), (210.6±60.71 vs. 253.9±32.51, P= 0.01) and (158.7±49.96 vs. 209.7± 16.78, P<0.01), ml.min^{-1}.m^{-2} respectively Comparable operative times and graft weights with Des vs, C (11.35±2.45 vs. 12.0±2.38 hr, P=0.40), (785.0±110.14 vs. 775.0±137.66 gram, P=0.80), respectively. Total Dex consumed 205±15.39 μg. Dex reduced the total anaesthetic cost (654.17±116.21 vs. 807.22±99.01, Egyptian pounds, LE, P<0.01).
Conclusion: PSI guided Dex infusion helped to reduce Desflurane and fentanyl consumption at a lower cost and with no adverse effects on haemodynamics. The observed reduction in VO2 and VCO2 associating Dex infusion and their clinical impact particularly on newly transplanted liver graft cells needs be further investigated in depth.

1AP14-9

Intraoperative sugammadex improves quality of recurrent laryngeal nerve monitoring during total thyroidectomy

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Background: Intraoperative neuromonitoring (INM) of the recurrent laryngeal nerve (RLN) during total thyroidectomy increases patient safety.[1] However, low voltages may indicate nerve damage (temporary or permanent), technical failure or neuromuscular blockade for the use of neuromuscular blocking agents (NMB). Systematic use of NMB antagonists, as sugammadex, could be useful in this type of surgery improving the quality of INM techniques and therefore increasing safety during thyroid dissection.
Goal of Study: The aim of this study is to asses if the reversal of motor block by using sugammadex, improves electromyographic response of the vocal cords and therefore the quality of the techniques of INM.
Material and methods: Prospective observational study of 32 adults scheduled for total thyroidectomy. RLN was monitored with NIM Response 2.0® (Medtronic, USA) and neuromuscular function with E-NMT Module® (GE, USA). After induction of general anesthesia and cinemiography calibration, rocuronium 0.6 mg/kg was administered for tracheal intubation. At the time of the first RLN stimulation we recorded first nerve response (V1) and the degree of NMB (TOF1). After reversal of NMB with 200 mg of sugammadex we assess nerve response (V2) and the degree of NMB (TOF2). We performed a paired T-test and Wilcoxon test.
Results: Demographic data showed an age 53.7 ± 15.3, weight 69.6 ± 11.5 and height 160.9 ± 9.9. Only 7 patients don't have a complete recovery of NMB (86.4 ± 12.4 %, range 30 to 100), but all patients showed increased signal of INM. The mean difference between V1 and V2 was 408.4 ± 326.0 mv (IC 95% 530.2 to 286.7) with p< 0.001. The mean difference between TOF1 and TOF2 was 73.2 ± 21.5% (IC 95% 65.4 to 81.0) with p< 0.001. We detected 3 patients with technical failure.
Discussion/Conclusions: The reversal of NMB increases the sensitivity of the NIM. The lack of signal increased after antagonizing may indicate nerve damage or technical failure of NIM. Monitoring of neuromuscular blockade and sugammadex are tools that enhance safety in thyroid surgery.
Reference:
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1AP14-10

Investigation of heat loss during surgery - where does it happen?

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Background and Goal of Study: Perioperative hypothermia (PH), as defined by temperature less than 36ºC, has a negative impact on both patient experience and post operative outcomes. Despite national guidance on its prevention[1], PH remains a common problem[2].
Study aims: To determine the incidence of PH in patients undergoing elective surgery in two regional hospitals. To investigate where perioperative heat loss occurs.
Materials and Methods: We recorded core body temperature of 144 patients following surgery (on admission to recovery room). We followed this with serial core body temperatures measurements (check-in, anaesthetic room, start of surgery, end of surgery and recovery room) on 54 patients undergoing elective surgery. We also recorded ambient theatre temperature, warming techniques and length of surgery (from induction to recovery).
Results and Discussion: This study found that the incidence of hypothermia (body temperature <36ºC) following surgery was 58% (83/144) and 50% (27/54) for two groups of studied patients. Mean (SD) age of patients was 39 years (24.5), theatre ambient temperature 22(1.4)°C and mean (SD) length of surgery was 75 (55) min. Mean [range] loss of body temperature from induction to recovery was 0.47ºC [0.8ºC gain - 2.8ºC loss] (p = 0.0003). A significantly greater temperature drop was seen if no warming methods were used versus active fluid and body warming (0.81ºc v 0.18ºc, p=0.01). Main findings are presented in the table.

Table 1. Serial recording of core body temperature and use of active warming. Values are mean(SD) and %(proportion).

Induction	Start of surgery	End of surgery	Recovery
36.7 (0.41)°C	36.4 (0.49)°C	36.1 (0.58)°C	36.0 (0.55)°C
	Active Warming		
	Forced air warmer	Fluid warmer	
	51% (22/43)	56% (20/36)	

[Table 1]

Conclusion(s): This study found that PH is a common problem. Most of the heat loss happens from induction to recovery. Application of active warming measure is likely to significantly reduce the incidence of PH in patients having elective surgery.

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Acknowledgements: Arumugam S

1AP14-11

Is the application of lipid emulsion able to improve recovery after a mepivacaine - induced cardiac arrest in a rodent model?

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Background: The application of lipid emulsion after bupivacaine - induced cardiac intoxication leads to an improved cardiac recovery in the isolated cardiomyocyte as well as in the whole animal model (1,2). But there is only an insufficient number of studies concerning less lipophilic local anaesthetics (LA). Therefore we investigated the effect of the application of lipid emulsion after mepivacaine - induced intoxication in a whole animal model. We postulated a smaller lipid effect than for high lipophilic LAs.
Materials and Methods: After approval from the Institutional Animal Care Committee of the University of Regensburg 16 male Wistar rats were anaesthetized and asystole was induced by an i.v.-application of mepivacaine (2 mg/kg/min). Resuscitation was performed with thoracic compressions and in one group with lipid emulsion (mepi+lipo: bolus: 5 ml/kg, then 1 ml/kg/min; Lipofundin® MCT/LCT 20%) (3) and in the other group with epinephrine alone (mepi+epi: initially bolus of 30µg/kg, then 10µg/kg). ROSC within 5 min after the asystole was declared a successful reanimation.
Results: The time (mepi+lipo: 570 +/- 114 sec vs. mepi+epi: 548 +/- 122 sec) and the required mepivacaine dose (mepi+lipo: 7.3 +/- 1.3 mg vs. mepi+epi: 7.1 +/- 1.2 mg) to reach asystole did not differ between both groups. The lipid group showed a resuscitation rate of 75% (6/8) and the epinephrine group reached 100% (8/8). The resuscitation time for mepi+lipo was 108.3+/-55.4 sec and for mepi+epi 161.2 +/- 48.7 sec. There was no significant difference in terms of resuscitation rate and -time.
Conclusion: The data show a partial positive effect for the application of lipid emulsion after mepivacaine - induced cardiac arrest compared to a conventional resuscitation respective to the resuscitation time.With regard to the resuscitation rate no benefit could be stated compared to the conventional resuscitation.
This seems to be contradictory to in-vitro-studies. In terms of the isolated cardiomyocyte there was no or only a reduced effect of lipid application on the cardiac recovery after mepivacaine intoxication (1,2). The reason for this discrepancy is unclear although pharmakokinetic and/or -dynamic effects are probable.
Literature:
1. Wagner & Zausig et al. Anesthesiology, 2014;
2. Weinberg et al. Anesthesiology, 1998;
3. Di Gregorio et al. Crit Care Med, 2009;

1AP14-12

The effect of prolonged inspiratory time on arterial and cerebral oxygenation during laparoscopic bariatric surgery

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Background and Goal of Study: The purpose of this study was to compare the effects of conventional inspiratory to expiratory (I:E) ratio (1:2) ventilation (CRV) with prolonged ratio ventilations, equal ratio (1:1) ventilation (ERV) and inverse ratio (2:1) ventilation (IRV), on heamodynamics, respiratory mechanics, arterial oxygenation and regional cerebral oxygenation saturation (rSO_2) during laparoscopic bariatric surgery in reverse Trendelenburg position.
Materials and Methods: Twenty-eight adult patients (body mass index (BMI) ≥30 kg/m²) scheduled for laparoscopic bariatric surgery were enrolled in this prospective observational study. After anaesthesia induction, mechanical ventilation was conducted initially with pressure-controlled mode at an I:E ratio of 1:2 with a tidal volume of 8 ml/kg of ideal body weight at 60% inspired oxygen in air. A 5 cmH_2O positive end-expiratory pressure was applied during mechanical ventilation. Twenty minutes after pneumoperitoneum, the I:E ratio was changed to 1:1 for 20 min and then to 2:1 for 20 min. Haemodynamic variables, end-tidal carbon dioxide tension and rSO_2 were measured every 5 min. Arterial blood gas analysis results and respiratory variables were recorded at 20 min after applying CRVduring pneumoperitoneum, ERV and IRV, respectively.
Results and Discussion: There were no significant changes in haemodynamics and rSO_2 over time. Peak airway pressure was significantly lower, whereas mean airway pressure and dynamic compliance were significantly higher during ERV and IRV vs. CRV. Arterial oxygen tension (PaO_2) was significantly higher (P=0.009) and alveolar-arterial oxygen tension gradient was lower during IRV vs. CRV (P=0.015).
Conclusion(s): This study showed that changing from conventional to inverse ratio ventilation significantly improved respiratory mechanics and arterial oxygenation without haemodynamic derangement and cerebral desaturation in laparoscopic bariatric surgery in revese Trendelenburg position.

1AP15-1

D-dimer testing cannot rule out thromboembolism after major lower extremity arthroplasties and thromboprophylaxis treatment

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Deep vein thrombosis (DVT) and pulmonary embolism (PE) are common, but serious complications of arthroplasties of the major lower extremities, such as total hip arthroplasty (THA) or total or partial knee arthroplasty (TPKA). Previously, we demonstrated, for the first time, that a guideline-recommended thromboprophylactic strategy reduced the prevalence of venous thromboembolism (VTE), including DVT and PE, to 4.4% [1]. In this retrospective study, we aimed to examine the diagnostic value of D-dimer for VTE and to confirm the low prevalence of VTE after THA or TPKA.
Methods: This was a retrospective study including 380 procedures of 361 patients who underwent elective 129 TPKA or 251 THA, as well as multidetector computed tomography (MDCT) on postoperative day 7 to screen for VTE, including DVT and PE. The antithrombotic prophylaxes included anticoagulants, pneumatic compression devices and compression stockings, and early ambulation. D-dimer was measured on the same day as the MDCT. When the diagnosis of VTE was not conclusive on the MDCT, the diagnosis was made with venous compression ultrasonography (US) of the lower extremities. Data were assessed per procedure rather than per patient because some of the patients underwent the same procedures on the other side or a revision in this period.
Results: The prevalence of VTE was 4.5%, 17 (males: 2, females: 15) of the 380 patients undergoing THA or TPKA had VTE. The D-dimer level was significantly greater in the patients with VTE than without (13.4 ±11.1 vs. 10.1 ±6.5 mg/L, respectively). ROC analysis showed that the AUC was 0.59, indicating moderate predicting value, and the best cutoff level was 8.5 mg/L. At the lowest cutoff value of 4.0 mg/L, D-dimer testing ruled out VTE in only 26 of 303 patients with 1 (6%) false negative result. There was no VTE-related mortality and morbidity in the current.

Discussion & Conclusions: The low incidence of postoperative VTE with the strict anticoagulation strategy was confirmed in this validation study. Although there was a difference in the D-dimer level on postoperative day 7 between patients with and without VTE, we did not find that D-dimer testing was useful for excluding VTE postoperatively in patients who underwent THA or TPKA.
Reference: 1. Fujita Y.,et al. European Journal of Anesthesiology 2014; 31:e52: 93-94.

1AP15-2

Development of a head space technique with mass spectrograph to detect reliable propofol blood concentrations

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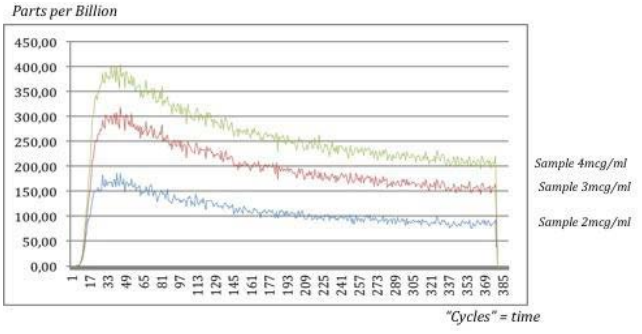
Background and Goal of Study: Many research groups have been working on the detection of exhaled propofol during general anesthesia using a mass spectrograph. Our team has achieved to reproduce and improve those results, and we have decided to go further.
The few past years we have been working on the development of a device to detect the exact blood concentration of propofol to correlate it with the concentration of the exhaled one. For this purpose we have developed a Head Space device implemented in a mass spectrograph (PTRMS), saving time and costs.
After validating our analytic method we will seek after all the parameters that can alter the free fraction of propofol in blood, as well as the breath parameters that can change the exhaled propofol concentration. Our main perspective is to define a useful propofol end-tidal with applicability on our daily surgeries.
Materials and Methods: We work with a mass spectograph (PTRMS, Ionicon) in which we have developed different arrangements to obtain more accurate results. In this particular part of the study, we have developed a Head Space device connected to the PTRMS, being capable of analysing different blood samples with different propofol concentrations (2, 3, 4mcg/ml, n=75; 25 each) . There are plenty of parameters (temperatures in whole tubular circuit, time of incubation, time of sampling…) that must be controlled and therefore, we have developed appropriate software to have a strict control on them.
Results and Discussion: Two minutes after incubating the samples and processing them for two more minutes, we obtained the following averaged results: for a blood concentration (BC) of **2mcgr/ml:** Peak value: 182´3; area: 23304,8; residual value: 90; BC of **3mcg/ml:** Peak value: 312; area: 33976,4; residual value: 153´6; BC of **4mcgr/ml:** Peak value: 403´8; area: 40363,2; residual value: 207´2.



[Propofol detection]

Conclusions: We are capable of detecting reliable propofol concentrations in the breath and blood of our patients.
More sample studies are needed to ascertain the different parameters that can alter/affect the blood and air propofol concentrations.

1AP15-3

Difference in the effect-site concentration of remifentanil for preventing QTc interval prolongation following intubation in normotensive and hypertensive patients

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Background and Goal of Study: Prolongation of heart-rate corrected QT (QTc) interval is associated with torsade de pointes. During anesthetic induction, QTc interval may be prolonged by anesthetic agents and changes may be exacerbated by sympathetic stimulation from tracheal intubation. In hypertensive patients, hemodynamic responses to tracheal intubation are more pronounced than that of normotensive patients. However, there is no study regarding to the method of preventing the QTc interval prolongation in hypertensive patients during intubation. Therefore, we investigated the effect-site concentration (Ce) of remifentanil for preventing QTc interval prolongation following intubation in hypertensive patients and compared it with that of normotensive patients.
Materials and Methods: Twenty-two normotensive and 22 hypertensive patients (≥50 yr) were enrolled. General anesthesia was induced and maintained with propofol and remifentanil using a target-controlled infusion. The Ce of remifentanil for maintaining a QTc interval prolongation <15 ms following intubation was determined using the isotonic regression method and a bootstrapping approach following Dixon's up-and-down method. The Ce of remifentanil was 4.0 ng/mL for the first patients in both groups.
If the effective concentration of remifentanil in 50% of the population (EC_{50}) and 95% of population (EC_{95}) for each group did not overlap at the level of the 83% CI and 95% CI, respectively, the null hypothesis of equal ECs was rejected at an α of 0.05.
Results and Discussion: The mean ages of normotensive and hypertensive group were 61 yr and 63 yr, respectively. The median duration of hypertension was 6 (range, 2-15) years.
The EC_{50} and EC_{95} of remifentanil Ce were significantly higher in hypertensive patients than in normotensive patients. By using isotonic regression method, the ED_{50} (83% CI) of remifentanil was 3.8 (3.5-4.1) ng/ml in normotensive patients and 6.1 (5.8-6.2) ng/ml in hypertensive patients.
The EC_{95} (95% CI) of remifentanil was 4.4 (4.3-4.5) ng/ml and 6.5 (6.4-6.5) ng/ml in normotensive and hypertensive patients, respectively.
Conclusion(s): The Ce of remifentanil needed for preventing QTc interval prolongation following intubation is higher in hypertensive patients than in normotensive patients. Hypertension should be considered as the factor of QTc interval prolongation caused by tracheal intubation, thus caution should be taken when intubating hypertensive patients.

1AP15-4

Does desflurane anaesthesia associated or not with nitrous oxide induce genotoxicity in patients?

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Background and Goal of Study: Desflurane is one of the newest halogenated anaesthetics and has recently been introduced in clinical practice. Little is known about the genotoxic effect of desflurane[1], and whether concomitant use of nitrous oxide (N_2O) can aggravate this effect on genetic material. Thus, the aim of this study was to evaluate the possible genotoxicity of desflurane anaesthesia, associated or not to N_2O, in patients.
Materials and Methods: After approval from the local Ethical Committee, 22 ASA physical status I patients, of both sexes, who underwent minimally invasive surgery lasting at least 90 min were included in the study. Patients were randomly allocated into two groups of 11 to receive desflurane anaesthesia (1 MAC - 6%, 40% O_2 and 60% air) or desflurane anaesthesia associated with N_2O at 60% (40% O_2). Blood samples were collected before anaesthesia induction (baseline), 90 min after the beginning of anaesthesia and one day after surgery. DNA damage was evaluated in lymphocytes by the alkaline comet assay.
Results and Discussion: Patients enrolled in the study were young adults (36 ± 9 years desflurane x 32 ± 8 years desflurane + N_2O) with normal body mass index (24 ± 4 kg/m^2 desflurane x 24 ± 3 kg/m^2 desflurane + N_2O). No differences in DNA damage were observed in the same group or between groups (P>0.05).

Conclusion: The findings indicated that neither desflurane anesthesia nor desflurane anaesthesia associated with N_2O were genotoxic when evaluated in ASA physical status I patients undergoing minimally invasive surgery. Both types of anaesthesia seems to be safe regarding the genome.
Reference: 1. Akin A, Ugur F, Ozkul Y, et al. Acta Anaesthesiol. Scand. 2005; 49:1559-1561.
Acknowledgements: This study was supported by FAPESP (grant #2013/16842-0).

1AP15-5

Dose dependent effects of fibrinogen concentate (FC) and factor XIII concentrate (FXIIIC) on thrombelastometrical fibrin clot strength in an artificial, plasma free solution based on human albumin 5%

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Background and Goal of Study: Dilutional coagulopathy (DC) is a frequent complication in massive bleeding caused by volume replacement with colloid/cristalloid solutions. Loss of blood clot stability due to hypofibrinogenemia is an early stage complication of DC. Several in vitro and in vivo studies have shown positive effects of FC and FXIII on physical blood clot stability in thrombelastometry. Most of these studies are performed in whole blood environment. This complicates the interpretation of the hemostatic neto effect of both drugs (FC and FXIIIC) due to their multiple interactions with other plasma proteins and corpuscular components. In this in vitro study we could examine dose dependent effects of CF and FXIIIC on fibrin clot formation in a highly purified, blood component free model based on a 5% human albumin solution.
Materials and Methods: Human albumin 5% (Grifols, Spain) inViaflo Plasmalyte® 148 (Baxter, Spain), enriched with Ca++ gluconate (0,9 mmol/l) was titrated with TRIS buffer 2M to pH 7,3 -7,4. Two sets of experiments were performed on this stem solution (SS):
1) Increased concentrations (conc) of FC* (range from 0 to 12g/l) were tested with fixed conc of PCC* (1IU/ml).
2) Increased conc of FXIII* (range from 0 to 8 IU/ml) were tested with fixed conc of PCC* (1U/ml) and CF* (4g/L).
To define human plasma normal range for A10 and MCF whole blood from 10 healthy, volunteer donors was centrifuged (3200 R/min for 25 minutes) and tested by thrombelastometry.
All tests were performed on ROTEM® delta using fib-tem® S reagents.
*CSL Behring GmbH, Marburg, Germany.

Results and Discussion:
- strong positive correlation between FC conc and A10/MCF was shown (pearson correlation (P-Cor): 0,983 for both)
- high positive correlation between FXIIIC conc and A10/MCF was shown (P-Cor: 0,73 for both)
- Mean plasma values of MCF in our control group was 23,17 mm. This MCF value was achieved in our experiments at FC concentrations of 6,7 g/l (without FXIIIC).
- Low -normal whole blood Extem values for A10 (45 mm) and MCF (50mm) are reached at FC concentrations of 12 and 13,4 g/l, respectively (without FXIIIC).

Conclusion(s): FC and FXIIIC have a highly significant linear correlation with A 10 and MCF in a blood free in vitro model. Normal plasma fibrin clot stability and normal whole blood clot stability can be achieved by using adequate doses of both hemostatic factors under complete absence of any whole blood component.

1AP15-6

Effects of desflurane postconditioning on lipopolysaccharide-stimulated human endothelial cells

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Background and Goal of Study: Desflurane is a halogenated ether anaesthetic agent whose protective properties on brain and cardiac tissues have been studied, whereas underlying protective effects on cellular mechanisms still remain poorly characterized. Our *in vitro* study aims to explore effects of desflurane postconditioning in lipopolysaccharide (LPS)-stimulated human endothelial cells.
Materials and Methods: Primary human endothelial cells (HUVECs) were exposed to LPS from *E. coli* at 1 μg/mL. Three hours after stimulation with LPS, cells were placed in an airtight chamber at 37ºC and perfused for 1 hour with air (21% O_2, 5% CO_2, 69% N_2) containing 2, 3 or 8% desflurane. Gas and desflurane were continuously monitored from the output line by an anesthetic gas measurer module. For each condition, control cells were superfused for the same length of time with fresh air lacking desflurane. Once the exposure was finished, cells were returned to the incubator and samples were taken 24 hours after exposure to analyze cell death measured by LDH release, levels of the inflammatory mediator IL-6 and the antioxidant enzyme catalase. After the normality of data were assessed by Kolmogorov-Smirnov test, statistical analysis was performed with ANOVA followed by *post hoc* test when appropriate using statistical software Prism 5 (GraphPad). A $p < 0.05$ was considered statistically significant.
Results and Discussion: All studied concentrations of desflurane showed a cytoprotective effect on LPS-stimulated HUVEC cells, decreasing cell death 24 hours after exposure (all $p < 0.001$) compared to control group. Desflurane at 2% did not decrease IL-6 levels, whereas cells treated with doses of 3% and 8% showed lower levels of IL-6 (all $p < 0.05$) compared to controls. In addition, results demonstrate that desflurane influences antioxidant defense system, since cells treated with doses of 3% and 8% showed greater levels of the antioxidant enzyme catalase compared to controls (all $p < 0.05$), whereas this effect was not observed at 2%, the lowest tested dose ($p \geq 0.05$).
Conclusions: Desflurane postconditioning after LPS stimulation of human endothelial cells shows relevant cytoprotective effects, attenuating cell death. This protective effect might be mediated, at least in part, by a decrease of the inflammatory response as well as by an enhancement of the antioxidant defense mechanisms of the cell.

1AP15-7

Effects of helium on microparticle release after TNF-a- and H_2O_2-induced damage in human umbilical vein endothelial cells

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Background: Helium (He) induces preconditioning in human endothelium in vivo (1). Microparticles are derived from endothelium in response to injury and are a marker of endothelial dysfunction (2). We hypothesized that helium preconditioning is regulated by the amount and content of microparticles in response to TNF-a- and H_2O_2-induced cell damage.
Materials and Methods: Human umbilical vein endothelial cells were isolated from fresh umbilical cords and grown upon confluence. At passage 3, cells were subjected to starving medium without addition of growth factors for 12 h before the experiment. Cells were treated for either 3x5 min or 1x30 min with helium (5%CO_2, 25%O_2, 70%helium) or control gas (5%CO_2, 25%O_2, 70%N_2) in a specialised gas chamber. Subsequently, cells were stimulated with TNF-a (40ng/ml for 24 h) or H_2O_2 (500mM for 1.5 h) or left untreated. Cell supernatant was collected and analysed using nanoparticle tracking analysis and flowcytometry for detection of caspase-3. Data shown are mean±SD.
Results: After pretreatment with 3x5 min helium no differences were observed in amount of particles after TNF-a or H_2O_2 stimulation. Pretreatment with 1x30 min He showed that TNF-a stimulation, He alone and the combination of He and TNF-a significantly increased the amount of particles compared to controls (fig. 1). Exposure to 1x30 min He significantly increased the amount of

particles when He was given alone, and in combination with H_2O_2 compared to controls (fig. 1). Stimulation with H_2O_2 without He did not increase particles ($p < 0,05$ with ANOVA and bonferroni correction after log transformation). TNF-a stimulation resulted in an increased amount of caspase-3-containing particles after 3x5 min ($2.9*10^5 \pm 0.1*$) and 1x30 min ($4.2*10^5 \pm 0.1*10^5$) compared to controls ($1.2\ 10^5 \pm 0.1*10^5$ and $1.5*10^5 \pm 0.1*10^5$). Pretreatment with 3x5 min He further increased TNF-a induced increment of caspase-3 containing particles compared to TNF-a alone ($6.4*10^5 \pm 1.1*10^5$) ($p < 0,05$ with ANOVA and bonferroni correction). H_2O_2 had no effect on caspase-3 containing particles.

Conclusion: Exposure of 30 min He increased the amount of particles independent of the damage model used. Exposure of 3x5 min He has no effect on the general amount of particles produced, but further increases caspase-3 containing particles after TNF-a stimulation.

References:

1. Smit et al. Anesthesiology 2013; 118: 95-104.
2. Boulanger et al., Circulation. 2001; 104: 2649-52

1AP15-8

Effects of nicardipine on the onset time and intubating conditions of rocuronium-induced neuromuscular blockade

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Background: Nicardipine 20-30 μg/kg has been reported to effectively attenuate transient hypertensive responses on laryngoscopy and tracheal intubation. One clinical study has shown that the vecuronium dose requirements are significantly reduced by continuous infusion of nicardipine. the aim of this study was to identify the effects of nicardipine on the onset time of rocuronium and intubation conditions using a dose of nicardipine that attenuates cardiovascular responses during endotracheal intubation.

Materials and Methods: ASA physical status I and II 78 patients, aged 18 to 60 years who were undergoing elective surgery under general anesthesia. Interventions The nicardipine group was given an intravenous (iv) bolus of 20 μg/kg nicardipine before tracheal intubation: the control group was given an iv bolus of a comparable volume of normal saline before tracheal intubation. Measurements: Using a TOF-Watch SX® monitor, the time between rocuronium injection and a TOF count of zero (onset time) was measured. Intubation was performed 1 min after rocuronium administration, and the status of the intubating conditions was assessed. The mean blood pressure (MBP) and heart rate (HR) were each measured after endotracheal intubation. Rate-pressure product (RPP) values were also calculated.

Results and Discussion: Intubating conditions were clinically acceptable in 37 of 39 patients (94.9%) in group N compared with 29 of 39 (74.4%) in group C ($P<0.05$). The onset time of rocuronium was significantly faster in group N than in group C ($P<0.05$). The MBP was significantly lower in group N than in group C ($P<0.05$). The HR was significantly higher in group N than in group C ($P<0.05$). RPP values showed no significant difference between the two groups ($P>0.05$).

Group	Grade of intubations		
	Excellent n (%)	Good n (%)	Poor n (%)
Group C (n = 39)	9 (23.1)	20 (51.3)	10 (25.6)
Group N (n = 39)	13 (33.3)	24 (61.5)	2 (5.1)

[1. Intubating conditions]

	Group C (n = 39)	Group N (n = 39)
Onset time (sec)	204.0 ± 107.2	141.2 ± 59.0*

[2. Onset time of roucuronium]

Conclusion(s): Pretreatment with 20 μg/kg nicardipine, which attenuates cardiovascular responses to tracheal intubation, improves intubating conditions and shortens the onset time of rocuronium.

References: Bikhazi GB, Flores C, Foldes FF. The effect of verapamil and EGTA on the rat phrenic nerve-hemidiaphragm preparation. Anesth Analg. 1985;64:505-8.

1AP15-9

Evaluation of hypersensitivity incidence following repeated single-dose sugammadex administration in healthy subjects

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Background: This study evaluated incidence of hypersensitivity (HS) and anaphylaxis after repeated single-dose sugammadex administration in healthy adult subjects.

Methods: This was a multicentre, randomized, double-blind, placebo-controlled study (NCT02028065). Subjects received three repeat IV bolus injections of either sugammadex 4 mg/kg, sugammadex 16 mg/kg or placebo, with a ~5 week washout period between doses. Adverse events (AEs) were recorded throughout the study, and targeted HS assessments were performed at 0.5, 4, and 24 h after dosing. HS signs or symptoms in the first 24 h after dosing were referred to the blinded independent Adjudication Committee for evaluation. Anaphylaxis was determined according to Sampson (Criterion 1). Subjects with HS-related AEs of severe intensity or requiring treatment, and those with serious AEs, were discontinued. Primary endpoint was n (%) of subjects with adjudicated HS symptoms for each sugammadex and placebo dose. Key secondary endpoint was n (%) of subjects with adjudicated anaphylaxis.

Results: In total, 375 subjects received ≥1 dose of study medication (table). Twenty-five subjects had adjudicated HS after receiving ≥1 study medication dose (table); majority of HS symptoms were mild and self-limited. Of these 25, three (all 16 mg/kg group) required treatment for HS symptoms and were discontinued from the study. Symptoms of all three subjects resolved rapidly following treatment with antihistamines/corticosteroids. One subject had confirmed anaphylaxis after the first sugammadex 16 mg/kg dose (table). There was a higher percentage of AEs in the sugammadex 4 and 16 mg/kg groups vs placebo (62.3% and 66.2% vs 47.4%, respectively); proportions of subjects with serious AEs were similar between groups (1.3% and 0.7% vs 2.6%, respectively).

Table. Subjects with adjudicated HS, or anaphylaxis according to Sampson (Criterion 1)

	Sugammadex 4 mg/kg (n=151)		Sugammadex 16 mg/kg (n=148)		Placebo (n=76)	
Adjudicated HS						
	n[a]	m[b] (%)	n[a]	m[b] (%)	n[a]	m[b] (%)
First dose	151	6 (4.0)	148	8 (5.4)	76	0 (0)
Second dose	140	7 (5.0)	138	8 (5.8)	69	0 (0)
Third dose	136	4 (2.9)	134	9 (6.7)	64	1 (1.6)
After any dose	151	10 (6.6)	148	14 (9.5)	76	1 (1.3)
Estimated difference vs placebo (95% CI)	5.3 (-0.9, 10.7)		8.1 (1.7, 14.2)		N/A	
Anaphylaxis according to Sampson (Criterion 1)						
	n[a]	m[b] (%)	n[a]	m[b] (%)	n[a]	m[b] (%)
First dose	151	0 (0)	148	1 (0.7)	76	0 (0)
Second dose	140	0 (0)	138	0 (0)	69	0 (0)
Third dose	136	0 (0)	134	0 (0)	64	0 (0)
After any dose	151	0 (0)	148	1 (0.7)	76	0 (0)
Estimated difference vs placebo (95% CI)	0.0 (-4.8, 2.5)		0.7 (-4.2, 3.7)		N/A	

[a]nnumber of subjects receiving dose; [b]mnumber of subjects with adjudicated HS/anaphylaxis according to Sampson (Criterion 1). Note that a subject could have events in more than one dosing occasion.

[Table]

Conclusions: Sugammadex 4 and 16 mg/kg doses were associated with higher HS incidence vs placebo. Most HS events occurred immediately after sugammadex administration and were mild and self-limited; remaining events responded to standard treatment. No anaphylaxis occurred in those receiving sugammadex 4 mg/kg, the highest recommended dose for routine reversal in clinical practice.

1AP15-10

Evaluation of qCon, a novel monitor of the hypnotic component of anaesthesia

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Background and Goal of Study: Monitoring the hypnotic component of anaesthesia using EEG derived indices may be a valuable tool to detect inadequate anaesthesia levels and, in the best case, prevent awareness with recall during surgery. In previous studies, we evaluated response times of several such monitors to sudden changes in simulated levels of consciousness and found considerable delays [1-3]. The aim of the current study was to determine time delays of index calculation for the recently introduced qCon monitor (Quantium Medical, Spain).
Materials and Methods: Recorded real EEG sequences from our database [3] which resulted in index values indication "awake" (qCon≥80) and "general anesthesia" (qCon=40-60) as well as no input signal ("EEG suppression") were replayed to the qCON monitor using the EEG Player [4]. After a switch from one simulated state of consciousness to another, the time of qCon to adjust the displayed index to the new simulated level was recorded.
Results and Discussion: Time delays ranged from 19 to 52 s and were dependent on the particular start and end levels as well as the direction of the input signal alteration (lower to higher level vs. higher to lower level).

Start level	Target level	Time delay s(±SD)
burst suppression	general anaesthesia	45(5)
general anaesthesia	awake	26(5)
burst suppression	awake	45(2)
awake	general anaesthesia	19(5)
general anaesthesia	burst suppression	52(4)
awake	burst suppression	52(4)

[Time delay of qCon index calculation]

A time delay of 26±5 s in the simulated wake-up reaction (from "general anaesthesia" to "awake") cannot guarantee a sufficiently fast detection of episodes of wakefulness to exclude the formation of memories.
Conclusion(s): Our results indicate, that - similar to other monitors evaluated by our group - the ability of the qCon to prevent intraoperative awareness with recall may be limited.
References:
1. Anesthesiology 104(3):488-94, 2006
2. Br J Anaesth. 103(3):394-9, 200
3. Anesth Analg. 115(2):315-9, 2012
4. Anesth Analg. 104(1):135-9, 2007

1AP15-11

Propofol Schnider Model performance analysis by steps of stable states up and down

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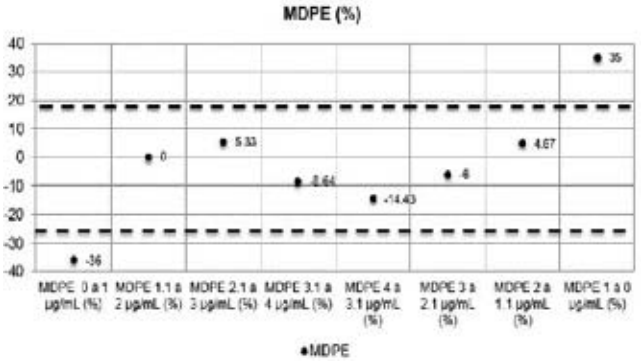
Background: The Schnider pharmacokinetic (PK) model´s overall performance has been evaluated following a bolus and perfusion[(1)].Our aim is to analyze the performance of the model in long stable ascending and descending steps of TCI infusion.
Methods: After approval of Ethics Committee of Clinica Alemana and written informed consent, 14 healthy volunteers were enrolled. An effect site propofol TCI using Schnider's model was administered in plateaus of 0.5 ug/ml and 7 minutes each, up to two levels above loss consciousness (LOC) followed by declines of equal magnitude and duration to Ccal 0.5ug/ml. Venous blood samples were taken at the end of each step to measure propofol by HPLC. Varvel´s(2) method for performance analysis of error (PE) was used. Population median PE (MDPE) was calculated for each step as a measure of bias, and the absolute median (MDAPE) as a measure of inaccuracy between measured and predicted values. Interindividual variability was determined by calculating wobble (the median absolute deviation from the MDPE). The change of global error in time was measured through divergence (the slope of the linear regression of the absolute error (PE) versus time).
Results: 203 blood samples were analyzed; the overall performance of the model was MDPE 0.5%, MDAPE 26%. Divergence was 19.24% h-1 and wobble 4%. Steps up 0-1μg/mL shows a **MDPE -36%, MDAPE 39** and step down 1-0μg/mL, **MDPE 35%, MDAPE 55%** (figure 1).
Conclusion: Overall performance for each step are within accepted values. At low concentrations (i.e: less than 1 μg/ml) the model overpredicts during induction and underpredicts at recovery. Variability on induction is smaller in relation to the variability of recovery.
References:
1. Br J Anaesth 2009; 102: 626-32
2. J Pharmacokinetic Biopharm 1992; 20: 63-93



[Figure 1]

1AP15-12

The influence of sugammadex on glycaemic status

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Background and Goal of Study: The aim of this prospective, interventional, randomized and one-side blind study was to find out the influence of sugammadex on postoperative blood values of glucose in adult non-diabetic patients.
Materials and Methods: After institutional approval and signed informed consent, 140 patients scheduled for elective septoplasty in general anaesthesia (GA) were randomly assigned to two groups according to the agent for reversal of neuromuscular blockade: sugammadex 2mg/kg (S group) or neostigmine/atropine (N group). GA was induced with propofol, fentanyl and rocuronium (0.6 mg/kg) and maintained with propofol infusion, N_2O/O_2, supplemented with fentanyl and rocuronium. Exclusions: age <18; ASA III or IV, BMI <18.5 or >24.9; diabetes, neuromuscular disease, liver or renal disease, carbohydrates metabolism disorders, allergy or asthma; patients' refusal. Venous blood glucose was measured by a point of care device at 5 time points. T1- before anaesthesia induction; T2- at the end of the surgery and before the application of the study agent; T3- 1 hour after the surgery; T4- 2 hours after the surgery; T5- 24 hours after the surgery: The final analysis included 82 patients, 41 in each group.
Results and Discussion: Both groups were similar according to age (P=0.752), body weight (P=0.180), height (P=0.144), BMI (P=0.609), duration of surgery (P=0,963) and anaesthesia (P=0.856), hospital stay after surgery (P=0.569), whole hospital stay (P=0.840), total fentanyl (P=0.377), fentanyl/kg (P=0.728), intraoperative blood loss (P=0.931), first drink intake (P=0.817), upstanding (P=0.676) and food intake (P=0.956) after the surgery. There was some difference in total rocuronium (P=0.043), but not for rocuronium/kg (P=0.368). Extubation time (2 min vs. 4 min, P<0.001) and time of discharge to the ward (3 min vs. 9 min, P<0.001) were shorter in S group. Unpaired *t*- test for normally distributed glucose values showed significant difference 1 hour (P=0.023) and 2 hours (P=0.015) after the surgery (both values higher in S group). ANOVA for repeated glucose measurements showed no significant difference in total dynamics between the study and control group (P=0.173). However, ANOVA for repeated glucose measurements within each group showed significant difference (P<0.001).
Conclusion: Sugammadex increases blood glucose 1 and 2 hours after septoplasty, but this increase does not exceed clinically acceptable values.

1AP16-1

Remifentanil reduces the consumption of propofol in drug-induced sleep endoscopy

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Background and Goal of Study: Drug-induced sleep endoscopy (DISE) with propofol allows correct localization of upper airway obstruction in obstructive sleep apnea syndrome (OSAS). Excessive propofol can increase muscle relaxation that cause false positive patterns of upper airway collapse. This study aimed to compare the propofol level of remifentanil-propofol group with propofol alone group during DISE.
Materials and Methods: In a prospective, randomized trial, 40 adult patients with obstructive sleep apnea syndrome were separated remifentanil-propofol group (n=20) and propofol alone group (n=20). Sedation level was monitored using bispectral index (BIS) monitoring between 50 and 80. The procedure was carried out using a target controlled infusion (TCI) system with effect site (cerebral) targeted model. The starting dose of propofol was 1.5 mcg/ml and increments of 0.5 mcg/ml took place every 2 min. In remifentanil-propofol group, remifentanil started 0.5 ng/ml prior to propofol infusion and kept concentration. The Mann-Whitney test was used to estimate the difference in propofol level between two groups. The Wilcoxon rank-sum test and the Fisher's exact test were used for group comparisons among categorical variables, respectively. The significance level was set at $p<0.05$ for all analyses.
Results and Discussion: The mean concentration of propofol was 2.87±0.60 mcg/ml in remifentanil-propofol group that was lower than 3.38±0.72 mcg/ml in propofol alone group ($P<0.05$). Apnea-hypopnea index and mean SpO2 showed no statistical difference between two groups ($P<0.05$). The minimum SpO2 during DISE did not differ with polysomnography ($P<0.05$).
Conclusion(s): These preliminary results allow us to infer that sedation with remifentanil-propofol decreases propofol consumption during DISE without respiratory depression. These results propose that excessive propofol concentration can be prevented without increasing muscle relaxation.

1AP16-2

Remote ischemic preconditioning delays the onset of acute mountain sickness in normobaric hypoxia

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Acute mountain sickness (AMS) is a syndrome of non-specific neurologic symptoms typically experienced by non-acclimatized mountaineers ascending too fast, too high. Symptoms usually develop within 5-12 hours after arrival to altitudes >2500m. The crucial step in the pathophysiology of AMS is the altitude-related drop in inspired PO2 that is caused by the reduced barometric pressure. Remote ischemic preconditioning (RIPC) is a non-invasive intervention capable of protecting an organ remote from the ischemic site from the damage induced by subsequent hypoxia or ischemia.
Protective effects of RIPC have been found for the heart, kidney, liver, stomach, lung and the skeletal muscle. In addition, emerging evidence suggests that the brain can be protected by RIPC. We hypothesized that RIPC protects the brain against AMS and that this effect is related to reduced oxidative stress.
Fourteen subjects were exposed to 18 hours of normoxia (21% oxygen) and 18 hours of normobaric hypoxia (12% oxygen, equivalent to 4500m) on different days in a blinded, randomized order. RIPC consisted of four cycles of lower limb ischemia (5 min) and 5 min of reperfusion, and was performed immediately before the study room was entered. A control group was exposed to hypoxia (12% oxygen, n=14) without RIPC. AMS was evaluated by the Lake Louise score (LLS) and the AMS-C score of the Environmental Symptom Questionnaire. Plasma concentrations of ascorbate radicals, oxidized sulfhydryl (SH) groups, and electron paramagnetic resonance (EPR) signal intensity were measured as biomarkers of oxidative stress.
RIPC reduced AMS scores (LLS: 1.9±0.4 vs. 3.2±0.5; AMS-C score: 0.4±0.1 vs. 0.8±0.2), ascorbate radicals (27±7 vs. 65±18 nM), oxidized SH-groups (3.9±1.4 vs. 14.3±4.6 μM), and EPR signal intensity (0.6±0.2 vs. 1.5±0.4x10^6) after 5 hours in hypoxia (all $P<0.05$). After 18 hours in hypoxia there was no difference in AMS and oxidative stress between RIPC and control. AMS and plasma markers of oxidative stress did not correlate.
This study demonstrates that RIPC transiently protects the brain against the consequences of hypoxia and thus reduces the severity of AMS. This effect is not associated with reduced plasma levels of reactive oxygen species. The lack of protection after 18 hours could be caused by the typical biphasic protection of RIPC. However, if RIPC causes protection again after more than 18 hours of hypoxia remains unknown and needs further investigation.

1AP16-3

Repercussions of cardiovascular autonomic neuropathy during general anesthesia

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Background: Cardiovascular autonomic neuropathy (CAN) is a serious complication of unclear etiology in patients with type I and II diabetes, characterized by autonomic nerve system dysfunction (ANSD). ANSD during anesthesia can cause severe cardiovascular changes, including sudden cardiac arrest. The absence of response to ephedrine and atropine during systemic arterial hypotension and bradycardia should alert the anesthesiologist to ANSD. This case report illustrates the repercussions of ANSD on levels of glycemia, BIS and burst suppression (BSR).
Case report: A 56-year old patient (ASA P2) with diverticulitis, type II diabetes medicated with dapagliozine and metformin, and hypertension controlled with amlodipine and benazepril, was submitted to rectosigmoidectomy by videolaparoscopy. The preoperative findings were normal. Prior to induction, capillary glycemia (cG) was 93 mg/dL, BP was 110/60 mmHg, and HR was 80 bpm. The patient was submitted to total intravenous anesthesia with propofol and remifentanil. During anesthesia, BP was 85x50-75x45 mmHg, HR was 65-75 bpm, BIS was 40-45, BSR was 0, cG was 100-120 mg/dL and urine output was 70 mL/h. The parameters were stable until the moment of incision for exeresis (HR=70 bpm, BP=71/37 mmHg, BIS < 40, BSR=18, cG=200 mg/dL). The adopted conduct was rapid infusion of 500 mL 0.9% saline, 5 U regular insulin i.v., and dose-escalated ephedrine (5-30 mg). Since ephedrine elicited no response (HR=65-70 bpm, BP=70x30-60x30 mmHg), the patient was started on adrenaline at 0.2 ug/Kg/min, with insulin maintained at 1 U/h. This changed parameters to: BIS 40-45, BSR=0, BP=90/60 mmHG, HR 75-85 bpm and cG=90-100 mg/dL. Drug infusion was discontinued in the post-anesthesia recovery room.
Discussion: Clinical manifestations of CAN may be overlooked on preoperative evaluation. Sudden bradycardia and systemic arterial hypotension not responsive to ephedrine and atropine have been reported in diabetics during anesthesia. Epinephrine i.v. is known to be effective against CAN-related hypotension.
Reference:
1. Oakley I, Emond L. Diabetic cardiac autonomic neuropathy and anesthestic management: Review of the literature, AANA J 2011;79(6), 473-479.2.
Learning points: In the presence of cardiac autonomic neuropathy, a thorough preoperative assessment and vigilant monitoring perioperatively ensure successful anesthesia management.

1AP16-4

Residual neuromuscular block with rocuronium reduces hypoxic ventilatory response in patients with untreated obstructive sleep apnea

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Background: Obstructive sleep apnea (OSA) has been identified as a leading risk factor behind serious complications, in particular respiratory, in the postoperative period. It is shown that residual neuromuscular block markedly reduce the acute hypoxic ventilatory response (HVR) in healthy volunteers. While untreated OSA patients has an increased HVR and animals exposed to intermittent hypoxia have an increased chemosensitivity in the carotid body,

it is not known to what extent neuromuscular blocking agents interact with hypoxic control of breathing in OSA patients.
Materials and Methods: 11 newly diagnosed and untreated OSA patients entered the study. They were studied supine with a 30° head-up tilt, using a facemask and with standard circulatory and respiratory monitoring as well as thoracic and abdominal impedance bands. Neuromuscular function was assessed by mechanical adductor pollicis train-of-four (TOF) response after supramaximal ulnar nerve stimulation. After a resting period, individual baseline isocapnic HVR and normoxic HCVR were measured. Thereafter, CPAP was applied at 6-7 cm of H_2O and was followed by three series of HVR and HCVR tests: i.e. control, during rocuronium-induced residual neuromuscular block aiming at a TOF ratio of 0.70 and after recovery to a TOF ratio >0.90. At each occasion, isocapnic HVR was studied at an inspiratory FiO2 of 0.08-0.12 targeting a SpO2 of 80% while normoxic HCVR was performed by addition of 5% CO2 to the inspired air.
Results: HVR and HCVR tests before three months of CPAP-treatment in eight of the 11 OSA patients have been analysed (age 49 ± 5 years, BMI of 30.3 ± 0.9 and AHI of 23 ± 1). There was no difference in individual baseline HVR or HCVR without or with 6-7 cm H_2O of CPAP. Residual neuromuscular block caused a reduction in HVR while the HCVR was unaffected. 33.2 ± 6.8 mg rocuronium was infused i.v. for 49 ± 9 min to acheive a TOF ratio of 0.76 ± 0.03.
Conclusions: Based on the preliminary data from this study, residual neuromuscular block by rocuronium attenuates the acute HVR in untreated OSA patients. Notably, this is not due to muscle paralysis since the HCVR is unaffected, but rather a depression of the peripheral chemosensitivity. The reduction in HVR by rocuronium in OSA patients was smaller compared to previous studies using other neuromuscular blocking agents in healthy volun teers. We speculate that this difference can be attributed to an increased baseline HVR in untreated OSA patients.

1AP16-5

Retrospective analysis of perianesthetic adverse events in thoracic surgery

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Background and Goal of Study: Despite a long history of concerning the patient safety in clinic, some patients undergoing thoracic surgery continued to experience adverse events. This study analyzed the causes, treatment and prognosis of 59 perianesthetic adverse events from a single center study of 25592 consecutive cases in Shanghai Chest Hospital, in order to provide reference for further surgical safety.
Materials and Methods: In this study, the authors collected a total of 25592 thoracic surgery anesthesia records via Anesthesia Information Management System(AIMS) from August 2006 to December 2012, and obtained 59 cases of perianesthesia serious adverse events from the subsystem of "adverse events registration". Meanwhile we analyzed the related hospitalization data of the 59 patients, including anesthesia, recovery room, ICU records and follow-up outcome. The cause of these adverse events were classified as follows: events related to patients' pathogenetic condition(P); surgical reasons(S); anesthesia reasons(A); and the three-aspect interactive reasons(P & A & S). And then we further analyzed the main clinical manifestations, causes and treatment of these events.
Results and Discussion: The rate of perianethesia adverse events in thoracic surgery was 0.23% (59 of 25592), wherein 8% caused by P and 27% caused by A, and both had no death in patients; while events caused by S and P&S&A accounted for 53% and 12% respectively, accounting for 65% together. Of all cases, 8 postoperative patients caused by S or P&S&A died within 3 days(13.6% of 59 cases). 45%(15/59) patients suffering Sudden Cardiac Arrest (SCA), recovered successfully. Surgical massive hemorrhge (48%,15/59) have been reported as predominant factors of mortality in this group, which 6 of the 8 deaths died of massive hemorrhge.
Conclusion(s): The rate of perianethesia adverse events in thoracic surgery was 0.23%.An important thing of anesthesia related events was still respiratory management that we should pay attention to evaluation; Two major clinical manifestations of surgery related events were cardiac arrest and massive hemorrhge. Cardiac arrest is the major contributing factors to adverse event, but its adverse consequences could be avoided as long as the timely discovery and correct treatment. Massive hemorrhge is a significant cause of mortality, which may be prevented through surgeon's early diagnosis and suitable interventions.

1AP16-6

Reverse Takotsubo cardiomyopathy in young, healthy patient after appendectomy. A case report

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Background: Reverse takotsubo, a variant form of takotsubo cardiomyopathy in which the basal and midventricular segments of the left ventricle are akinetic, occurs in a minority of patients. It tipically occurs as the result of severe emotional or physical stres.
Case report: 22-year old male, delivered to the operation room for appendectomy. General anaesthesia was induced by means of propofol 200 mg, rocuronium 50 mg and fentanyl 0,2 mg and was mantained with oxygen and air and sevofluorane at 2%. Surgery took place without incident, followed by extubation and transfer to the recovery room, with satisfactory progress within the first 4 hours. Suddenly, the patient started opressive chest pain, which disappeared spontaneously within a few minutes. ECG showed changes suggesting ischaemia, with elevated tropnin I levels. Suspeting acute coronary syndrome, the patient was transfered to the coronary care unit. Coronary catheterization showed healthy coronary arteries, with global hypokinesia except in the apical zone. The following days ECG changes as well as left ventricular function normalized. The patient keeps asymptomatic since.
Discussion: Takotsubo cardiomyopathy is a weakening of the left ventricle with healthy coronary arteries, usually as a result of severe emotional or physical stress. The main symptoms are chest pain and shortness of breath. It accounts for approximately 1.2% of all troponin proven acute coronary syndrome events and is thought to be caused by a catecholamine-mediated injury. Clinicians usually recommend standard heart failure medications such as beta blockers, ACE inhibitors, and diuretics. Beta blockers may be continued indefinitely to help prevent recurrence.Inverted takotsubo cardiomyopathy is a rare variant of the classic cardiomyopathy implies wall-motion abnormalities which involve the basal and midventricular segments, preserving the apex. It affects younger people and presents less incidence of pulmonary edema or cardiogenic shock, but higher cardiac markers. Though it is a rare disease, we believe that both forms are important to be kept in mind in the perioperative setting due to the situation of severe stress, especially in young patients.
References: Reverse Takotsubo cardiomyopathy associated with the consumption of an energy drink.Kaoukis A, Panagopoulou V, Mojibian HR, Jacoby D.
Circulation. 2012 Mar 27;125(12):1584-5
Learning points: Takotsubo, systolic disfunction, healthy coronary arteries.

1AP16-7

RYR 1 genetic mutation - a patient with malignant hyperthermia risk?

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Background: Central core disease (CCD) is an autosomal dominant congenital myopathy characterized by the presence of muscle weakness and defined by existence of central cores on muscle biopsy[1]. Although malignant hyperthermia susceptibility (MHS) trait and clinically active myopathies are considered distinct presentations of specific skeletal muscle ryanodine receptor gene (RYR1) mutations, a substantial overlap between these entities occurs making it challenging to identify patients at risk.[2] We present a patient with a CCD submitted to a gastric bypass.
Case report: A 35 years old female patient with a CCD - RYR 1 gene mutation (c.14769-14771 del CTT at exon 102) - was scheduled for a laparoscopic gastric bypass (BMI 40,4Kg/m2). Her family history included her father, two sisters and her two children with the same mutation. She had no history of previous surgeries or anesthesia and presented diffuse muscular weakness with proximal and distal involvement. Preoperative workout was normal. She was submitted to a total intravenous anesthesia with propofol 2%, under standard ASA monitoring which included neuromuscular transmission monitoring, invasive blood pressure, central venous pressure, urine output and central temperature. Her airway was secured after rocuronium administration and we used sugamadex for reversal of neuromuscular block. There were no surgical or clinical events during the procedure and the patient was transferred to the intensive care unit after surgery on spontaneous ventilation, normothermic and hemodynamically stable. She was discharged home 4 days later without any postoperative complication.

Discussion: An anesthetic plan for patients with CCD can be challenging mainly because of the profound genotype-phenotype variability combined with the uncertainty that even bearing the mutation the patient may or may not be susceptible to malignant hyperthermia (MH)[1]. Although the RYR1 mutation of our patient is not described in the European Malignant Hyperthermia Group, CCD are traditionally related to MH and so our anesthetic approach was MH orientated avoiding volatile agents and succinylcholine[3]. Sugamadex was safely used and may be suitable for other cases of unclear MHS.
References: 1-Pediatric Anesthesia 23 (2013)834-841;2-Neuromuscular Disorders 22 (2012)453-462;3-Br. J. Anaesth.107(1)(2011)48-56.
Learning points: Even with undiagnosed MHS, as risk in these patients is unknown, every measures should avoid triggering this pharmacogenetic disease.

1AP16-8

Prolonged recovery time from rocuronium-induced muscle relaxation in patients with severe chronic kidney disease using Sugammadex under Desflurane anesthesia

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Background and Goal of Study: It is well known that renal dysfunction, estimated by plasma creatinine concentrations, increased the risk of residual neuromuscular block(RNMB) induced by rocuronium and that there are possibly no relationships between the dose of Sugammadex(SGDX) and recovery from neuromuscular block under renal dysfunctions under various degrees. However, there are no reports, based on the renal function estimated by Glomerular Filtrating Ratio (eGFR), on the relationship between RNMB and renal dysfunction under Desflurane (DES) anesthesia. In this study, we examined the effect of the SGDX towards the rocuronium in patients under DES anesthesia was evaluated by comparing the time required for recovery by determining the time interval between Train of four (TOF) count 1 and TOF ratio 100% using TOF monitoring.
Materials and Methods: Twenty-eight adult patients who underwent surgery under general anesthesia at our hospital were included in this study. We divided the patients into two groups: the R group, who had eGFR of less than 15 and thus severe CKD (n = 13); and the N group, who had eGFR of more than 90 and thus normal renal function(n = 15). Anesthesia was induced in both groups with 2 mg/kg propofol and 0.8 mg/kg rocuronium for tracheal intubation and maintained with DES anesthesia. TOF count 1 state was sustained by administration of an appropriate dosage of rocuronium. After confirming the TOF count 1 value at the end of the surgery, pure oxygen was administered, and 4 mg/kg SGDX was then intravenously injected over 5 s. The time interval between TOF count 1 and TOF ratio100% was measured. We used the TOF-watch (T.X.) SX (Organon Ltd., Ireland).
Results and Discussion: Following SGDX administration, the mean (±SD) time to recovery of TOF count1 to TOF ratio 100% was increased to 239 ± 102 s in the R group compared with 113 ± 37s in the N group; this difference was statistically significant (p = 0.0001). Statistical processing was used one-way ANOVA.
Conclusion(s): The muscle relaxation recovery time interval from TOF count 1 to TOF ratio 100% was prolonged in patients with severe CKD compared to patients with normal kidney function during recovery from rocuronium following DES anesthesia when using SGDX. Thus, we recommend that rocuronium should be used with caution in patients with severe CKD during DES anesthesia.

1AP16-9

Real-time monitoring of blood propofol concentrations: can it help to individualize propofol dosing?

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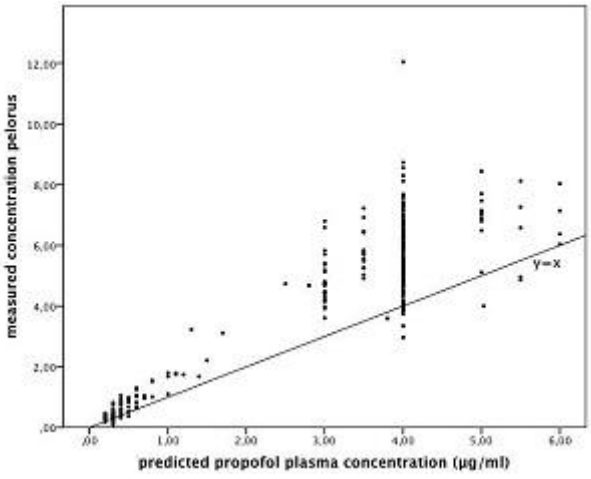
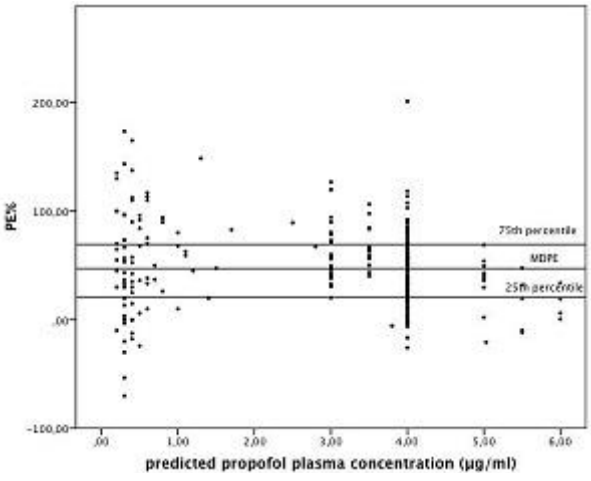
Background and Goal of Study: TCI is a widely used technique. However we need to bear in mind that the PK-models used never or just by chance match the PK characteristics of our patient. A Pelorus 1500 propofol measurement system has been developed (Sphere Medical, Cambridge, UK), which is designed for rapid analysis of propofol concentration in whole blood samples. The purpose of this study was to test the usefulness of the Pelorus during TCI of propofol.
Materials and Methods: 20 patients, ASA I to II, scheduled for thyroid surgery were included. Standard monitoring included ECG, pulse oxymetry, NIBP. The level of hypnosis was monitored with a Neurosense monitor and the analgesic level with a ANI monitor (Metrodoloris, Lille, France). A radial arterial catheter was inserted in the contralateral arm of the infusion for blood sampling and was connected to a FloTrack for continuous monitoring of BP and CO. A TCI of sufentanil was started with a target effect (Ce) of 0.3 ng/ml (PK-Gepts) followed by the TCI of propofol , targeting a predicted blood concentration (Cp) of 4 µg/ml (PK- Schnider). The Cp of propofol was increased or decreased if the neurowave index was >60 or <40 and the Ce of sufentanil was increased or decreased if the ANI index was <50 or >70. Arterial blood samples for measurements of propofol (Cm) were collected at well-defined time-points until 2 hours after the end of infusion.
Results and Discussion: A total of 261 samples were analyzed. Cm ranged from 0.09 to 12.04 mg/ml. The performance errors (PE) were distributed around a range of -70% to 201% when plotted against the predicted concentrations with a median value of 47.33%. The PE increased slightly (2.35%) with higher sufentanil.



[Figure 1]



[Figure 2]

Whole blood analysis and simultaneous sufentanil may perhaps explain the high bias.
Conclusion(s): Pelorus1500 can be a useful tool to better understand propofol PKs.

1AP16-10

Reliability of a non-invasive continuous arterial pressure measurement device during perioperative total intra-vascular anaesthesia

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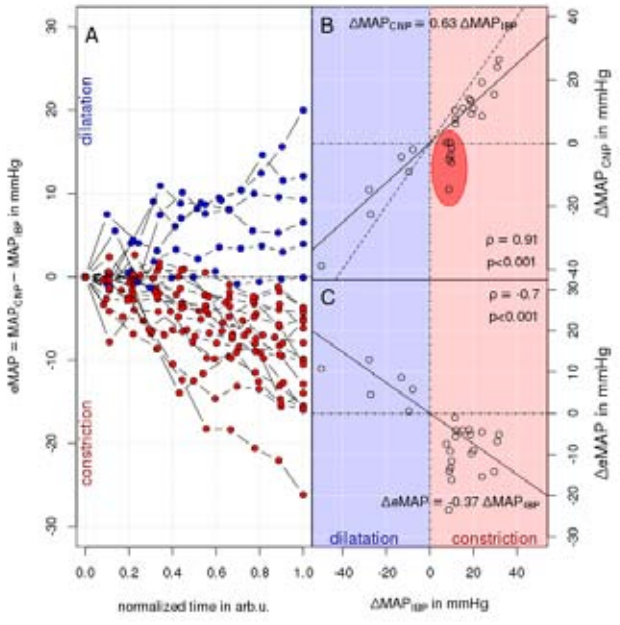
Background and Goal of Study: Non-invasive continuous blood pressure monitoring (NcBP) may potentially replace invasive blood pressure monitoring (IBP) as the latter may cause infection and vascular damage. However, during total intravenous anaesthesia (TIVA) for neurovascular surgery, hemodynamic stability is crucial and usually maintained with vasoactive drugs. Thus, to assess the eligibility to replace IBP monitoring in TIVA, the ability of the NcBP to track fast BP changes ought to be quantified, especially when induced by vasoactive drugs.
Materials and Methods: During anaesthesia in neurosurgery, mean arterial pressure MAP_{IBP} measured by means of IBP (A. radialis) was compared to MAP_{CNP} measured by CNAP Monitor 500 (CNSystems) in 10 patients (age: 63±13 years). To scrutinize the ability of detecting fast MAP_{IBP} (ΔMAP_{IBP}) changes by the CNAP, the dependence of $\Delta eMAP = \Delta MAP_{CNP} - \Delta MAP_{IBP}$ on ΔMAP_{IBP} was evaluated during use of vasoactive drugs. Based on this analysis a complementary Bland-Altman analysis of differences (dBA) was used to detect systematic errors in tracking fast blood pressure changes upon the complete set of available measurement pairs.
Results and Discussion: Overall accuracy (-2.8 mmHg) but not precision (9 mmHg) of MAP_{CNP} was almost within accepted limits. However, a significant systematic ΔMAP underestimation of 37% was observed during administration of vasoactive drugs. Consequently, MAP_{CNP} during vasoconstriction/-dilation was lower/higher than MAP_{IBP} The dBA analysis enabled the detection of such systematic errors in the overall data without a priori knowledge of distinct time intervals, showing a systematic, yet patient specific, underestimation in tracking ΔMAP_{IBP} by ΔMAP_{CNP} (16…120%) in this patient cohort.
Conclusion(s): In this patient population, CNAP systematically underestimated short-term MAP changes by >20% with potentially serious side effects on medication decisions during TIVA. The dBA technique was able to reveal systematic errors in tracking blood pressure changes otherwise masked by established methods of analysis and thus may be a valuable means for re-analysis of completed large cohort clinical studies.



[MAP measured with CNAP versus IBP]

1AP16-11

The impaired peripheral chemoreflex sensitivity increases hemodynamic instability of general/epidural anesthesia in major abdominal surgery

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Background and Goal of Study: Increased sensitivity of peripheral chemoreceptors (SPCR) reflects the degree of activation of the sympathetic nervous system and the degree of changes in cardiorespiratory reflex regulation. These disorders can be a cause of hemodynamic instability and potential perioperative anesthetic complications, especially during epidural anesthesia. The goal of the study was to evaluate hemodynamics during general/epidural anesthesia in patients with high peripheral chemoreflex sensitivity.
Materials and Methods: We conducted a prospective study in 76 patients received a major abdominal surgery. SPCR was evaluated using breath-holding test. The test was performed by measuring of voluntary breath-holding duration (BHD) after a 2/3 of maximal inspiration. The end of breath-hold was determined by a palpation of contraction of the diaphragm. All patients were randomized into two groups: high SPCR (BHD ≤38 sec) [1] (n=33), and normal SPCR (BHD >38 sec (n=43). Hemodynamic instability was determined as a decrease in mean arterial pressure below 70 mmHg or the need for vasopressors. We compared the incidence of complications, the length of stay in hospital. The study was approved by the Internal Review Board of the Kuban State Medical University.
Results and Discussion: The frequency of hemodynamic instability was 45% in patients with high SPCR and 24% in patients with normal SPCR (p<0.001). The patients in high SPCR group showed a higher incidence of postoperative nausea and vomiting (24% vs. 16%, p<0.001) and postoperative delirium (26% vs. 18%, p<0.001), which were, probably, the results of disturbed cerebral perfusion. No differences in other complications were noted. The length of stay in the hospital was 16 (11-18) days in high SPCR group vs. 12 (11-14) in stable group (p<0.001).
Conclusion(s): Impaired peripheral chemoreflex sensitivity increases the risk of hemodynamic instability, nausea and vomiting and postoperative delirium during general/epidural anesthesia in major abdominal surgery.
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1AP17-1

Positional injury in robot-assisted radical prostatectomy patients

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Background: Robotic interventions applied with steep trendelenburg-lithotomy (ST-L) position may cause positional injury and peripheral neuropathy if appropriate position is not achieved on the operating table. This study was a 7-year retrospective examination of postoperative positional injury (PPI) in patients undergoing robot-assisted radical prostatectom(RARP) for prostate cancer.
Method: After approval of ethics committee,retrospective evaluation was made of 412 patients who underwent RARP between 2008-2014. Patients with known peripheral neuropathy, lumbar-cervical discopathy or history of orthopaedic surgery or trauma were excluded. The demographic data of patients, ASA, Charlson Comorbidity Index(CMI), Body Mass Index(BMI), operating time(OT) and Trendelenburg time(TT) were obtained from patient records. Patients were questioned as to whether or not PPI had developed, if so, in which extremity, in what form (sensory-motor), duration, whether or not a doctor had been consulted, if so, what treatment had been given and whether or not the PPI had continued
Results: Of 412 patients examined, 376 were included in the study. 151(39.8%) cases were ASAI, 195(51.5%) ASAII, 32(8.4%) ASAIII, and 1(0.3%)ASAIV, with a mean age of 62.34±6.68 years, mean BMI 27.44±2.75 kg/m^2, mean CMI

2.41±0.89, mean OT 208.83±52.1 mins, mean TT 146.74±46.33 mins.
The BMI,OS and TT values of patients with PPI were at a significantly high level compared to those without PPI($p < 0.01$). No significant difference was determined in age,CMI orASA values according to PPI status ($p > 0.05$).
Of 49 patients(12.9%) determined with PPI, the injury was in the upper extremity in 27 (55.1%), the lower extremity in 25 (51%) and both extremities in 3 (6.1%). In upper extremity injuries,14(51.9%) had pain, 13(48.1%) motor and 2(7.4%) sensory deficits, and in lower extremity injuries,12(48%) had pain, 14(58.3%) motor and 1(4%) sensory deficits. Of 6 patients consulting a doctor for PPI, 5 were prescribed Gabapentin and 1 Pregabalin and 3 patients reported ongoing complaints. The recovery time was mean 6.50±2.81 months. No significant correlation was determined between age, BMI, OT, TT, CMI and ASA scores with recovery time ($p > 0.05$).
Conclusion: The ST-L position carries high risk in terms of PPI, especially when lengthy surgery is planned and the risk could be increased in patients with high BMI. Considering the rate of 12.9% PPI in this study, it should be a requirement to define the PPI risk on the patient consent form.

1AP17-2

Post-operative pulmonary distress after administration of sugammadex probably in relation to ventilator dyssynchrony

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Background: Suggammadex is a molecule that completely reverts the action of the rocuronium. The reversion can be so fast that we have to be aware of the patient fighting the ventilator.
Case: 20 year old man, ASA-I, 72kg, with an acute appendicitis. After rapid sequence induction with propofol, fentanyl and rocuronium 0.6mg/kg, adding 4mg of dexamethasone for post-operative emesis. We used BIS, and neuromuscular monitorization. A nº8 orotraqueal tube was used, with Cormack I. Ventilatory mode was pressure control volume guarantee, protective ventilation 6cc/kg, PEEP=6, FiO2 40% and sovereign for maintenance.
During the laparoscopic appendectomy, the patient remained clinically stable. The surgery lasted 40´ and the patient remained without the breathing impulse, with a BIS ascending and the TOF was 0.7 . We administered sugammadex at a dose of 2mg/Kg resulting in a rapid recovery of the reactivity of the patient, trying to breathe so we used pressure support ventilation, with which we detected that the patient TOF was >0.9, the patient was hemodynamically stable, with a breathe frequency of 15 per minute, a volume of 9L/min and the SpO2 was 99% so we extubated the patient.
After one minute, the patient started to have a respiratory distress with intercostal retraction, hypoxemia of 88% and sibilants. We administered hydrocortisone ev 2mg/kg and 4 puffs of Salbutamol and used a Ventimask FiO2 50%, with a recover of the saturation and the retractions. The sibilants were progressively disappearing. After 12 hours in the recovery room, the patient could be discharged.
Discussion: Our theory is that the sugammadex produces such a quick reversion of the neuromuscular blockade that if we do not act very quickly, the patient can develop a ventilatory dyssynchrony that can lead into a respiratory distress that could compromise the life of the patient. Though it cannot be considerated as an adverse reaction to the rocuronium, it has to be used wisely, and we have to be aware that this can happen.
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Learning points:
-Although very few adverse reactions are described with sugammadex, we have to be aware of the patient fight with the ventilator due to a very fast non physiological recovery of the neuromuscular blockade.

1AP17-3

Postoperative stupor: central anticholinergic syndrome?

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Background: Memory deficits and disruption in cerebral functions may occur in early postoperative period following general anesthesia. These cognitive dysfunctions may be expressed as depression or excitation. It is difficult to diagnose postoperative cognitive dysfunctions presenting with depression, because these are commonly attributed to residual effects of anesthesia. Stupor is consisted of memory and attention deficits, disorientation, lack of cooperation, unresponsiveness to painful stimuli. In this report we present a young patient who developed stupor in early postoperative period.
Case report: A 29 year-old female patient was scheduled for elective laparoscopic cholecystectomy. Anesthesia was induced with thiopental sodium, fentanyl and atracurium, and maintained with sevoflurane. Methylprednisolone with ranitidine was administered after intubation due to multiple attempts to avoid vocal cord edema. The surgery was completed without complications. Patient was extubated after reversal of neuromuscular blockade with neostigmine 2 mg with atropine 1 mg.
The patient was unresponsive in the recovery room still after an hour.
Neurological examination was done and she was unresponsive to painful stimuli. Subsequent cranial MRI and Diffusion-MRI revealed no pathology. Arterial blood gas and biochemical analysis excluded metabolic etiologies. The patient was spontaneously fully recovered at the 6th hour postoperatively. She was discharged without any sequelae.
Discussion: Risk factors for postoperative delirium (POD) are old age, male sex, history of cognitive impairment, alcohol use, abnormalities in electrolytes, blood glucose and hemoglobin, major and long term surgeries, intraoperative hypoxia or hypotension, excessive bleeding, metabolic acidosis, malnutrition, dehydration, postoperative pain, infections, meperidine, transdermal fentanyl, anticholinergic drugs.[1]
In this case, the patient had some risk factors for POD like medications as atropine, neostigmine, fentanyl, ranitidine, sevoflurane. Inadequate pain control may have contributed also.
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Learning Points: Suspicion of delirium postoperatively, after exclusion of central nervous system pathologies. Importance of pain control after surgery to avoid postoperative delirium.

1AP17-4

Postural effects on pulmonary gas exchange in severe obesity before and after bariatric surgery

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Background: Clinical guidelines recommend that critically ill obese subjects remain upright to minimize supine-induced gas exchange (GE) worsening. We hypothesised that in morbid obesity, pulmonary GE abnormalities will worsen when supine and that bariatric surgery (BS) will mitigate this effect.
Methods: Pulmonary GE, including ventilation-perfusion (V_A/Q) distributions were investigated in 19 morbidly obese (MO) females (51±[SE]2 years; 17 never-smokers; body mass index, 45±1 Kg/m^2) and 8 normal weight, never-smoker, age-matched control women, while spontaneously breathing ambient air, both upright and supine, before and one year after BS.
Results: In control individuals, no postural changes in arterial blood gases (ABGs) were observed. While MO subjects had more altered PaO_2, SaO_2 and $AaPO_2$ values than controls ($p < 0.05$ each) when upright, the values unexpectedly remained unchanged when supine (Table 1). This was similar in the subset of 6 normoxaemic ($PaO_2 \geq 80$ mmHg) MO, but the remaining 13 hypoxaemic ($PaO_2 < 80$ mmHg) subjects improved ABGs when supine: PaO_2 (from 69.5±1.9 to 72.3±2.3 mmHg, $p=0.06$), SaO_2 (from 94±1 to 96±1 %), and $AaPO_2$ (from 31.2±1.9 to 27.8±2.0 mmHg); and cardiac output increased (from 6.6±0.4 to 7.0±0.4 L·min-1)($p < 0.05$ each). V_A/Q descriptors were not different from upright to supine.

After BS, in all MO subjects PaO_2 and $AaPO_2$ (Table 1) and pulmonary GE were improved compared to before BS when upright, but ABGs worsened when supine (Table 1). Moreover, except for a decrease in Log SDV (improvement), no other postural-induced changes in V_A/Q descriptors were observed.

OBESE SUBJECTS (n, 19)						
	BEFORE SURGERY			AFTER SURGERY		
	Upright	Supine	p *	Upright	Supine	p §
PaO_2, mmHg	75.5 ± 2.4 δ	76.1 ± 2.6	NS	89.4 ± 2.4 δ	84.8 ± 3.1	**0.02**
$PaCO_2$, mmHg	39.0 ± 1.0	39.7 ± 1.0	NS	39.8 ± 1.2	39.7 ± 1.3	NS
$AaPO_2$, mmHg	27.0 ± 2.0 δ	25.9 ± 2.0	NS	15.4 ± 2.1 δ	19.6 ± 2.1	**0.02**
pH	7.41 ± 0.01	7.41 ± 0.01	NS	7.41 ± 0.01	7.42 ± 0.01	**0.01**
SaO_2, %	96 ± 1 δ	96 ± 1	NS	99 ± 1 δ	99 ± 1	NS

[Table 1. ABGs Findings in MO Subjects]

Conclusion(s): Before BS, ABGs are not altered in normoxaemic MO subjects moving from upright to supine, even improving in those with hypoxaemia when supine. After successful BS, pulmonary GE improved when upright in all MO subjects but ABGs deteriorated when supine. However, the important clinical observation is the lack of gas exchange deterioration when supine, which may have implications for critical care and anaesthesia settings.
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1AP17-5

Predictors parameters of difficult intubation in patients with morbid obesity

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Background and Goal of Study: The incidence of morbid obesity is growing in recent years significantly, and thus, the number of bariatric surgeries. This surgery has shown up to 82% reduction in BMI in five years and reduce the rate of diabetes, cardiovascular disease and cancer with an increase in global survival. The management of the airway in obese has its peculiarities: desaturation is faster, the ventilation with facial mask and intubation is more difficult and susceptibility to respiratory depression with opioids is higher. Then, it is very important to predict difficult intubation, which there is much controversy nowadays. For this, we have related clinical and anatomical aspects with our rate of difficult intubation in morbid obesity surgeries.
Materials and Methods: We evaluated age, height, weight, body mass index (BMI), thyromental distance (TMD), cervical perimeter and Mallampati in 49 patients who were undergoing morbid obesity surgery. History of obstructive sleep apnea (OSA), continuous positive airway pressure (CPAP) or chronic obstructive pulmonary disease (COPD) were also collected. After that, we proceeded to anesthesia induction and then a direct laryngoscopy to assess the Cormack. We considered a difficult intubation when patients had a grade III or IV Cormack.
Results and Discussion: After analyzing the results, we found that the percentage of difficult intubation was 28%. No significant differences between age, height, weight, BMI, thyromental away and cervical perimeter with a difficult intubation were found. Neither, we could related significantly the history of OSA and CPAP. However, grades III and IV of the Mallampati and history of COPD show a significant difference as predictors of difficult intubation, with $p = 0.007$ and $p = 0.02$ respectively.
Conclusion(s): Our results show that grades III and IV of the Mallampati and history of COPD can predict better than other parametersthe difficult intubation in morbidly obese patients. Even so, it is advisable to assess the patient globally, since in the literature there is much disparity in the results. Therefore, we need more studies to achieve a difficult intubation can be prevented.

1AP17-6

Preoperative anxiety in the premedication outpatient clinic: an underestimated problem?

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Backround: For many patients, a visit to our preoperative outpatient clinic represents a significant milestone as they undergo surgical therapy procedures. The broad range of medical constellations, socio-demographic profiles and intrapersonal architecture is extremely diverse here. We often observe anxiety that is particularly focussed on anaesthesia (1).
However, we also know that patients plagued by severe anxiety have a higher risk of complications associated both with the anaesthesia and the operation (2).
This poses the question of how we can identify these patients and whether we are able to determine specific risk factors and patterns.
Methods: We make use of the German version of the "Amsterdam Preoperative Anxiety and Information Scale" (APAIS-D) to record preoperative anxiety and information requirements (3). After receiving a positive response from the local ethics commission, 621 patients from University Hospital Düsseldorf were included in this study, which was based on a cross-sectional research design. The detailed statistical evaluation was carried out using SPSS 22.0.
Results: Both the validity and reliability of the APAIS-D were able to be confirmed in our study. On exploratory factor analysis, two instead of three major factors were determined, which deviated from the original description. We ascertained an incidence of 59.4% cases of anxiety in our patient collective. We found significantly more cases of anxiety in the groups of seniors, inpatients, very small and medium-sized operations and patients who had no or only a little experience of anesthesia amongst others.
Conclusions: With an incidence of almost 60%, preoperative anxiety undeniably appears to pose a problem for our surgical patients. Acting as a "mediator" during the surgical process, the anaesthesiologist can and should make an important contribution to these patients in protecting them from the negative consequences of this anxiety, and not simply in terms of medication. In particular, interdisciplinary dialogue between the anaesthetist and the surgeon can lead to a better understanding and more effective intervention.
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1AP17-7

Preoperative use of ondansetron and dexamethasone in thyroid gland surgery

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Background and Goal of Study: Common postoperative concerns for patients undergoing thyroidectomy include postoperative nausea and vomiting (PONV), acute postoperative pain and vocal dysfunction, which can not only reduce comfort but can also lead to serious complications. Particularly high incidence of nausea with or without vomiting is observed in patients following thyroidectomy. No single mono-therapeutic approach to these complications is effective enough. The aim of this study was to investigate the effects of the usage of ondansetron and dexamethasone on PONV, pain and vocal dysfunction.
Materials and Methods: Prospective, randomized, double blind, placebo-controlled clinical trial included 50 patients who underwent partial or total thyroidectomy in the period between March and October 2014. Patients were randomized into 2 groups; both received antiemetic drugs intravenously before anaesthesia. Group A (n=25) received ondansetron 4 mg and 0, 9% NaCl solution (2 ml), while patients in Group B (n=25) were administrated ondansetron 4 mg and dexamethason 8mg (2ml).

Postoperative complications were monitored within the first 48 hours following the surgery and the data were collected using a survey.
Results and Discussion: In Group A 72% of patients (18/25) reported nausea, while only 16% (4/25) had an intense PONV. Nausea was significantly less frequent in Group B ($p<0,000$; $p>0,05$), where 32% of patients had nausea (8/25). In the first hour following the surgery intense PONV occured among 8% (2/25) of patients in Group A , whilst not a single patient in Group B reported intense PONV, which is a statisticaly lower figure ($p=0,034$; $p<0,05$). Patients in Group B reported less pain on coughing ($p=0,027$; $p<0,05$) and not coughing ($p=0,009$; $p<0,05$). Our research also showed significantly lower figure in terms of vocal dysfunction in Group B ($p=0,025$; $p<0, 05$).
Conclusion(s): Preoperative use of ondansetron and dexamethason is more effective than ondansetron mono-therapy in the prevention of PONV, vocal dysfunction and postoperative pain and should be considered for routine clinical use in thyroid gland surgery.

1AP17-8

Oxygen stimulates migration and upregulates secretion of angiogenesis factors in oestrogen receptor (ER)-positive and ER-negative human breast cancer cell lines

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Background: Breast cancer is the most common cancer in European women, with surgical resection being the primary mode of treatment. Perioperative factors, including anaesthetic gases, may affect cancer cell proliferation, migration, related angiogenesis, and cancer recurrence. We have found that in breast cancer cell lines, sevoflurane promotes migration and angiogenesis in a high oxygen environment, typical of anaesthesia (60% v/v O_2) but not at 21% v/v O_2[1]. This supports recent clinical trial evidence linking high inspired oxygen during cancer surgery with reduced tumour-free survival[2]. Our aim here was to investigate the consequence of acute oxygen exposure on subsequent breast cancer cell viability, migration, and secretion of angiogenesis factors *in vitro*.
Methods: MDA-MB-231 (ER-) and MCF-7 (ER+) breast cancer cells were exposed to either control gas (medical air; 21% v/v O_2) or increasing concentrations of oxygen (30%, 60% and 80% v/v) concurrently for 3h in two hermetic chambers, with the remaining gas consisting of 5% v/v CO_2 and nitrogen to 100% v/v. Cell viability at 24h post-exposure was determined by MTT assay. Migration at 24 h was determined using the Oris Cell Migration Assay™. Secretion of angiogenesis factors into conditioned medium at 24h was measured via membrane-based sandwich immunoassay array (Raybiotech).
Results: Compared to air, acute exposure to 30%, 60% or 80% O_2 did not significantly affect viability. Exposure to 60% O_2 increased migration in MDA-MB-231 ($P=0.012$) and MCF-7 cells ($P=0.007$); exposure to 30% O_2 increased migration in MCF-7 cells ($P=0.011$). In MDA-MB-231 cells exposed to 60% O_2, secretion of the angiogenesis factors monocyte chemoattractive protein-1 (MCP-1), RANTES (Regulated on Activation, Normal T Cell Expressed and Secreted) and vascular endothelial growth factor (vEGF) was significantly increased versus control; 30% and 80% O_2 also increased MCP-1 expression ($P\leq0.05$). In MCF-7 cells, interleukin-8 (IL-8), angiogenin and vEGF expression were significantly increased by 30% and 60% O_2 ($P\leq0.05$).
Conclusions: Acute exposure to 60% O_2 increases migration in ER-positive and ER-negative breast cancer cells. High oxygen concentration also stimulates secretion of several angiogenesis factors. These results may have implications for the use of high inspired oxygen concentrations during anaesthesia for breast tumour resection.
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1AP17-9

Particulate and gaseous cerebral microembolism in orthopaedic surgery

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Background and Goal of Study: Cerebral microemboli (ME) are frequently generated during major orthopaedic surgery. The primary objective of this study was applying novel transcranial Doppler (TCD) ultrasound software algorithm to quantify (ME load/15 minutes) and qualify (particulate vs. gaseous) ME, detected as high-intensity transient signals (HITS) in both middle cerebral arteries (MCAs) before and after orthopaedic surgery.
Materials and Methods: The study design was a prospective observational pilot trial. Upon receiving local ethics committee approval, orthopaedic patients (hip/knee/shoulder prothesis, spine surgery), who underwent general anaesthesia were included. Exclusion criteria were: age <50 or >90 years, severe valvular heart defect or acute neurological disorder. Using the ultrasound device *DWL Doppler BoxX* (Compumedics Germany GmbH), HITS were recorded in both MCAs for at least 15 minutes shortly prior and right after the operation (measurement settings: threshold of 9 dB using a sample volume of 8 mm at a pulse repetition frequency of 7 kHz). Simultaneously, velocimetry of cerebral blood flow (CBFV) and venous blood gas analyses were performed. Gaussian distribution was tested with the *D´Agostino & Pearson Omnibus Normality Test*. Data were presented as median with interquartile ranges. Statistical analysis was carried out with the *Wilcoxon Signed Rank Test* ($p<0.05$).
Results and Discussion: Thirty-four patients were examined, 9 of them were excluded (no pretemporal bone window (n=6), refusal of postoperative investigation (n = 3)). Overall HITS count increased from 24 (7; 78) before surgery to 140 (34; 391) after surgery ($p<0.001$). Particulate ME changed from 1 (0; 3.5) to 3 (0.5; 5.5 ($p<0.05$)) and gaseous ME from 23 (6.5; 77.5) to 136 (30; 388 ($p<0.001$)) after surgery. Mean CBFV (cm/s) showed no significant change after surgery (left: 34.2 (29.4; 41.4) vs. 34.6 (27.8; 45.1) and right: 33.3 (25.8; 40) vs. 32.3 (24.5; 42.8)), while $pvCO_2$ (mmHg) increased from 40.5 (37.7; 41.6) to 46.9 (42; 53.3 ($p<0.001$)).
The differentiation of ME indicated that primarily gaseous HITS increased after major orthopaedic surgery.
Conclusion(s): Preliminary findings reveal a significant increase of gaseous ME, a low mean CBFV and a potentially impaired CO_2-reactivity of cerebral vasculature after major orthopaedic surgery. Future studies need to evaluate the impact of these factors on neurologic and overall patient outcome.

1AP17-10

Perioperative arterial CO_2 blood gas variation in obese patients

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Background and Goal of Study: Obesity is a multi-organic disorder associated with respiratory adverse effects due to alterations in gas exchange, pulmonary/thoracic mechanics and respiratory control failure. [1,2] The aim of our study was to evaluate CO_2 blood gas variations during the perioperative period in patients with a Body Mass Index (BMI) >40 kg/m^2.
Materials and Methods: After the approval by the ethics commission, a prospective study was conducted, during 6 months. We included obese patients (BMI>40 kg/m^2), submitted to laparoscopic bariatric surgery (vertical sleeve gastrectomy and gastric bypass). Data collected: comorbidities, demographic characteristics, perioperative data including arterial blood gas sample at preoperative period and at Post-Anesthesia Care Unit (PACU) admission and discharge. We defined hypercapnia as PaCO2 higher than 45mmHg and used Mann-Whitney U test and Chi-square test for comparasion of variables (IBM SPSS® Version 22.0).
Results and Discussion: Of the 44 patients enrolled 23 (52%) had hypercapnia at PACU admission. These patients were older (45 vs 44, $p=0.008$) and presented a higher incidence of STOP-Bang score ≥5 (52% vs 18%, $p=0.031$). Pre-operatively, they had higher bicarbonate and PaCO2 levels (25.3 vs 22.9, $p<0.001$; 37.7 vs 34.0, $p< 0.001$, respectively) and lower PaO2 levels (78.7 vs 88.3, $p=0.002$). Regarding to PACU admission, arterial pH was lower (7.30 vs 7.33, $p<0.001$) and PaCO2 levels higher (48.8 vs 40.0, $p<0.001$) than non-

hypercapnia patients. At PACU discharge, these patients presented higher bicarbonate and PaCO2 levels (23.7 vs 21.0, p=0.001; 46 vs 40, p<0.001, respectively). The anaesthetic emergence time, the occurrence of respiratory events and length of stay in the PACU were similar in patients studied.
Conclusion(s): Patients with hypercapnia at PACU admission had increased PaCO2 and bicarbonate levels at perioperative period. Older patients and those with STOP-BANG ≥5 score seems to be more prone to develop perioperative hypercapnia.
References:
1. Continuing education in anaesthesia, critical care and pain 2008; volume 8, number 5, 151-156
2. Clinical Obesity 2013; vol 3 117-123

1AP17-11
Perioperative polygraphy predicts obstructive sleep apnea

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Background and Goal of Study: Obstructive sleep apnea (OSA) is a common sleep disorder, associated with major comorbidities, higher mortality rates and perioperative complications. In surgical patients, despite higher prevalence, it is often undiagnosed. New screening methods for perioperative period are necessary. We hypothesized that perioperative polygraphy obtained from sedated patients undergoing elective surgery could be used as a screening tool for obstructive sleep apnea.
Materials and Methods: Patients scheduled for elective knee surgery were included. Overnight polysomnography (PSG) was done 3 days prior to surgery. For the surgery, spinal anaesthesia and sedation with propofol infusion were used. Sedation depth was monitored by bispectral index and maintained for all patients (BIS 70). During surgery, polygraphy (PG) recording was performed (using Embletta device). All PSGs and PGs were scored for sleep disordered breathing events. Sleep apnea was defined by the type (central/obstructive apnea ≥ 50%) and by the apnea-hypopnea index (events/hour; AHI>5 mild apnea; AHI 5-15 moderate apnea; AHI>30 severe apnea). Decision statistics (2x2 tables) were calculated for several cut-off values of AHI. Bland-Altman plots were used to analyse the agreement between PSG and PG parameters. Data are shown as bias with limits of agreement (bias ± 1.96 standard deviations) or mean ± SD.
Results and Discussion: Nineteen consecutive patients were studied (14 ASA II; 5 ASA III). The PSG total sleep time was 301 ± 94 minutes and the PG total sleep time was 80 ± 15 minutes. By overnight PSG, 14 patients (74%) were diagnosed with OSA (mostly moderate), 2 patients (10%) with central sleep apnea (moderate) and 3 patients (16%) with no sleep apnea. The mean PSG AHI was 18.8 ± 12.4 and the mean PG AHI was 31.2 ± 24.5. Perioperative PG bias was 12 (-36; 60) for AHI, 13 (-33; 59) for obstructive events and -5 (-24; 14) for central events. For the detection of sleep apnea, PG cut-off value AHI>5 yielded 100% sensitivity and 14% specificity, AHI 5-15 yielded 82% sensitivity and 40% specificity and AHI>30 yielded 100% sensitivity and 73% specificity. In summary, apnea severity and obstructive events were slightly overestimated whereas central events were slightly underestimated by PG. PG sensitivity for sleep apnea detection was high and specificity gradually increased with apnea severity.
Conclusion: Perioperative PG could be used to screen sedated surgical patients for OSA.

1AP18-1
Post-operative anisocoria: a diagnostic conundrum

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Background: Post-operative aniscoria can cause significant anxiety in clinicians, who attempt to quickly navigate the plethora of aetiologies.
Case report: A 39 year old male had a functional endoscopic sinus surgery for persistent nasal blockage. Induction of anaesthesia took place using fentanyl and propofol, with atracurium to facilitate intubation. General anaesthesia was maintained with remifentanil and sevofluorane. Co-phenylcaine was atomised intra-nasally and the nasal submucosa instilled with 2% Lidocaine /1:80,000 Adrenaline. Intra-operatively the patient was positioned with a slight 'head up' tilt and mild hypotension was induced. On recovery from anaesthesia, the patient was noted to have a dilated unreactive right pupil (8mm) and a 'pin-point' left pupil (1mm) with a partial ptosis. A full neurological examination was performed with no other abnormal findings noted. He was monitored overnight with regular neurological observations. A few hours later, the pupils began to respond and by the morning, both pupils were normal.
Discussion: The dilemma this case raises is whether there was right sided mydriasis or a left sided Horner's syndrome. This illustrates the complexities of eye signs in the post-operative patient and the spectrum of anaesthetic and surgical aetiologies of aniscoria. Pharmacologic stimulation is the most common cause of aniscoria, either by sympathetic activation, or by parasympathetic blockade(1). A unilateral fixed, dilated pupil may be due to trauma to the ocular sphincter muscle or serious intracranial pathology (2). In our case, the presentation suggests pharmacological cause, likely sympathetic stimulation from Co-phenylcaine (with contralateral reflex meiosis).
References:
1. N.Theofilopoulos, J.Longmore, F.A.Kerr, E.Szabadi & C.M.Bradshaw, "Consensual papillary responses to mydriatic and miotic drugs", Br.J.Clin. Pharmac. (1988),26,697-702
2. R.C. Prielipp "Unilateral mydriasis after induction of anaesthesia",CAN J ANAESTH 1994,41:2,140-3
Learning Points:
1. Cautious patient positioning and application of nasal solutions to minimise ocular spread.
2. Clear guidance and a systematic diagnostic approach are key to narrow down the differentials and provide a construct to determine the most likely diagnosis.

1AP18-2
Progesterone decreases anaesthetic requirement in male mice

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Background and Goal of Study: Progesterone, a potent positive allosteric modulator of γ-aminobutyric acid type A receptors, has long been known to have central effects, with some groups demonstrating reduced anaesthetic requirements in various settings. We previously reported that progesterone reduces sevoflurane requirement in male mice. However, so far, the action of exogenous progesterone on isoflurane requirement has not been studied. At the same time, since isoflurane preferentially inhibits NMDA receptors unlike sevoflurane, it is not yet clear whether exogenous progesterone affects the isoflurane requirement. Therefore, we examined the effect of progesterone on anaesthetic requirements in a mouse model.
Materials and Methods: Male C57BL/6 mice (n=5 for each group, and 6 independent experiments were done) were treated with either progesterone (75 mg kg^{-1}, suspended in olive oil) or the olive oil vehicle. Injection was completed 1 hour prior to each experiment. Animals were assigned modified rolling response. Animals were contained in the cylinder and the cylinder was set for revolution (4 rev min^{-1}) in the closed chamber supplied with oxygen and isoflurane. Roll over during any revolution of the chamber were counted. Six sets of five revolutions were carried out at intervals of approximately 5 min. Concentration of isoflurane was controlled stepwise 0.05% interval below 1.0% and 0.1% above 1.0% by using a vaporizer. We analyzed the data by using a multiple independent variable logistics regression model. Statistical comparisons were performed with chi-squared test between groups. The *P* value less than 0.05 was considered to be statistically significant.
Results and Discussion: The ED50 and ED90 of isoflurane for control group were 0.38% (CI: 0.36-0.40) and 0.48% (CI: 0.45-0.54), respectively. The ED50 and ED90 for progesterone group were 0.35% (CI: 0.33-0.37) and 0.41% (CI: 0.39-0.46), respectively. Subcutaneous administration of progesterone significantly reduced isoflurane requirement ($P=0.0369$).
This study demonstrated that progesterone significantly reduced isoflurane requirement in male mice. This finding elucidated that progesterone affects isoflurane requirement similar to sevoflurane.
Conclusions: We conclude that exogenous progesterone injection also decreases isoflurane requirement as defined by rolling response. Our results may suggest the necessity of adjustment for anesthetic requirement in sex differences.

1AP18-5

Performing safe general anaesthesia in patients with narcolepsy: three case reports

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Background: Narcolepsy is a sleep disorder characterized by excessive daytime sleepiness, hypnagogic hallucinations, sleep paralysis, and cataplexy. The cause is thought to be a loss of function of the neurones in the lateral hypothalamus producing hypocretin/orexin peptides, which play an important role in the regulation of sleep-wake cycle. The current hypothesis is that there is a genetic predisposition to autoimmune attack on the hypocretin-producing neurons, triggered by environmental factors, such as infective agents.[1] Modafinil is a ‚wake-promoting' drug used to treat excessive sleepiness. Anesthetic implications include increased sensitivity to anesthetic agents, prolonged emergence from anesthesia, increased risk of postoperative hypersomnia, apneic episodes and sleep paralysis, and interactions with treatment medications.
Case report: We report the cases of three patients with narcolepsy who were submitted to different surgical procedures under general anesthesia with bispectral index (BIS) monitoring. Their symptoms had been well controlled using a daily dose of modafinil, which they took on the day of surgery. We performed a balanced anesthesia in two of them (induction with fentanyl and propofol and maintenance with sevoflurane) and a total intravenous anesthesia in the other one (propofol and remifentanil). None of them had a prolonged emergence from anesthesia. The recovery was uneventful and the post-operative course was uncomplicated. During the hospital stay, no symptoms of narcolepsy were observed.
Discussion: Little information exists regarding the anesthetic management of narcoleptic patients. Some authors recommend avoiding pre-medication and opioid analgesics and using short-acting drugs.[2] However, we used different pharmacologic approaches with successful outcomes. According to the literature, modafinil improve recovery from anesthesia.[2] The use of BIS monitoring has been recommended to prevent awareness during anesthesia due to administration of central nervous system (CNS) stimulants and delayed emergence due to oversedation.[2]
References: 1. Leschziner G. Narcolepsy: a clinical review. *Pract Neurol* 2014;0:1-9. 2. Morimoto Y *et al.* Anesthetic management of a patient with narcolepsy. *J Anesth* 2011;25:435-37.
Learning Points: Performing an uneventful general anesthesia in patients with narcolepsy seems to be likely if the disease is well controlled and the patient's regular CNS stimulant medication is continued perioperatively.

1AP18-6

Pharmacological and non-pharmacological preventions of shivering: a systematic review and Bayesian network meta-analysis of randomised clinical trials

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Background and Goal of Study: Intra- and postoperative shivering sometimes causes detrimental consequences. Pharmacological and non-pharmacological preventions vary from trial to trial, and the most effective method remains unknown. Previous traditional pairwise meta-analyses have limitations. The Bayesian approach enables simultaneous comparison of the effect size among trials with more than two intervention arms (multiple comparisons) to choose the best intervention (probability of ranking). Our study aim was to update the meta-analysis of interventions for the prevention of shivering in the Bayesian framework.
Materials and Methods: We followed the PRISMA statement. A literature search with no language restrictions was conducted using electronic databases up to September 2014. The primary outcome was incidence of intra- and/or postoperative shivering during general or neuraxial anaesthesia. Bayesian random-effects meta-analysis was used. The median posterior odds ratio (OR) with corresponding 95% credible intervals (CrIs) were calculated using the Malkov chain Monte Carlo method. Statistical analyses were performed using OpenBUGS© (MRC, UK).
Results: We identified 94 randomised trials with 7062 patients, including 76 pharmacological interventions (opioids, 5-HT_3 antagonists, α-$_2$ agonists, magnesium, ketamine, amino acids, etc.) and 18 non-pharmacological interventions (forced-air warming, warmed intravenous fluid, etc.). Overall incidence of shivering with no prevention was 53% (95% CrI: 44%-63%) for general anaesthesia and 45% (37%-52%) for neuraxial anaesthesia. Nefopam showed the greatest probability for being the best pharmacological prevention against shivering (28.1%, OR=0.01, 95% CrI 0.01-0.04), followed by amino acids (27.5%, OR=0.02, 95% CrI 0-0.09), magnesium (24.9%, OR=0.04, 95% CrI 0.01-0.17), and tramadol (22.6%, OR=0.08, 95% CrI 0.04-0.14). Forced-air warming showed the greatest probability for being the best non-pharmacological prevention (6.6%, OR=0.09, 95% CrI 0-0.96). Epidural fentanyl, intrathecal morphine, and warmed intravenous fluid were identified as less efficacious for prevention of shivering.
Conclusions: Bayesian methods provided the current strategy for shivering. The four most efficacious pharmacological preventions were nefopam, amino acids, magnesium, and tramadol, and the only efficacious non-pharmacological intervention was forced-air warming. These interventions can be recommended unless otherwise contraindicated.

1AP18-7

Prophylactic anti-thrombotic therapy using low molecular weight heparins (LMWH) in aesthetic facial rejuvenation

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Background and Goal of Study: The expanding volume of plastic surgery procedures and growing number of patients with higher risks of thrombotic complications increase the incidence of thromboembolism in aesthetic plastic surgery. The risk of postoperative bleeding is the main limitation for the use of pharmacological prophylaxis of venous thromboembolism in aesthetic facial surgery. The aim of the study was to analyze safety and efficacy of LMWH in prevention of thrombosis and thromboembolism during aesthetic facial rejuvenation.
Materials and Methods: The retrospective study was performed using medical records of the Cosmetology and Plastic Surgery Center from 2007 to 2012. Aesthetic facial rejuvenation included rhytidectomy with tightening of the superficial muscular aponeurotic system of face and neck in combination with endoscopic face lift. A group of face lift patients that received LMWH (n=262) was compared with the control group that did not receive LMWH (n=234) in terms of blood loss via drains (on the day of surgery, on p/o days 1 and 2); the length of time drains remain in place; and the number of postoperative hemorrhagic complications. In accordance with the developed protocol of thromboprophylaxis, enoxaparin was administered subcutaneously in patients with moderate to high risk of thrombosis and thromboembolism in doses of 20 and 40 mg, respectively, at 12 hours before surgery and once a day postoperatively for 2-7 days.
Results and Discussion: Demographic and epidemiological study of face lift patients showed the necessity of prophylactic antithrombotic therapy based on patients' age, comorbidity type and surgery duration. The volume of blood loss via drains in the LMWH group and in the control group was 40 mL (20; 60) and 50 mL (30; 60) on the day of surgery; 40 mL (25; 60) and 40 mL (20; 50) on postoperative day 1; 40 mL (20; 50) and 30 mL (20; 40) on postoperative day 2, respectively. Blood loss via drains more than 100 mL in both groups was noted in 6.5% and 11.1% of cases (p = 0,09) on the day of surgery; and in 6.1 % and 2,7% (p = 0,09) on p/o day 1, respectively. Surgical revision for postoperative hematomas was performed in 3.8% of cases in the LMWH group and in 1.7% (p = 0.25) of controls. No clinical signs of venous thrombosis or thromboembolism were found in these groups.
Conclusion(s): The use of LMWH for prevention of thrombotic complications proved its feasibility and safety in aesthetic facial rejuvenation.

1AP18-8

Prospective audit to a protocol to reduce postoperative nausea and vomiting

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are one of the most undesirable postoperative effects, with nausea having an incidence of about 50%, and vomiting about 30%[1]. We defined a PONV prophylaxis protocol and implemented it in our department. The goal of this study was to audit protocol efficacy.
Materials and Methods: Prospective audit to all adult patients submitted to inpatient elective surgery from March to May 2014. Excluded re-operated, unreached, non-cooperating patients. Protocol (table 1) and PONV were evaluated 24 hours after surgery (clinical records and personal/phone interview). Chi-square, Fisher and Spearman correlation tests were used ($p < 0.05$).

Risk Factors (RF)	LOW risk	
Female	0 RF	No prophylaxis
Non smoker	1 RF	Dexamethasone 4mg ev induction or Droperidol 0,625mg ev end of the surgery
Age <50 years old	MEDIUM risk	
Previous PONV / motion sickness	2 - 3 FR	Dexamethasone 4mg ev induction and Droperidol 0,625mg ev end of the surgery
Volatile agents / N2O	4 - 5 FR	Dexamethasone 4mg ev induction and Droperidol 1,25mg ev end of the surgery
Anaesthesia >120min	HIGH risk	
Postoperative opioids	>5 RF	Dexamethasone 4mg ev induction and Droperidol 1,25mg ev end of the surgery and Ondansetron 4mg ev end of the surgery

[PONV Risk Factors and Recommended Protocol]

Results and Discussion: Included 1006 patients. PONV incidence: Total: 23% (n=230). Protocol group (PG):19%(n=34), Non protocol Group (NPG): 24% (n=196) (p=0,14).
PONV incidence correlated with the number of risk factors (RF) (r=0,26, p<0,0001) (table 2).

Number of RF	0	1	2	3	4	5	6	7
Number of patients	8	87	183	302	243	141	38	4
Number of patients with PONV	2	8	19	53	70	58	18	2
PONV incidence (%)	25	9	10	18	29	41	47	50

[PONV incidence according to risk factors (RF)]

PONV incidence according to risk groups:
High risk group (n=42):48%;
medium risk group (n=869):23%;
low risk group (n=95):10%.
Postoperative vomiting (POV) incidence was:
Total:10,3% (n=104);
PG:6,1% (n=11) and NPG:
11,3% (n=93) (p=0,04).
PONV incidence in recovery room was 4,2%(n=42); 2,2% in PG (n=4) and 4,6% in NPG (n=38) (p=0,22).
POV incidence in recovery room was 1,7% (n=17);
no patients in PG presenting POV in the recovery room versus 2,1% (n=17) patients from NPG.
Conclusion: PONV global incidence was inferior to that reported in literature. Risk factors considered seem to positively correlate to PONV incidence. Protocol group had less PONV incidence but no statistically significant difference. Postoperative vomiting had a statistically significant reduction in protocol group. Protocols should be audited after implemented and a new study with a higher protocol group needs to be done.
References:
1. AnesthAnalg 2014;118(1):85-113

1AP18-9

Rapid recognition of acute adrenal insufficiency diagnosed by an ucommon symptom: loss of consciousness

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Background: Acute Adrenal Insufficiency (AAI) is a rare but severe condition caused by a sudden defective production of adrenal steroids (cortisol and aldosterone).
The clinical symptoms and signs are: muscle weakness and fatigue, vomiting and diarrhea, fever, syncope, confusion, psychosis, convulsions, hypotension, hypoglycemia, hyponatremia, hyperkalemia.
We present a case of AAI diagnosed by an uncommon symptom: loss of consciousness, in a patient who received a single dose of etomidate.
Case report: A 80-years-old-male with high blood pressure and atrial fibrillation who underwent ventriculoperitonial shunt insertion surgery.
Induction: Etomidate 20 mg, Fentanile 0´15 mg, Rocuronium 40 mg.
Maintenance: Sevoflurane 1%, Remifentanile 0´1mcg/kg/min.
BIS values = 40.
One hour after surgery and removal of maintenance drugs: BIS didn't recover normal values and the patient didn't wake up. Sugammadex, Flumazenile and Naloxone were used without any response. He was transferred to the recovery room and connected to mechanical ventilation, but BIS values = 45.
Recovery room: BIS values continued around 45, and he did not respond to stimulus. Pupillary light reflexes were normal so we found no evidence of neurological damage due to the surgical procedure or cerebrovascular accident.
A suspected diagnosis of AAI was made and he was treated with an IV bolus of Hydrocortisone 500mg. BIS values increased to = 97 and the patient recovered consciousness one minute after administration. Then, he was extubated without incident. There were not any adverse effects in the intervention.
Discussion: AAI can be a challenging diagnosis. The novelty of this paper lies in the uncommon symptom [loss of consciousness] which allowed us to carry out this diagnostic, in a patient who received a single dose of etomidate.
References: Coursin BD, Wood KE. Corticosteroid supplementation for adrenal insufficiency. JAMA 2002; 287:236-40.
Learning points:

- Many of elderly patients with adrenal fatigue are undiagnosed. They are likely to present an AAI when their bodies are subjected to stress, such as a surgery.
- Even a single dose of etomidate can suppress corticosteroid synthesis in the adrenal cortex by reversibly inhibiting 11-B-Hydroxylase.
- Our case report illustrates a novelty: low BIS values not explained by any other cause is an uncommon but a very important sign that can alert us of a possible AAI.

1AP18-10

Remifentanil preconditioning protects human keratinocyte in hypoxia/reoxygenation injury by induction of autophagy

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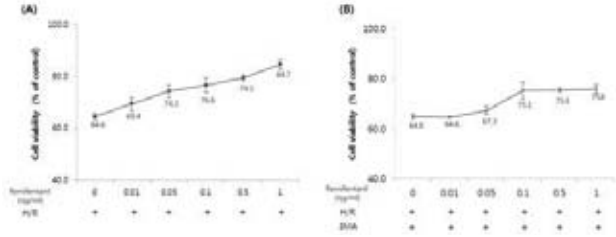
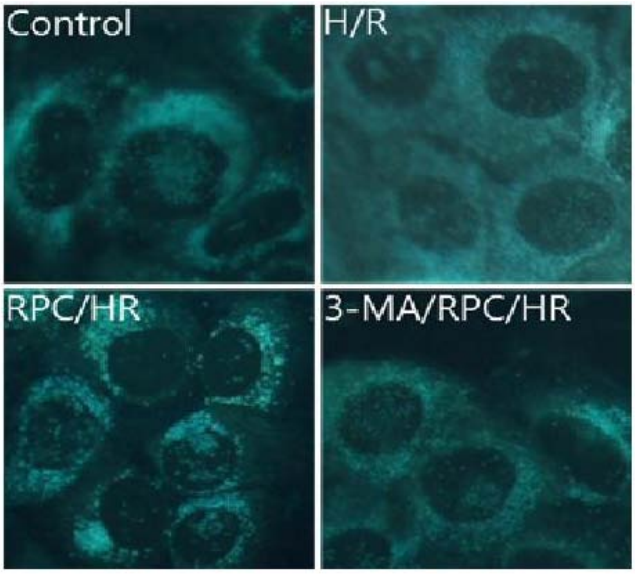
Background and Goal of Study: Incisional site become transient ischemic state and then occur reoxygenation due to vasodilatation by inflammatory reaction. Keratinocyte apoptosis and autophagy is an inevitable process during skin tissue ischemia-reperfusion induced injury. Remifentanil can prevent the inflammatory response and can suppress inducible nitric oxide synthase expression in a septic mouse model. We investigated whether remifentanil pretreatment has cellular protective effect against hypoxia-reoxygenation in human keratinocytes.
Materials and Methods: The cultured human keratinocyte were exposed to 24 h hypoxia (5% CO2, 1% O2, 94% N2) followed by 12 h reoxygenation (5% CO2, 21% O2, 74% N2). The cultured cells were exposed to various concentrations of remifentanil (0.01, 0.05, 0.1, 0.5 and 1 ng/ml) for 2 h before hypoxia (RPC/HR group). Control group did not receive hypoxia and remifentanil treatment for 36 h. 3-MA/RPC/HR group was treated 3-methyladenine(3-MA) for 1h before remifentanil treatment.

Results and Discussion:

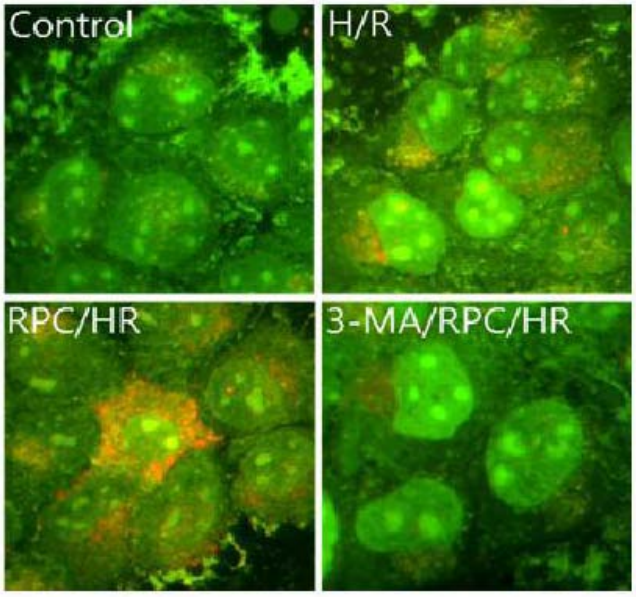


[Fig.1]

The cell viability was decreased in H/R group and remifentanil increased the cell viability dose-dependent manner. In 3-MA/RPC/HR group, the cell viability was lower than RPC/HR groups. Remifentanil 1 ng/ml represented the highest cell viability.



[Fig.2]



[Fig.3]

In autophagic specific staining, MDC and AO stain, RPC/HR group induced more autophagic expression than control, H/R group and 3-MA groups.
Conclusion(s): We showed that remifentanil preconditioning increased the proliferation of human keratinocytes in hypoxia-reoxygenation injury by induction of autophagy.

1AP18-11

Efficacy and safety profile of rivaroxaban following total hip and knee joint replacement

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Background: The incidence of venous thromboembolism (VTE) after hip and knee arthroplasty has is quoted as 1.1% and 0.53% respectively despite thromboprophylaxis (1). Furthermore, the VISION group quoted the incidence of myocardial injury after non-cardiac surgery as 8.0%. Both studies illustrate the burden of VTE events in orthopaedic patients during the perioperative period. NICE recommends use of rivaroxaban thromboprophylaxis following total hip and knee replacements. Our study investigates the efficacy and safety profile of rivaroxaban in patients undergoing hip and knee arthroplasties.
Methods: Patients who underwent total hip or knee replacement between 2 April 2013 - 12 August 2014 were included in this retrospective study, carried out in accordance with the UK GCP code (Reference : CAPP924). Data regarding patient characteristics and postoperative morbidity were collected using medical records. Telephone call follow-ups were used to investigate bleeding events. Primary efficacy was defined as composite of pulmonary embolism (PE), deep vein thrombosis (DVT), myocardial infarction (MI) and stroke. Safety profile was defined as major or minor bleeding. Data analysis was performed using IBM SPSS statistical software.
Results: A total of 445 patients were identified. We present the preliminary results for a sub-cohort of 99 patients. PE occurred in three (3%) patients of which one died, and is higher compared to other studies (1). No incidences of DVT, MI or stroke were reported. One major bleed and 7 minor bleeds occurred in 5 patients. The major bleed followed a lobectomy and required blood transfusion. Minor bleeds included epistaxis, gastrointestinal and skin bleeds. There was a statistically significant association between diabetes and PE ($p=0.02$), and ischaemic heart disease and bleeding events ($p=0.04$) according to Fisher's exact test.
Conclusion: Prophylactic management of VTE should be individualised according to patients' risk factors. A small percentage of patients experienced bleeding events and strategies for reversal of the anticoagulant remain limited. Future work includes long-term follow up of orthopaedic patients initiated on rivaroxaban and preventative strategies of VTE events.
References: 1. Januel JM, Chen G, Ruffieux C, et al. Symptomatic in-hospital deep vein thrombosis and pulmonary embolism following hip and knee arthroplasty among patients receiving recommended prophylaxis: a systematic review. JAMA 2012; 307:294.

1AP18-12

Digital game for assessment of pre and postoperative cognitive function

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is an adverse event observed with higher incidence in the elderly undergoing cardiac surgery and general anesthesia1. Preoperative evaluation of cognitive functions aid in the postoperative diagnosis of POCD as well as rehabilitation of compromised functions. However, a complete standard neuropsychological evaluation takes time, in general more than two hours, and prevents the preoperative evaluation as a routine2. To reduce this time and adjust a single test that can assess the main cognitive functions, which are expected to change in POCD, we create a digital game (*Mental Plus*, Sao Paulo, Brazil). The aim of this study was to describe this new digital game intending to facilitate pre and postoperative cognitive function evaluation.
Materials and Methods: The *Mental Plus* digital game was developed using Engine Game, Unity 3D, enabling support for rendering three-dimensional and two-dimensional files. The graphic was created by vector images for editing and files in sequence of images in formato.png. Programming language C sharp (C #) for logic creation and operation of the game verification and recording of data and creation of logs. This language generates files in .csv and sends the data for parse.com server that stores the data

Results and Discussion: The new digital game allows the neurocognitive evaluation in a 20 minutes section for immediate and delay memory, attention, visual motor dexterity and executive functions. Preliminary studies have already shown that games could be used as a tool for evaluation of cognitive function. The presented digital game needs clinical validation for possible use for assessment of pre and postoperative cognitive function.
Conclusion(s): The instrument shows evidence of decrease the length of evaluation of cognitive function.
References:
ADDIN EN.REFLIST
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1AP19-3

Factors affecting effective end-tidal concentration of desflurane anaesthesia

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Background and Goal of Study: There is accumulating evidence that inappropriate depth of anaesthesia is associated with increased risk of postoperative complications including risk of death (1). The aim of this study was to identify factors determining the effective end-tidal concentration (EEtC) and duration of wash in and wash out of desflurane in patients undergoing elective neurosurgery.
Material and methods: In this prospective observational study, 43 patients with American Society of Anesthesiologists physical status I-III scheduled for elective neurosurgical procedure under general anaesthesia were enrolled. In each individual, the manufacturer recommended age-corrected end-tidal concentrations of desflurane was set and achieved initially. Individual EEtC of desflurane was then defined according to entropy parameters and maintained in the targeted range of static and response entropy 40-50. Comorbidity, regular intake of alcohol and medication, smoking, sex, weight, height, and age were recorded. Postoperative questionnaire was used to reveal the intraoperative awareness.
Results and Discussion: The EEtC of desflurane was 2.7 ± 1.0 (range 1.3 - 5.2) Vol % in the study group. Bivariate analysis revealed following factors influencing EEtC of desflurane: age (correlation coefficient -0.569, coefficient of determination 0.3234, P=0.0001), presence of hepatopathy (correlation coefficient 0.347, coefficient of determination 0.1238, P=0.0228) and smoking (correlation coefficient 0.352, coefficient of determination 0.1202, P=0.0207). Effects of age and presence of hepatopathy remained significant after forward multivariate analysis (coefficient of determination 0.4171, P=<0.001). None of the recorded factors influenced the duration of wash in a wash out phase of anaesthesia. Intraoperative awareness was not found.
Conclusion: Main factors determining the effective end-tidal concentration of desflurane are age and presence of hepatopathy.
References:
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1AP19-4

Frequency characteristics of pressure transducer kits with inserted pressure resistant tubes of a small diameter and the effects of its length

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Background: The frequency characteristics of pressure transducer kits are influenced by the length and inner diameter of the pressure resistant tube. Currently, there are few studies on the frequency characteristics of pressure transducer kits with inserted pressure resistant tubes of a small diameter for infants (paediatric [PE] circuit). Here, we studied PE circuits and the effect of extending the length of the PE circuit on the frequency characteristics of pressure transducer kits.
Methods: The FloTrac sensor kit (MHD6S; length, 150 cm; Edwards Lifesciences [ED], CA, USA) and PE circuits (lengths, 150 cm, 180 cm, and 210 cm) were evaluated in this study. Their frequency characteristics were tested, with or without the PE tube (internal diameter: 1.1 mm, ED). BIO-TEK 601A (BIO-TEK) was used as a pressure generator. The natural frequency and damping coefficient of the MHD6S and PE circuits were determined using frequency characteristics analysis software (Argon Medical Devices, TX, USA) and were evaluated by plotting values on the Gardner chart [1]. In addition, the pressure wave forms of MHD6S and the three PE circuits were compared.
Results: For the MHD6S, the natural frequency was 34.2 Hz and the damping coefficient was 0.11. With the 150-cm long PE circuit (150PE), the natural frequency and damping coefficient were 25.1 Hz and 0.11, respectively. The natural frequency decreased from 25.1 Hz to 22.5 Hz with the 180-cm long PE circuit (180PE) and markedly decreased from 22.5 Hz to 21.1 Hz with the 210-cm long PE circuit (210PE). The damping coefficients of the 150PE, 180PE, and 210PE were 0.11, 0.12, and 0.15, respectively. The 180PE and 210PE showed a slightly increased damping coefficient.
Discussion: The natural frequency was significantly decreased with 150PE compared with MHD6S (from 34.2 Hz to 25.1 Hz), whereas the damping coefficients were the same. With regard to the pressure wave from, the 150PE and the 180PE showed slight over damping (2 mmHg). The 210PE also showed slight over damping (3 mmHg). As the recommended frequency characteristics of pressure transducer kits, for natural frequencies of more than 16 Hz or 20 Hz, damping coefficient should be 0.5 or 0.7, respectively [2]. In conclusion, the PE circuits evaluated showed markedly decreased natural frequency, but they could be used for arterial blood pressure monitoring without serious difficulties.
References:
1. Anesthesiology 1981; 54:227-36.
2. Munich 1989; 89:1-5.

1AP19-5

From conservative surgical treatment until hysterectomy in one case of cervical pregnancy: the approach of anesthesiologist

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Background: Cervical pregnancy (CP) is infrequent (less than 1%) form of ectopic pregnancy. Number of CPs rises in recent year [1].
Case report: A 39 year old woman, with the history of one vaginal delivery, one cesarean section and one miscarriage, presented to the outpatient department with amenorrhea for 7 weeks and painless vaginal spotting. Her medical history was unremarkable. Transvaginal ultrasound revealed a gestational sac at the cervix without embryo. The diagnosis was: missed abortion in cervix. The patient refused to be hospitalized. She reappeared after 3 days with vaginal bleeding and abdominal pain. Laboratory tests: Hb 113 g/l, Ht 32,7%, SPA 93%, INR 1,03. Suction curettage with abrasion under general intravenous anesthesia was performed. Massive bleeding was observed. The tactic was: change in to balanced general anesthesia and prepare for massive bleeding treatment. To secure haemostasis vaginal ligation of cervical arteries and a cervical tamponade with a Foley catheter were performed. That was not sufficient. The angiographic embolization of uterine arteries was done unsuccessfully. As minimally invasive measures were not effective, it was decided to perform life saving hysterectomy.

In the operating theatre: Ac. Tranexamicum 1g was administered intravenously. Laboratory tests: Hb 62 g/l, Ht 18,1%, platelets 99×10^9, fibrinogen 1,5 g/l, SPA 53%, INR 1,37; lactats 1,2 mmol/l.
Total fluid balance: total blood loss 3900 ml, urine output 3240 ml, crystaloids 8000 ml, colloids 1000 ml, red blood cells 1719 ml, fresh frozen plasma 1592 ml. The patient was treated in the ICU for 1 day after operation. In the ICU: Hb 112 g/l, Ht 32,5%. The patient was discharged after 7 days.
Discussion: Because of the highly vascular nature of the cervical tissue, treatment of CP may be associated with massive haemorrhage, requiring urgent surgical treatment up to hysterectomy. The most effective method of management is under investigation and more than one method is usually tried in the termination of CP, therefore the balanced general anesthesia could be the method of first choice.
Reference: Management of cervical ectopic pregnancy after unsuccessful methotrexate treatment. S. Sijanovic, D. Vidosavljevic, Z., et al., Iran J Reprod 2014, 12:4, p. 285-288.
Learning Points: CP treatment can reveal itself as a challenge for the anesthesiologist and requires be alert, ready for adequate fluid resuscitation and prepared for the worst scenario.

1AP19-6

HCN1 channels contribute to the effects of amnesia and hypnosis but not immobility of volatile anaesthetics

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Background and Goal of Study: HCN1 channel has been identified as a target of ketamine to produce hypnosis and volatile anaesthetics were found to inhibit HCN1 channels. However, the role of HCN1 channel in the effects of volatile anaesthetics in vivo is still elusive.
This study was designed to evaluate the role of HCN1 channel in the actions of volatile anaesthetics.
Materials and Methods: Minimum alveolar concentrations (MAC) of isoflurane and sevoflurane that induced immobility (MAC of immobility) and hypnosis (MAC of hypnosis) were determined in wildtype, global HCN1 channel knockout (HCN1-/-) and forebrain-selective HCN1 channel knockout (HCN1$^{f/f}$: cre) mice, respectively. Immobility and hypnosis of mice were defined as no purposeful reactions to tail-clamping stimulus and loss of righting reflex (LORR), respectively. Amnestic effects of isoflurane and sevoflurane were evaluated by fear-potentiated startle in these three strains of mice.
Results and Discussion: For MAC of immobility of isoflurane, no significant difference was found among wildtype (1.25±0.19%), HCN1-/- (1.24±0.16%) and HCN1f/f: cre mice (1.26±0.16%). For MAC of hypnosis of isoflurane, both HCN1-/- (1.05±0.11%, P< 0.001 vs. wildtype) and HCN1$^{f/f}$: cre (1.04±0.11%, P< 0.001 vs. wildtype) mice were significantly increased than wildtype mice (0.86±0.12%).
No significant difference was found between HCN1-/- and HCN1f/f: cre mice. For MAC of immobility of sevoflurane, no significant difference was found among wildtype (2.62±0.38%), HCN1-/- (2.70±0.36%) and HCN1$^{f/f}$: cre mice (2.63±0.42%). For MAC of hypnosis of sevoflurane, both HCN1-/- (1.89±0.23%, P< 0.001 vs. wildtype) and HCN1$^{f/f}$: cre (1.90±0.26%, P< 0.001 vs. wildtype) mice were significantly increased than wildtype mice (1.58±0.21%).
No significant difference was found between HCN1-/- and HCN1$^{f/f}$: cre mice. By fear-potentiated startle experiment, amnestic effects of isoflurane and sevoflurane were significantly attenuated in HCN1-/- and HCN1$^{f/f}$: cre mice (P<0.01 vs. wildtype).
No significant difference was found between HCN1-/- and HCN1$^{f/f}$: cre mice.
Conclusion(s): Forebrain HCN1 channels contribute to hypnotic and amnestic effects of volatile anaesthetics while spinal HCN1 channel is not involved in the effect of immobility.

1AP19-7

Hiroshige Shiota (1873-1965), a young surgeon from Tokyo, and the Japan Red Cross Hospital in Paris during World War I

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During the World War I, the Japan Red Cross sent medical relief missions to France, Britain and Russia. The mission to France was led by Dr Hiroshige Shiota, associate professor of surgery from Tokyo University. Shiota's autobiography (1) published at the age of 91 including detailed account of the Red Cross Mission to Paris, and other literatures and material on the mission available in Japan (2) were reviewed.
The mission of 31 included 22 nurses, 3 doctors, one pharmacist, one coordinator, 2 interpreters and 2 helpers.
Hotel Astoria near the Arc de Triomphe was offered as the site of the Japanese hospital opened on 14 February,1915. Most of the equipment and materials were sent from Japan except Xray machines. Veteran nurses had experienced the caring of the wounded in Russo-Japanese war of 1904 to 05. The mission's ability to care seriously injured became soon recognized. Shiota described, however, that anaesthesia was given by French nurses, as in Japan those days anaesthesia was given by junior surgeons.
They worked as in the battle field. No official holiday was allowed during the 17 month mission. Nurses neither had official holiday but volunteer French ladies took them out in the afternoon.
The hospital admitted 910 patients including 858 injured, 40 with surgical diseases and 12 with medical problems. Shiota and the colleagues performed 637 operations, 2 manipulations of the dislocated joints, and 106 cases of plastering. Average number of the inpatients was 111.2 per day.
On 24 April, 1915, President and Mrs Raymond Poincaré visited the hospital to encourage the wounded soldiers and to thank Japanese mission.
On leaving France, Shiota was decorated with officier de l'ordre national de légion d´honneur. Many of the nurses of the mission continued to serve in the Red Cross after coming back to Japan and three former nurses of the mission were awarded Florence Nightingale medals.
Shiota in 1922 was appointed as professor and chairman of the surgical department of the Tokyo University Hospital and became the leading surgeon, educator and organizer. Shiota was one of the surgeons with vision who helped to establish Japanese Society of Anaesthesiologits in 1954 leading to the birth of professional anaesthesiologits in Japan.
1. Shiota, Hiroshige. Knife and Scissors, Togensha, Tokyo 1963
2. Kumamoto Branch, Japanese Red Cross. Hatsume Takeda, a nurse from Kumamoto in the Japan Red Cross Mission to Paris, Kumamoto, 2009

1AP19-9

How acurate is agent usage reported by automated low flow anesthesia machines?

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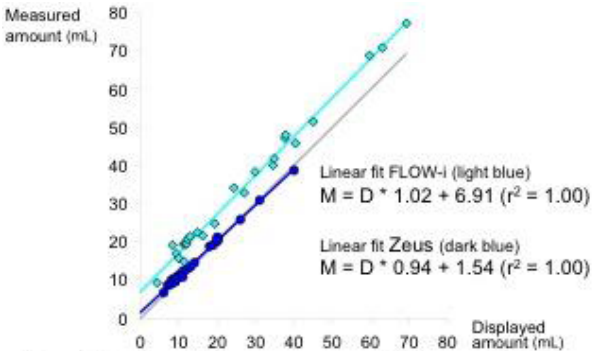
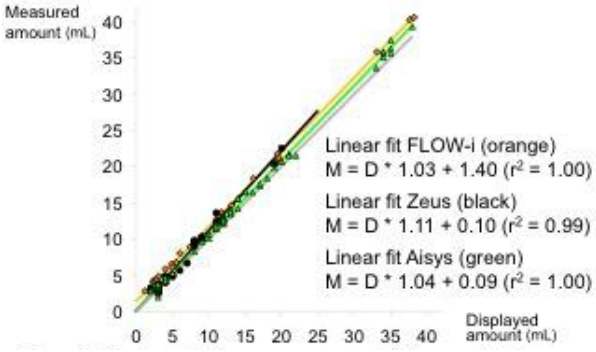
Introduction: To examine the extent to which automated low flow anesthesia (ALFA) machines reduce agent usage, accurate cumulative agent data are needed. We therefore examined how well agent usage reported by the Zeus (Draeger, Lubeck, Germany), FLOW-I (Maquet, Solna, Sweden), and Aisys (GE, Madison, USA) matched usage determined by weighing the vaporizer before and after the procedure.
Methods: In this observational study, patient consent was waived by the IRB. In 100 ASA I-III patients in which anesthesia was maintained with either desflurane in O_2/air or sevoflurane in O_2/N_2O with either the Zeus or FLOW-i (25 patients in each of the 4 subgroups). For the Aisys, historical data were used for sevoflurane in O_2/air (ref 1,n = 87). The vaporizer was weighed before and after the procedure with a high precision weighing scale (XP10002, Mettler-Toledo, Columbus, Ohio).
The weight difference was converted into mL liquid using the density of sevoflurane (1.5203 g/mL) and desflurane (1.4651 g/mL). Displayed and measured agent usage were compared using a linear curve fit.

Results:



[Fig. 1. Displayed (D) versus measured (M) amount of desflurane (in mL of liquid) with each of the machines. Straight line = linear fit. Color code of line and data points: light blue = FLOW-i, dark blue = Zeus. Gray = line of identity]



[Fig. 2. Displayed (D) versus measured (M) amount of sevoflurane (mL liquid) with each of the machines. Straight line = linear fit. Color code of line and data points: orange = FLOW-i, black = Zeus, green = Aisys. Gray = line of identity]

Conclusion: Measured agent usage was higher than the displayed amount with the FLOW-i and - less pronounced - with the Zeus, and more so when desflurane was used.
This was mainly caused by a Y-axis offset, which results from the fact that removing and/or calibrating the injector consumes some agent that is not added by the machine to the displayed amount. When this effect is taken into account, the slopes suggest the displayed amount of agent usage to match the measured amount within 2-3 % for the FLOW-i,-6 to 11 % for the Zeus, and 4% for the Aisys. Data for desflurane with the Aisys are being collected.
References: 1. ESA 2014, 3AP1-7

1AP19-10

Hyperoxic oxidative stress during abdominal surgey: a randomized trial

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Background and Goal of Study: Aim of this study is to compare effects of different inspired oxygen fractions on oxidative stress, antioxidant response and expiratory lung volumes in patients undergoing colorectal surgery.
Materials and Methods: 40 ASA I-II patients were included to study. Expiratory tidal volumes (ETV) measured by Wright Spirometer before induction. Patients were ventilated with 0.8 FiO2 and with 6L/min oxygen/air mixture during anesthesia induction. Following intubation, mini bronchoalveolar lavage (miniBAL) and blood samples were taken. After the first miniBAL sample, patients were randomly assigned to either receive 0.8 (group I)(n=20) or 0.4 (group II)(n=20) FiO2 during anesthesia management. Before extubation, miniBAL and blood samples were taken. PaO_2/FiO_2 ratio, oxidative stress (MDA,PCO) and anti-oxidant response (T-SH,NPSH,PSH,SOD) measurements in blood and miniBAL samples were obtained.
On 60th minute of the extubation, ETV was measured again in the postanesthesia care unit. Paired and unpaired t test was used for statistics.

Results and Discussion: ETV values were significantly higher in group II after extubation. In both groups plasma PCO,SOD, T-SH, PSH values increased significantly before extubation compared to after intubation ($p<0.05$) whereas the increase in MDA levels was not significant. Plasma PCO and T-SH levels were significantly higher in group I, SOD and PSH levels were significantly higher in group II before extubation. Significant decreases in plasma NPSH levels were similar in both groups. In both groups, MDA,SOD,T-SH and NPSH levels in miniBAL increased significantly before extubation compared to after intubation. Between group comparison, PCO levels were lower, T-SH and NPSH levels were higher in miniBAL samples of group II.
Although MDA and PCO levels increased in the samples taken before extubation in both groups, this increase was significantly higher in the group that received 80% oxygen/air mixture. Increase in MDA shows an increase in lipid peroxidation, increase in PCO signals oxidative protein damage. Reason of higher increase in MDA and PCO in miniBAL samples than plasma samples can be explained by the local effect of oxygen, which increases oxidative stress primarily in the lungs, and then subsequently followed by increase in plasma levels.
Conclusion: Use of high oxygen fractions for duration of anesthesia leads to increased local and systemic oxidative stress, may lead to atelectasis formation.

1AP19-11

In vitro canister life of co_2 absorber prepacks with the Zeus

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Background and Goal: Low fresh gas flows reduce inhaled anesthetic and carrier gas waste, but increase CO_2 absorbent use. Performance of CO_2 absorbents remains poorly studied, especially in a setting that resembles clinical practice. We report the performance of 6 brands with the Zeus ® (Draeger, Lubeck, Germany).
Materials and Methods: Via a CO_2 flow meter (MEDEC, Aalst, Belgium; accuracy 3.7 mL/min), 160 mL/min CO_2 was fed into the tip of a 2L breathing bag that was ventilated with the Zeus® (controlled mechanical ventilation, tidal volume 500 mL, rate 10/min, I:E 1:1). For each brand (Table 1), canister life was determined for 6 canisters (all of the same lot) with an O_2/air FGF of 0.35 L/min as the time until the inspired CO_2 (F_ICO_2) reached 0.1% and each subsequent 0.1% increment up to 1.0%. Data are presented by plotting the time until the F_ICO_2 reached 0.1% versus the time for F_ICO_2 to increase from 0.1 to 0.5%. In addition, for each F_ICO_2 threshold, canister life was compared using the ratio of average canister life of a certain brand/average canister life of the longest lasting canister (expressed in %). Efficiency per mass of absorbent of the different brands was compared using the ratio of average canister life per 100 g of fresh content/ average canister life per 100 g of fresh content of the most efficient product (expressed in %). Initial canister content was calculated by subtracting the weight of the empty plastic housing from the total weight measured with a high precision weighing scale (XP10002, Mettler-Toledo, Columbus,Ohio).
Results and Discussion:

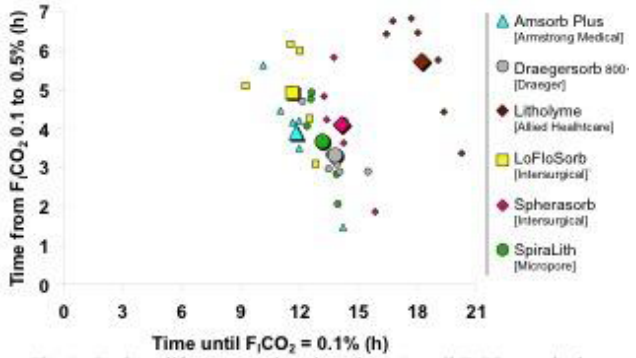

Fig. 1. Canister life presented as time (hours) until F_ICO_2 reached 0.1% (X-axis) and time (hours) until F_ICO_2 had increased from 0.1 to 0.5 % (Y-axis). Small symbols = individual canisters, large symbols = average value.

[Figure 1]

	F_ICO_2 threshold to replace canister (%)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Litholyme	100	100	100	100	100	100	100	100	100	100
Spherasorb	79	77	76	76	76	77	78	78	79	79
Draegersorb 800+	77	75	73	71	71	71	70	70	70	70
SpiralLith	74	73	72	71	70	70	69	69	69	69
Amsorb Plus	65	68	67	66	66	65	65	64	64	64
LoFloSorb	64	62	67	68	69	68	68	68	69	69

[Table 1A. Relative efficiency of the canisters (relative to most efficient canister which gets value of 100%)]

	F_ICO_2 threshold to replace canister (%)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
SpiralLith	100	100	100	100	100	100	100	100	100	100
Litholyme	62	62	64	65	65	66	66	67	67	67
Draegersorb 800+	60	59	59	58	59	59	59	59	59	59
Amsorb Plus	57	59	59	59	59	60	60	60	59	60
Spherasorb	50	49	50	51	51	52	53	54	55	55
LoFloSorb	46	45	49	51	52	52	53	53	53	53

[Table 1B. Relative efficiency per mass of absorbent (relative to most efficient canister per mass which gets value of 100%)]

Two canisters were excluded (technical failure).
Conclusion(s): F_ICO_2 thresholds have an important effect on relative canister efficiency. The Litholyme prepack is the most efficient canister, the Spiralith is the most efficient one on a per weight basis. Relative efficiency can be used to compare cost.

1AP19-12

Tramadol modifies the antibacterial activity of ropivacaine

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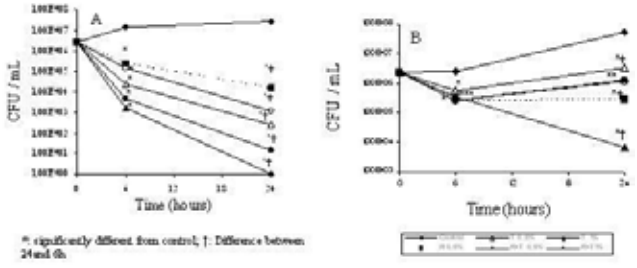
Background and Goal of Study: In our previous abstract, we have demonstrated the antibacterial activity of tramadol alone or associated with levobupivacaine against *E. coli* and *S. aureus* and shown its effect in the reduction a probable nosocomial infection. This present investigation carried out to know if tramadol has the same action with ropivacaine which was frequently used in our institution.
Materials and Methods: Bacterial cultures [$5x10^6$ colony forming units (CFU)] were added to Ropivacaine (0.5%), alone and in associated with 0.5 and 1% of tramadol solutions, then incubated for 6 or 24h at 37°C. The numbers of viable bacteria in the presence and absence (control) of the tested solutions were counted. ANOVA and Mann-Whitney test was performed for a comparison between the groups. Data are expressed as $\log_{10}$ values of the colony counts (mean ± SD).
Results and Discussion:



[Graphic]

Tramadol effect against *E. coli* and *S. aureus* were identical to those reported previously (Figs A, B). Ropivacaine had an antibacterial activity on two strains in a time-dependent manner. It decreased by >3 $\log_{10}$ the *E. coli* and by >2 $\log_{10}$ the *S. aureus* growths ($p<0.001$) after 24h (Figs A, B). In combined solutions, tramadol induced an additive effect (by 1 $\log_{10}$ and 3 $\log_{10}$ after 24h) ($p<0.001$) on ropivacaine action against *E. coli*. In contrast, it caused at 0.5 and 1% concentrations a light inhibition (not significant) of ropivacaine action on *S. aureus* after 24h (Figs A, B).

These results were different to those reported previously with levobupivacaine. This difference may be explain, in part, by lipid solubility of ropivacaine which was 10 times less than levobupivacaine, so it penetrated fewer and caused less alteration in microbial cell membrane and permit a more tramadol's liaison with its receptors.
Conclusion(s): . In combined solutions, tramadol presented a party of its strong antibacterial property and produces an additive effect on ropivacaine action against E. coli so reduce the risk of probable nosocomial infection. It was unable to modify significantly ropivacaine effect on the S. aureus growth.

1AP20-2

Midazolam suppresses inflammatory responses in murine macrophages via the peripheral benzodiazepine receptor and not the central benzodiazepine receptor

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Background: Benzodiazepine shows a sedative effect; it suppresses the central nervous system via the central benzodiazepine receptor (CBR), which is associated with the gamma aminobutyric acid (GABA) receptor. Peripheral benzodiazepine receptor (PBR, translocator protein: [TSPO]) is another target molecule of benzodiazepine. Benzodiazepine has been reported to affect immune cell function.
However, the mechanism of this effect is not known. Therefore, we examined the molecular mechanism by which benzodiazepine exerts inhibitory effects on inflammatory responses in macrophages.
Methods and Results: We used the macrophage cell line, RAW264. Stimulation of RAW264 cells with lipopolysaccharides increased the expression of costimulatory molecules (CD80, and CD86) and interleukin-6 (IL-6). Treatment of RAW264 cells with the benzodiazepine, midazolam, suppressed the expression of costimulatory molecules and IL-6. PBR and CBR transcripts were detected in RAW264 cells. Treatment with PBR ligands, but not with CBR ligands, suppressed the expression of costimulatory molecules and IL-6 in a similar manner as that observed when the cells were treated with midazolam. We also analyzed the specific functions of PBR in macrophages by knocking down PBR in RAW264 cells via the introduction of small interfering RNAs. This inhibition of PBR reversed the inhibitory effect of midazolam on the expression of costimulatory molecule and IL-6 in RAW264 cells.
Conclusion: Our results are the first demonstration that midazolam exerts an inhibitory effect on immune responses in macrophages via PBR. This suggests the possibility that clinically-administered benzodiazepine can suppress immune cells via an effect on PBR.

1AP20-3

Mitochondria to blame?

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Background: The mitochondria are involved in adenosine triphosphate production (Krebs cycle, oxidative phosphorylation, fatty acid oxidation), iron metabolism, amino acid biosynthesis and apoptosis. Therefore, mitochondrial disorders can cause multiorgan dysfunction in tissues with high energy consumption. Even such a small intracellular organelle can become a huge anesthetic challenge.
Case report: 72 year old male submitted to a retropubic prostatectomy and inguinal hernia repair under total intravenous anaesthesia. ASA physical status 3 (mitochondrial myopathy (MM), hypertension, dyslipidemia, scoliosis, L3-L4 nerve root compromise). Report of four uneventful surgeries under general anesthesia before MM diagnose. On physical examination, mild ptosis, deafness, bilateral marked quadriceps' atrophy and positive gowers maneuver. Normal preoperative exams. Standard ASA monitoring, BIS®, arterial invasive blood pressure, arterial blood gas, urine output and body temperature were monitored. Premedication with metoclopramide and ranitidine. Fluid management with normal saline and polyelectrolyte G. Normothermia by heated fluids and warm air blanket. Intravenous analgesia associated with ropivacaine infiltration of the surgical incision.
The 1 h50min long procedure was uneventful. In the PACU he presented a notable flexion deficit and left thigh hypoesthesia.
Investigation performed: MRI without new changes; EMG inconclusive but

suggestive of subacute L4-L5 left lumbar plexus injury. In the subsequent months after hospital discharge there was complete neurological recovery.
Discussion: The patients' positioning is a key step that should allow good exposure of the surgical field and minimize the associated injuries, resulting from the responsibility and compromise between surgeon and anesthesiologist.
Injuries and physiological changes have been described associated with incorrect positioning of the patient (cardiovascular, respiratory disorders, peripheral nerve injuries, pressure ulcers, blindness).
In most cases the lesions evolve favorably in 6-12 weeks, with evidence of complete motor and sensory function space recovery within 1 year in 50% of cases. The post operative evaluation of patients is essential, allowing early detection of lesions, their documentation and guidance.
Correct positioning of the patient should not be underestimated given the complexity of the associated pathology or complications.
Reference: *MEJA 2011 June*; 21(2): 235-244

1AP20-4

Muscle-relaxants affect the vis-a-tergo

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Aim: The expulsive hemorrhage is one of the most fatal complications during intraocular surgery. Often, iris-lens-pulsations are signs of a prodromal stage. These pulsations are called "vis-à-tergo" (VAT), a primary stage of the expulsive hemorrhage. In this study we investigated the influence of non-depolarizing muscle-relaxants during general anesthesia (GA) on the VAT.
Patients and methods: The VAT was measured in 229 patients who needed GA for their surgery. For this, VAT was graded from no VAT (grade 0), slight pulsation (grade 1), intense pulsation (grade 2) and pulsation of the iris onto the cornea (grade 3). In this relation, three groups of non-depolarizing muscle-relaxants were investigated: mivacurium (n=71), atracurium (n=91) and rocuronium (n=67).
Results: A VAT was observed in 18.3% of all patients. A VAT did occur more frequently with mivacurium (42.3%) in contrast to atracurium (6,6%) or rocuronium (9%; X^2-test: $p < 0.001$). 35% of the smokers and only 17% of non-smokers developed a VAT ($p < 0.001$). A VAT was not observed in patients with BMI of 35 and more.
Conclusion: A muscle relaxation with Mivacurium should be avoided in cases with a large surgical approach (e.g. penetrating keratoplasty or open globe injury), because it is significantly associated with VAT.
Keywords: Vis-à-tergo, expulsive hemorrhage, non-depolarizing muscle-relaxants, intraocular surgery, mivacurium, general anesthesia

1AP20-5

Non-invasive core temperature monitoring with Spot-On®, a comparison with esophageal temperature

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Background and Goal of Study: Core temperature monitoring is required for surgical patient management. None of the available non-invasive monitoring methods is accurate for perioperative use. In a previous study, a prototype deep tissue thermometry system agreed with pulmonary arterial blood temperature(1).The goal of the study was to assess the agreement of data from SpotOn®(3M) a new zero-heat flux non-invasive temperature monitoring system, with simultaneous measurements from an esophageal temperature probe.
Materials and Methods: In 69 patients undergoing a variety of surgical procedures with general anesthesia a Spot On® sensor was placed on the lateral forehead and an esophageal temperature probe was inserted after anesthesia induction. All patients were warmed using a convective air system from arrival at the operating room until PACU transfer. Esophageal temperature was used as the reference estimate of core body temperature. After the forehead sensor was applied, a ten minute time interval was allowed for thermal equilibration. Temperature measurements were recorded every ten minutes from anesthesia induction until the end of surgery. 906 pairs of measurements were obtained. Bias (SpotOn minus esophageal) was calculated for each outcome at each time point along with the mean bias across all pairs of measurements. Bland-Altman plots of individual temperature differences versus the average of the corresponding data pair were used to show agreement as a function of the range of differences. Limits of agreement were constructed based on within and between subject variance components. A single number agreement summary was obtained using Lin's Concordance Correlation Coefficient.
Results and Discussion: 69 patients were studied,(43/26 males/females)
Patient data (mean ± standard deviation and range):
Age (years): 53.96±18.40 (6-86)
Weight (kg): 74.74±18.16 (23-140)
Height (cm): 169.92±11.65 (120-196)
Body mass index (kg/m2): 25.62±4.59 (15.97-40.51)
Duration of surgery (min) was 139.10±83.93 (40-480)
Temperature measured by SpotOn system agreed with esophageal temperature, producing a Bias (SpotOn-Esophageal) of 0.02ºC and 95% Interval of Agreement of: -0.42/+0.46. Lin's Concordance Correlation Coefficient of Absolute Agreement was 0.91.
Conclusion: This results support SpotOn® as a clinically reliable, non-invasive method of continuous core temperature monitoring in the perioperative period.
References: Eshraghi Y, Sessler DI. Anesthesiology 2012; A639

1AP20-6

Objective variable model predicts 30-day morbidity and American society of anesthesiologists physical status score

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Background and Goal of Study: Most current surgical risk prediction models are driven by input that requires physician assessment, contain too many variables, or contain esoteric variables. The American Society of Anesthesiologists (ASA) physical status score is often used as a sole predictor of risk, or incorporated into risk prediction models with additional variables, but has been shown to have high inter-rater variability. We aimed to find an objective predictor of ASA status, as well to develop a patient-driven risk prediction model utilizing data that is likely to be available to most patients, specifically age and list of medications.
Materials and Methods: Logistic regression models were created based only on the patient´s age and list of medications as covariates. Models aimed to predict: exact ASA score; ASA score greater than II; ASA score separated into three categories (I and II, III, IV and V); and morbidity within 30 days of surgery. Models predicting 30 day morbidity based on ASA score, as well as based on age and number of medications, were also created.
Results and Discussion: The model aiming to predict ASA score from age and medications predicted the same ASA score as the anesthesiologist 65% of the time with Cohen's kappa of 0.425, while predicting within three categories was accurate 77% of the time with Cohen's kappa of 0.476. Prediction of an ASA score greater than II resulted in a model with c-statistic of 0.820. A model predicting 30-day morbidity had a c-statistic of 0.802 and a Brier score of 0.058. Using only age and the total number of medications resulted in a model with c-statistic of 0.765 and Brier score of 0.058, compared to a c-statistic of 0.736 using ASA score alone.
Conclusion: Exact prediction of ASA score based on medications was moderate, but categorizing of ASA score resulted in overall better model performance. A model using only age and the number of medications for morbidity risk prediction performed as well as ASA score alone, but is objective and can be used without direct physician involvement. Utilization of solely age and list of medications as covariates resulted in a well calibrated and discriminative model for risk prediction of 30 day morbidity. These models may be used alone, or potentially be incorporated into preexisting formulae for development of objective and high performance models.
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1AP20-7

Lecithin decreased the hypnotic potency of intravenous anesthetics in ddY mice

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Background and Goal of Study: We previously reported that the administration of lipid emulsion antagonized the hypnotic activity of propofol and thiamylal. A lipid formulation contains lecithin as an emulsifier. In the current investigation, the effect of lecithin on the hypnotic potency of propofol and thiamylal solutions was evaluated using in vivo experiment.
Material and methods: Male adult ddY mice (35 - 45 g) were given propofol or thiamylal intravenously. Propofol solution (Diprivan) was diluted with physiological saline. Each injection volume was set at 10 ml/kg and 3.75 to 10 mg/kg of propofol and 5 to 15 mg/kg of thiamylal were administered. Lecithin (L-alfa-phosphatidylcholine from dried egg yolk) was diluted with ethanol (200 to 1600 mg/ml) and adjusted to 40 to 320-mg/kg simultaneous administration with anesthetics. Acquiring of hypnosis was defined as a loss of the righting reflex (LRR) and the time from LRR to recovery of reflex was defined as the anesthetic time. The 50% effective doses (ED_{50}) were calculated by probit analysis.
Results and Discussion: ED_{50} of Propofol and thiamylal was 5.79 (0.61) (mean and SE) and 8.82 (0.84) mg/kg, respectively. ED_{50} of anesthetics with ethanol were 4.86 (0.57) and 7.96 (0.86) mg/kg. Lecithin significantly increased ED_{50} of both anesthetics; however, the effect was apparent in thiamylal (Figure).

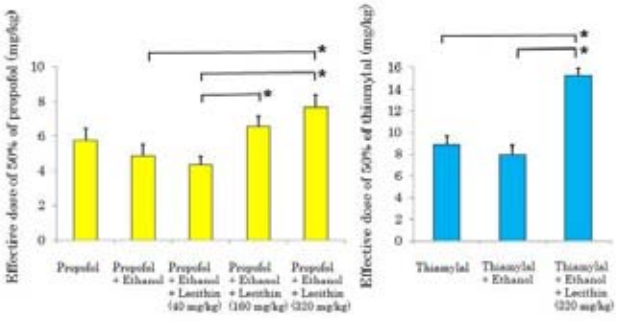

Figure. The effect of lecithin on the effective dose of 50% of propofol and thiamylal. The data were shown as a mean and SE. Ethanol was a solvent of lecithin, and 200-mg/kg ethanol was administered to each animal. * : $p < 0.05$ between groups.

[Figure]

The anesthetic time showed no significant difference among groups. The results of current investigation suggested that the additional mixing of lecithin decreased the hypnotic potency of intravenous anesthetics. Lecithin is an emulsifier and modifying the properties of micelles containing anesthetics. Lecithin is also one of the major components of the phospholipid portion of the cell membrane. Further study is required.
Conclusion: Not only lipid (soy bean oil) but also lecithin (emulsifier) might modify the hypnotic property of intravenous anesthetics by transforming of emulsified solutions.
References:
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1AP20-8

Lung aeration changes due to major abdominal surgery: a quantitative magnetic resonance imaging study

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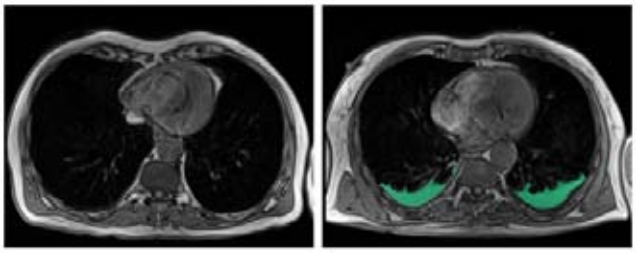
Background and Goal: Few studies investigated the morphology and incidence of postoperative atelectasis by computed tomography (CT), mainly due to ionizing radiation risks . The aims of the present study were:
1) to develop a new method for quantitative analysis of lung aeration in magnetic resonance imaging (MRI) scans, and
2) to study lung changes following major open abdominal surgery.
Materials and Methods: The study was performed in an *ex-vivo* model and in patients. An ex-vivo swine lung model [1] was used to define a threshold for non-aerated parenchyma, based on the relationship between gas content and lung MRI signal intensity. T_1-weighted volumetric interpolated breath-hold (VIBE) and T_2-weighted half-Fourier acquisition single-shot turbo spin-echo (HASTE) sequences were compared. Preoperative and postoperative MRI scans, acquired during a breath hold, in 45 patients (IRB approval #EK174052011; NCT01683578), were retrieved along with clinical data, including spirometry. MRI scans were analysed according to the findings of the ex-vivo study.
Results and Discussion: The data of *ex-vivo* experiments showed that:
1) VIBE sequences performed better than HASTE (AICc -159 vs. 299);
2) normalization of lung MRI to muscle signal reduced inter-subject variability compared to the raw lung signal analysis (AICc -159 vs. 257);
3) there was a strong correlation between increase in gas content and decrease in MRI signal (R=0.98);
4) the threshold for non-aeration for normalized MRI signal was 0.26.



[VIBE pre and post-operative scans]

Non-aeration, as % volume, increased from a pre-operative value of 0.3±0.3% to 3.4±2.9% (mean increase 3.1%, 95% C.I. [2.2 3.9], p< 0.001). A positive increase was observed in 44 patients (97.7%). The only clinical variable significatively associated with developement of post-operative atelectasis was pre-operative SpO_2 in room air (R=-0.44, p=0.003). No association was observed with sex, age, ASA class, ARISCAT score, BMI, type of surgery nor spirometry.
Conclusions: Lung MRI could be analyzed quantitatively to estimate lung aeration. Atelectasis was osbserved at various degrees in most of patients.
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1AP20-9

Major postoperative complications after total laryngectomy

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Background and Goal of Study: Patients after total laryngectomy are described as “neck breathers” and have some anatomical particularities. Postoperative period may have immediate (hemorrhage or loss of airway), short term (occlusion or tube misplace) and long term (stenosis) complications. Airway emergencies are rare but associated with significant morbidity and mortality. This study analyzed immediate and short term complications after total laryngectomy.
Materials and Methods: Retrospective observational study of patients undergoing total laryngectomy in an oncology institute between January 1st

and December 31st 2013. Information was obtained from clinical records. Descriptive and statistical analysis was performed using SPSS® program (Fishers´s Exact Test) with 95% confidence interval.
Results and Discussion: Sample included 74 patients. Most patients were males (96%) and ASA classification III or IV (65%). Before surgery, 28% of the patients had already a tracheostomy. In one case, it was difficult to intubate through the tracheostomy. There were postoperative severe complications: ostomy hemorrhage (five cases), ostomy occlusion (one case) and one case of death by occlusion. These complications occurred in patients with lower ASA classification, I or II (p=0.048). Previous tracheostomy did not predict adverse events. Median discharge to the infirmary was 2 days and from the hospital 19 days.
Conclusions: Despite reduced number of complications (9,5%), their severity cannot be underestimated. The application of a management protocol in post-laryngectomy emergencies can standardize procedures and may minimize consequences. Following this study, we implemented a protocol of airway emergencies in tracheostomy and laryngectomy.

1AP20-10
Impact of an anaesthetic protocol in bariatric surgery

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Background and Goal of Study: Obesity's prevalence is growing all over the world. It has been recognized as a predictor for perioperative morbidity. The aim of this study was to determine the impact of an anaesthetic protocol in the incidence of post-operative complications after bariatric laparoscopic surgery (BLS).
Materials and Methods: After approval by local Ethics Committee a retrospective study was conducted. Sixty patients undergoing BLS were included in the study: 28 followed an anaesthetic protocol instituted in our Department (AP) and 32 patients in whom anaesthetic management was left to the discretion of the anaesthesiologist (DA). Anaesthetic protocol consisted in induction with propofol, maintenance with desflurane, remifentanil and rocuronium and sugamadex for neuromuscular blockade reversion. Demographic and clinical data was collected from medical records. The following perioperative clinical data was collected: adverse respiratory events (ARE) such as polypnea, bradypnea or hypoxia; adverse cardiac events (ACE); pain; Richmond agitation and sedation scale (RASS) scores and post-operative nausea and vomiting (PONV). Data were tested for normal distribution, based on the Kolmogorov-Smirnov test. ANOVA, non-parametric tests or Chi-square test, were applied.
Results and Discussion: Both groups were similar in demographic variables, ASA physical status classification, co-morbidities, and type of laparoscopic procedure. AP patients presented lower emergence time (6 vs. 9 min, p< 0.001). Duration of anaesthesia was similar in both groups (153±34 vs. 166±50, p= 0.27). ARE were less frequent in AP patients (52% vs. 77%, p=0.041). These patients had lower pain scores at PACU discharge (0 vs. 2, p=0.025). DA patients had higher incidence of hypoactive emergence (defined as RASS score ≤-2) (39% vs. 7%, p=0.009) and presented more frequently arterial hypertension (54% vs. 21%, p=0.015). The incidence of PONV was similar in both groups. There were no differences in length of both hospital and PACU stay.
Conclusion(s): The establishment of an anaesthetic protocol for obese patients undergoing bariatric surgery was associated with less ARE, less hypoactive emergence and a better post-operative pain control.

1AP20-11
Incidence of residual neuromuscular block (RNMB) in the postanesthesia care unit. Observational cross-sectional study of a multicenter cohort. Part 1

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Background and Goal of Study: RNMB after general anesthesia with non-depolarizing neuromuscular agents (NMBA) remains a problem. In Spain the incidence of RNMB is unknonwn.
Hypothesis: A significant number of patients under general anesthesia using NMBA sustain RNMB in the PACU. AEMPS CEO-BNM-2014-01, ClinicalTrials.gov: NCT02226809
Materials and Methods: Prospective cross-sectional, multicenter study of a cohort of patients receiving NMBA. Individual Ethics Committee approval obtained. Primary objective: incidence of RNMB (TOFr< 0.9 upon PACU patients arrival). Secondary objectives: RNMB relationship with patients characteristics, and pre and intraoperative factors.
Results and Discussion: 763 patients from 26 hospitals. 190 patients (26.7%) showed RNMB, 26 patients (3.6%) showed TOFr< 0.7. Reversal performed in 442 out of 711 patients (62%), 2/3 with sugammadex.
Female patients showed RNMB (29.8% vs 22.4 p=0,027). Laparoscopic surgery patients received higher doses of NMBA, but without differences regarding PACU TOFr, reversal drugs and doses used. Other patient´s characteristics and type of surgical procedure showed no relationship with RNMB.
Intraoperative and drug-related factors like surgery lenght, type of NMBA used (cisatracurium 34%, atracurium 52%, rocuronium 24%), rocuronium converted doses -lower range-, type of anesthesia -halogenated based-, absence of intraoperative monitoring (30.4% vs. 43.2%, p=0.003), no NMBA reversal (48.9% vs. 66.7 p=0.00002), and neostigmine use (30.3% vs. sugammadex 15.8% p=0.0006), were significantly related with RNMB. Other intraoperative factors did´nt influence RNMB.
We observed that patients receiving lower doses of NMBA calculated by body weigth showed more RNMB, but not when corrected by time. Reversal was used in around 60%, mainly with sugammadex. No reversal is a know cause of RNMB and morbimortality. We observed increased RNMB in non-reversed patients, and in neostigmine reversal when compared with sugammadex.
Conclusion(s): The incidence of RNMB in Spain is similar to that published in other settings and countries. In addition to known factors influencing RNMB (female gender, longer duration of surgery, and halogenated drugs), some NMBA specific items should be taken into account (benzylisoquinoline drugs, and -importantly- absence of reversal).
This is the first study demonstrating -with the design limitations- that sugammadex offered advantages over neostigmine.

1AP20-12
The use of 2-D ultrasound in placing central venues catheters

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Background: In 2002 the Agency for Healthcare Research and Quality published guidelines that recommend the use of 2D ultrasound guidance for placing central venous catheters (CVC's) to enhance patient safety. In 2004 a survey was held in England among anaesthesiologists to understand to what point doctors were aware of these international guidelines and considerations for their use of placing CVC´s.
This study explores the acceptance of the guideline in The Netherlands compared to the results of the English study in 2004. For this, a survey was conducted among anaesthetists, intensivists and residents anaesthesiology in the Netherlands.
Methodology: All members of the Dutch Society of Anaesthesiology (NVA) were invited to participate through email. There were 241 respondents (66% anaesthetist, 24% resident and 10% intensivist). Results were compared to the outcomes of the NICE survey in 2004.
Results: 146 (62%) never read the guidelines, 70 (40%) of the respondents were not aware of its existence. 87 (38)% disagreed with or was neutral to the recommendation that 2-D imaging ultrasound is the preferred method for insertion of CVC into the internal jugular vein, compared to 102 (61%) in 2004. 75 (33%) answered neutral or disagree to the statement that 2-D ultrasound imaging should be considered in most clinical circumstances, compared to 89 (53%) in 2004
When comparing the level of training provided for medical staff on local 2-D ultrasound guided CVC insertion, in 2004 respondents answered that 113 (67%) received non or poor training and 2013 still 123 (60%) of the respondents received non or poor training.
Conclusion: The acceptance of the guidelines for CVC insertion has grown compared to 2004. The degree of training however still remains poor or non-existing. This data suggest that the level of training offered should be adapted so that guidelines can be adhered to.

Ambulatory Anaesthesiology

2AP1-1

Evaluation of the analgesic role of higher doses of fentanyl in day case laparoscopic cholecystectomy: can it have an oxycodone sparing effect?

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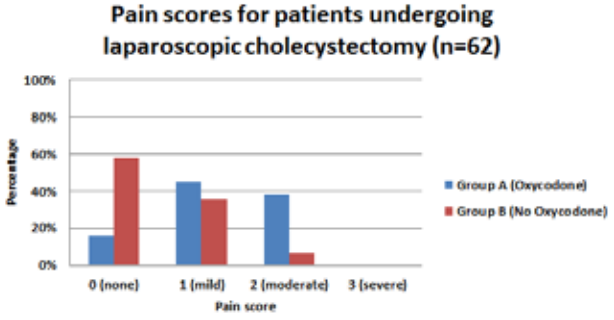
Background and Goal of Study: Laparoscopic cholecystectomy is one of the most common day surgery operations performed with a relatively high patient throughput. It is important to provide high-quality post-operative analgesia not only to avoid prolonged hospital stay and re-admission, but to also ensure patient satisfaction and minimise nausea, vomiting and reduced mobility. We aim to evaluate the use of higher doses of fentanyl as an alternative to the longer acting Oxycodone and assess its' influence on pain scores and post-operative nausea and vomiting (PONV).
Methodology: We conducted a retrospective observational study. We selected 62 ASA 1-2 patients who underwent laparoscopic cholecystectomies over one month and divided them into two equal groups (n=31). Group A had fentanyl (100 mcg) plus Oxycodone (5mg) and Group B had fentanyl (200 mcg) only administered intra-operatively. The patients' mean age was 46.7 years (range 21-69), their operative duration was 25 to 40 minutes and only those with a BMI less than 35 kg/m^2 were included. They all received intra-operative i.v Paracetamol 1g, Droperidol 1.25mg, Ondansetron 4mg and local infiltration (20 ml of 0.5% L-Bupivacaine). We compared pain scores and PONV between the two groups after 1 hour in the post anaesthetic care unit.
Results and Discussion: None of our patients had severe pain, but the majority of Group A had mild to moderate pain scores (about 84%) whereas almost 60% of Group B patients were pain free (Figure.1). Group A also showed a higher occurrence of PONV compared to Group B (7 and 3 patients respectively).In-patient admission figures were 4 patients for Group A and one for group B.
Conclusion: Our practice showed that administering higher doses of fentanyl led to relatively better pain scores and less PONV when compared to Oxycodone. Larger scale randomised experimental studies on such patients might prove this benefit and improve the quality and cost effectiveness of day surgery.
Reference: Contin Educ Anaesth Crit Care Pain (2014) 14 (6): 256-261



[Figure 1]

2AP1-2

A new protocol for ophthalmic surgeries outside hospital settings: a Brazilian case series study

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Background and Goal of Study: According to current guidelines, patients without active cardiac conditions who are unable to reach 4 metabolic equivalents (MET) are approved for low risk surgeries without further investigation.
Materials and Methods: From January 2009 to August 2013, 2046 patients have undergone Ophthalmic surgeries at our facility. All the surgeries were performed under sedation and local or topic anesthesia. For all these patients, we considered the metabolic equivalent as a decisive parameter to follow the next step: patients who were able to walk 400 m were cleared for surgery in our facility. The patients who did not reach 4 METs were classified according to the presence of five possible clinical risk factors: ischemic heart disease, compensated or prior heart failure, cerebrovascular disease, diabetes and renal insufficiency. Patients with three or more risk factors were obliged to have their surgeries in a satellite hospital. Patients with only one risk factor had their surgeries at our facility; if there were two risk factors, surgery was performed based on the anesthesiologists´ decision. Complications were registered in patient's charts, from the admission to the discharge.
Results and Discussion: There were 22 adverse medical events (1.08%). Two patients developed symptomatic bradycardia in the PACU (0.098%), one developed apnea following the periconal block (0.05%), and 19 developed intraoperative hypertension (0.93%). Of the minor occurrences, twenty-one developed nausea and vomiting (1.03%) and seventeen described post-operative pain (0.83%). In the five-year-period, twenty-seven patients were not cleared to operate in our facility, following the clinical criteria stated above.
Conclusion(s): Our data showed lower complication rates than the current literature, probably because we transferred sicker patients to a satellite hospital. The protocol has shown that this step further may improve safety for ophthalmic surgeries performed in small facilities with limited resources to deal with rare but serious complications that may arise.
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2AP1-3

Anesthesia for cataract surgery: when not all that seems simple is

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Background: Cataract surgery is, most of the times, an outpatient procedure. Patients are elderly with pre-existing illnesses. Routine pre-operative medical investigation is not mandatory as studies show that it does not measurably increase the safety of the surgery. Anesthetic management depends on patient, surgeon, globe and orbit features. Topic anesthesia is preferable as it is usually associated with lower morbidity and faster discharge. Intravenous osmotic agents, such as hypertonic mannitol, are used to reduce intraocular pressure to keep vitreous in its "physiologic position". We report a case of pulmonary edema after mannitol admnistration.
Case report: A 70 year old woman, 63Kgs, diabetic and dyslipidemic, who was admitted to cataract surgery. ASA standard monitorization was ensued and intravenous cannulation was performed. Prior to surgery, 125g of mannitol was perfused by ophthalmologist indication and anxiolysis was performed with 1mg midazolam by the anesthetist. 30 minutes after mannitol perfusion, at the end of the surgical procedure, the patient showed clinical and laboratory signs of respiratory failure. Treatment was instituted with morphine, oxygen, furosemide, hydrocortisone and inhaled bronchodilators. Chest radiography confirmed bilateral pulmonary congestion. Acute pulmonary edema diagnose was assumed. Global respiratory recovery was achieved within 2 hours and the patient returned home on the next day.
Discussion: Osmotic agents in ophthalmologic surgery have been used since 1904. The recommended dose of mannitol is 1,5-2g/Kg infusion over 30-60minutes, to reduce intraocular pressure. There are several adverse effects associated with its use and pulmonary edema is one of them, especially in patients with cardiac insufficiency. Cataract surgery is usually an ambulatory procedure, with low surgical risk but, despite the simplicity of anesthetic technique, perioperative complications may arise as patients frequently have coexisting diseases.
References: Reif ME, et al. Effects of mannitol and dextran on interstitial pulmonary edema J Surg Res. 1972 Apr;12(4):234-9.
Learning Points: Presence of an anesthesiologist is essential to perform an appropriated pre anesthetic clinical evaluation, diagnose and optimize medical condition, support vital functions, administrate anesthetic drugs and other medications, in order to improve anesthetic conduction and complete the procedure safely, reducing the morbidity and increasing the quality of care.

2AP1-4

Claims in ambulatory surgery: a study based on French insurance (SHAM) data

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Background and Goal of Study: Claims specifically associated with the practice of ambulatory surgery is still not well studied whereas the anesthetist is at the core of the organization and the realization of this type of surgery. The knowledge of the risk associated with this kind of medical practice should help professionals deal with these legal aspects [1]. SHAM insurances are the biggest French provider of medical liability insurances (50 % of the market), insuring 80 % of public and 27% of private hospitals. The study of the insurance claims provided by this insurer is therefore a relevant source of data on the complications related to ambulatory surgery.
Materials and Methods: The aim of this study was to compare the claim rate related to ambulatory surgery with surgery in general.
We did a retrospective study on insurance claims provided by SHAM insurances over a five years period (2007-2011) enabling the comparison of the claim rate related to ambulatory surgery with surgery in general.
Results and Discussion: On the study period, out of a total of 29565 registered claims, 467 (1.6%) originated from ambulatory surgery and 16716 from non ambulatory surgery.
December 31, 2013, 312 cases have been closed of which 107 without indemnification , 71 with amiable compensation, 111 have been settled by a Regional Commissions for Conciliation and compensation for medical accidents and 23 have been settled by a court. The average amount of compensation per claim was €18,265 for ambulatory surgery and was €31,000 for all types of surgery. The main causes are summarized in the table 1. The anaesthesia is involved only in 4 cases : urinary retention (medical hazard), nerve damage (wrong position during surgery), pneumothorax occurring at extubation (by defect of the valve ballon) and blindness after cataract with peribulbar anaesthesia (technical fault). The medical specialties concerned are primarily the ophthalmology (n=221), the orthopedic surgery (n=102) and the visceral surgery (n=71).
Conclusion(s): The claim rate in ambulatory surgery is proportionally less frequent with compensations three times less and were related to the most frequent type of surgery done in ambulatory settings. These data should help strengthen quality approach in ambulatory surgery.
References:
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2AP1-5

Disable patients undergoing oral ambulatory surgery: anaesthesia and recovery complications

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Background and Goal of Study: Disabled patients submitted to oral interventions frequently need general anaesthesia[1]. Complications during the recovery can cause distress in these patients and delay of discharge[1]. The aim of this study was to evaluate the incidence of recovery complications regarding different types of anaesthesia in disabled patients undergoing oral ambulatory surgery.
Materials and Methods: A retrospective study was approved by the ethical committee of our hospital. Disabled patients requiring general anaesthesia for oral surgery, in ambulatory setting, between January 2009 and June 2014 were eligible for this study. Patients characteristics (age, gender), diagnose of Epilepsy, ASA physical state, anaesthesia type and time, PONV prophylaxis, postoperative complications and end tidal of sevoflurane were registered. The strength of association was expressed as odds ratio with a confidence interval of 95%. Each patient characteristic was assessed by univariate analysis when used as the single explanatory variable. Variables that showed significance at $p < 0.20$ in univariate analysis were included in multivariate analysis. All statistics analyses were calculated with the software Statistical Package for the Social Sciences version 20.0. The significance level was set at 0.05.
Results and Discussion: From 170 patients reviewed, 27 were excluded due to incomplete medical records. Among the 143 disabled patients included in this study, 32.7% had also epilepsy, the average age was 28.3 years and 52.7% were female. Most of them were ASA II (56.7%) and the remaining ASA III. Prophylaxis of PONV was performed in 38.2%. A low incidence of recovery complications (11.9%) were registered (PONV (4.9%), pain (2.8%), bleeding (1.4%), agitation (1.4%), desaturation (0.7%) and laryngospasm (0.7%)). All patients were discharged, so no case of internment was registered. No significant associations were found between recovery complications and patient's characteristics, time and type of anaesthesia or PONV prophylaxis. None variable showed significance at 0.2 level when used as the single explanatory variable.
Conclusion(s): In our study, no association was found between recovery complications and type of anaesthesia in disability patients. Prospective studies are needed to understand if these patients have a lower incidence of PONV than others.
References: 1. Special features of general anesthesia in stomatology for disabled people. Med Pregl. 2010; 63(7-8):535-40

2AP1-6

Does prehospital preanaesthetic consultation lead to the optimisation of the perioperative patient care?

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Background and Goal of Study: The primary goal of pre-anaesthetic assessment is to obtain the information required to plan anaesthetic management. The aim of study was to compare the information provided by primary care general practitioners (GPs) and data obtained by anaesthetists, identifying the increased surgical risk aside the risk associated with the underlying surgical pathology. The end point of study was to detect the agreement of GPs-reported chronic conditions and data detected during consultation.
Materials and Methods: According to the policies of the Dpt. of Anaesthesiology of P. Stradins clinical university hospital pre-anaesthetic assessment of surgical patients takes place in an outpatient clinic before elective surgery. 450 patients undergoing urological, gynaecological, ear-throat, endocrinological, mastectomy surgery were investigated using standardized list of questions and analysing clinical and laboratory data. Multimorbidity was defined as the coexistence of at least three chronic conditions. The agreement was classified as good or fair.
Results and Discussion: The mean age of 100 selected patients was 72.5 ±10 yrs. 55% were female, 45%-male. Among patients 40% were with urological tumours; 15%-with gl.mammae tumours; 15%-with gynaecological tumours; 10%-with thyroid and parathyroid tumours; 20%-with ENT pathology. In 57% GPs informed about only main surgical disease. In 40% >6 chronic conditions were detected. Fair agreement were for disorders of cerebral circulation, sleep disorders, panic episodes, depression; musculoskeletal pathology, neuropathies; varicose vein, psoriasis, prostate hyperplasia, renal dysfunction. In 67% of cases additional investigations were needed. Good agreement were for diseases, that can be easily measured by laboratory values and functional investigation: diabetes mellitus, lipid metabolism disorders, thyroid, parathyroid dysfunction; cardiovascular disorders: arterial hypertension; ischemic heart disease, arrhythmia; respiratory disorders: bronchial asthma or asthmatic bronchitis.
Conclusions:
1. Chronic diseases and multimorbidity have a high disagreement between patient and primary care general practitioners reports.
2. Anaesthetists should pay special attention to chronic conditions among aged patients, because inaccurate and incomplete data increases the surgery and anaesthesia risk.
3. Essential training of GPs regarding anaesthesia administration is needed.

2AP1-7

Does the order of manipulations affect anesthesiological complications during combined endoscopy?

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Background and Goal of Study: Performing both oesophagoduodenoscopy (OGD) and colonoscopy (CS) or so called combined endoscopy (CE) under total anesthesia become a common thing in ambulatory anesthesiology. CE under total anesthesia eliminates recrudescent impact of anesthetics on pa-

tient, significantly saves costs and allows for perfectly manipulation. However, providing OGD and CS simultaneously under total anesthesia increases its duration and, consequently, the risk of anesthesiological complications. As usual CE begins from OGD. In a retrospective study, we tried to find out how did the order of procedures impact at the quantity and variety of anesthesiological complications.
Materials and Methods: During the period of 45 months (January 2011 - September 2014) 265 diagnostic CE was held. There were patients with ASA 1-3 aged 6 to 85 years, 93 male, 172 female, divided into 2 groups. 1 group - 68 women, 34 men, ASA 1-3, diagnostic CE started from OGD. 2 group - 104 women, 59 men, CE started from CS. Anesthesia was carried out using conventional dosages of propofol and fentanyl. Complications include hypoventilation, bronchospasm, and regurgitation. Results of the study are shown below in table 1. Comparison the frequency of complications was performed using two-sided Fisher's exact criteria.

Combined endoscopy	Start with OGD (n=102)	Start with CS (n=163)	all	Fisher´s exact test
hypoventilation	12 (11,8%)	16 (9,8%)	28	p>0,1
bronchospasm	8 (7,8%)	2 (1,2%)	10	p=0,015
regurgitation	4 (3,9%)	0	4	p=0,021
total complications	24 (23,5%)	18 (11,0%)	42	p=0,92

[Table 1]

Results and Discussion: There were two times more complications when starting CE from OGD, than starting from CS, due to more frequent occurrence of bronchospasm and regurgitation. The kind of complications is associated with the specifics and technical aspects of OGD and CS (e.g. washing stomach, disclosure of hiatus during OGD, blowing bowel during CS, etc.) that affect the likelihood and frequency of these anesthesiological complications.
Conclusion(s): It seems safer to start combined endoscopy from colonoscopy when using total anesthesia.

2AP1-8

Does type of anaesthesia influence recovery time of disabled patients undergoing oral ambulatory surgery?

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Background and Goal of the Study: Disabled patients are unable to tolerate oral procedures without sedation or general anaesthesia (GA). Aim of this study: evaluate the effect of different types of anaesthesia in recovery time of disabled patients undergoing oral ambulatory surgery.
Materials and Methods: After approval by the ethic committee, a retrospective study was conducted and included disabled patients that required GA for oral ambulatory surgery (between January 2009 and June 2014). Patients' characteristics, type and duration of anaesthesia, sevoflurane end tidal (ETSev), nausea and vomiting prophylaxis (NVP), recovery time and postoperative complications were recorded. The association of patients' characteristics with recovery time was assessed by univariate and multivariate General Linear Models. Variables with $p<0.20$ in univariate analysis were included in multivariate analysis. Results were expressed as values of standardized coefficient and its respective confidence interval of 95%. Statistical Package for the Social Sciences version 20.0 was used. The significance level was set at 0.05.
Results and Discussion: We reviewed 170 patients, 20 were excluded due to incomplete medical records.

Gender	Male	71 (47.3%)
	Female	79 (52.7%)
Age	Mean (years)	28.3 (15.5%)
ASA physical status	II	80 (56.7%)
	III	61 (43.3%)
Disability	Intellectual	99 (67.3%)
	Intellectual+Epilepsy	48 (32.7%)

[Patients' Characteristics]

Regarding the type of anaesthesia:37.3% did surgery with GA with neuromuscular block, 34.5% GA without neuromuscular block, 21.8% GA combined with local infiltration and 6.3% sedation. Anaesthesia last more than 90 minutes in 30.7% patients, between 66 and 90 minutes for 31.7% and less than 65 minutes in 31.3%. 38.2%patients had NVP. Mean recovery time was 93.7 minutes. In univariate analysis, NVP was significantly associated with recovery time. Anaesthesia type, complications and ETsev showed a p value less 0.2 and were included in the multivariate model. The association with prophylaxis did not remain significant. GA without neuromuscular block was associated with higher recovery time compared with the other types of anaesthesia.
Conclusion: GA without neuromuscular block in this population was associated with higher recovery time. Prospective studies may be needed to explain this association.

2AP1-10

Evaluation of day of surgery (DOS) cancellations at a Local Health Board (LHB) in the UK

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Background: Operating theatres are one of the most expensive fixed assets of a LHB. An empty theatre is estimated to cost £15/min. In the UK for every 100 hours of scheduled theatre activity 9 hours aren't used [1]. Cancellations are one of the main reasons: 6.9% of patients in Wales are cancelled on the DOS or within 24 hours of surgery [2]. A significant proportion could be prevented by an effective pre-assessment service. Currently, in our LHB, the majority of pre-assessment clinics (PAC) are nurse led.
Goal: To evaluate the number (and reasons) of DOS cancellations. We hope to highlight issues that could be remedied by a more robust pre-assessment process, potentially reducing DOS cancellations, financial wastage and improve theatre efficiency whilst enhancing the quality of patient care and experience.
Methods: We conducted an eight week, prospective audit on DOS cancellations due to pre-assessment failure in elective patients. An audit form was developed and placed in every anaesthetic room in the LHB. The lead anaesthetist completed it for every cancellation due to anaesthetic/medical reason. Our online theatre tracker ORMIS was used to cross-reference data to ensure completeness. Missing data was collected by requesting patient notes.
Results: 2382 total operations were conducted during the 2 month period that fulfilled our selection criteria. 7.8% of all cancellations were felt to be due to a failure of pre-assessment. Major issues identified included investigations not being requested and/or followed up, advice and guidelines not being adhered to, deterioration in co-morbidities and clear instructions regarding stopping regular medications not given/followed. Two patients were missed by the pre-assessment process altogether and cancelled
Conclusion: DOS cancellations secondary to pre-assessment failure in our LHB contributes significantly to overall cancellations. This is both expensive and avoidable. Regular updates of guidelines for PAC nurses have been implemented and more robust protocols created. Pre-assessment booklets are being revised. A database will be created for easier tracking of patients and their investigations. We wish to centralise the PAC service, making every clinic consultant led and potentially introduce CPEX testing
References:
1. Operating Theatre Efficiency Improvements using Operations Management Science Fordyce. A 2007
2. Review of National Guidelines: Operating Theatres, http://archive.audit-commission.gov.uk

2AP1-11

Evaluation of dissatisfaction and quality of pre-anesthesic clinic for patients undergoing scheduled outpatient procedure

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Background and Goal of Study: Showing a consistently high level of satisfaction, satisfaction surveys do not identify dysfunctions that may exist in our daily practice. As in marketing, dissatisfaction surveys could help highlight these problems.
The aim of the study was to assess dissatisfaction in patients at the pre-anesthesic clinic (PAC).
Materials and Methods: The survey was conducted at the PAC over a period of 3 months in the outpatient surgery unit of the University Hospital of Poitiers using an anonymous questionnaire given to the patient by nurses. The questionnaire consisted in 17 items assessing level of dissatisfaction with a 4-point scale.

Patients were considered to be dissatisfied if they “strongly agree” or “agree”, moderately dissatisfied if they “somewhat agreed” and satisfied if they “did not agree” with the proposed item.
Results are presented as mean and standard deviation for quantitative variables and number and percentage for categorical variables.
Results and Discussion: A total of 152 questionnaires were collected. The items for which patients were most dissatisfied were in decreasing importance:
lack of information on surgical techniques (15.8%),
lack of involvement in the choice of the anesthetic technique (15.1 %),
waiting time for PAC (12.5%), and;
short duration of PAC (12.5%) (Table 1).

	D* n (%)	MD* n (%)	S* n (%)
Just before the pre-anesthesic clinic			
The staff (reception, secretaries) was not pleasant	3 (2)	2 (1.3)	145 (95.4)
The waiting room was not comfortable	**6 (4)**	**11 (7.2)**	**132 (86.8)**
During the pre-anesthesic clinic			
The anesthesiologist did not introduce himself	8 (5.3)	1 (0.7)	143 (94)
The anesthesiologist was not pleasant	2 (1.3)	0 (0)	150 (98.7)
I was not satisfied by the delay of the consultations	**9 (5.9)**	**10 (6.6)**	**133 (87.5)**
I did not have enough information on the anesthesia techniques	3 (2)	12 (7.9)	135 (88.8)
I did not have enough information on the benefits and risks of anesthesia	6 (3.9)	10 (6.6)	135 (88.8)
I did not have enough information on the surgery techniques	**7 (4.6)**	**17 (11.2)**	**127 (83.5)**
The instructions on the ambulatory which we gave me in the end of the anesthesia consultation were not rather clear (preoperative fasting, discharge criteria from ambulatory unit)	6 (3.9)	8 (5.3)	138 (90.8)
The modifications of my medication realized by the anesthesiologist were not rather clear	2 (1.3)	5 (3.3)	138 (90.8)
The information and the instructions concerning the anesthesia was not handed to me in writing	8 (5.3)	4 (2.6)	139 (91.4)
I did not have time to speak or to ask questions	2 (1.3)	6 (3.9)	143 (94.1)
I was not involved in the choice of the anesthetic technique (general or locoregional anesthesia)	**11 (7.2)**	**12 (7.9)**	**125 (82.3)**
I did not trust in the anesthesiologist experience	2 (1.3)	4 (2.6)	145 (95.4)
After the pre-anesthesic clinic			
I was not reassured, even not worried	4 (2.6)	4 (2.6)	144 (94.8)
I thought that the duration of the consultation was too short	**8 (5.3)**	**11 (7.2)**	**133 (87.5)**
I did not find that the consultation was useful	2 (1.3)	10 (6.6)	139 (91.4)

* **D** : dissatisfied, **MD** : moderately dissatisfied, **S** : satisfied

[Table 1. Results of the questionnaires of dissatisfaction (n=152)]

Conclusion: Considering these reasons of dissatisfaction could help improving the perception of PAC by patients. This approach may be involved in a broader commitment to improve practices and better collaboration between the anesthesiologist and the patient. The PAC would best meet their expectations.

2AP2-1

Feasibility of anterior cruciate ligament reconstruction in ambulatory conditions: the experience of a French orthopedic center

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Background: Ambulatory Surgery of Anterior Cruciate Ligament (ACL) Reconstruction has only recently become mainstream in France *(1)*. In 2013, over 42000 ACL reconstruction procedures were performed in France, but only 2.8% of these were ambulatory *(2)*.
We decided to increase this rate in our hospital (around 1100 procedures a year) and developed therefore an *ACL-Outpatient Program* for fast rehabilitation.
Materials and Methods: The preparatory work for the ACL-Outpatient Program included multiple meetings between the medical and non-medical staff of our hospital in order to start in June 2014. All patients received a specific information booklet custom-made for the program. The anesthesiologists agreed on common anesthesic procedures (short-acting premedication with sublingual midazolam, general anesthesia, systematic prevention of postoperative nausea and vomiting, with IV dexamethason, no femoral nerve blockade). The surgeons involved all administered a local intra-articular anesthesia to the knee and to the area around the harvested ACL graft, using 0.75% ropivacain (20 to 30 mL). Patients received multimodal analgesia with paracetamol, codeine, nefopam, ketoprofen and with tramadol for breakthrough pain relief. All had intensive local cryotherapy, starting from the recovery room til the end of their stay, and were mobilised by a physiotherapist in their room. Patients were discharged on the same day of surgery with multimodal oral pain killers.
Our primary outcome for this audit was our outpatient rate, our secondary outcomes were the results of the phone survey the day following the surgery.
Results: Before the ACL-Outpatient Program, 2.6% of our patients (1115 in 2013) were discharged on the same day of surgery. In September 2014, 57% of our patients achieved this target.
From June to September 2014, 233 ACL ambulatory patients were called. 182*(78%)* answered : the average of the pain scores (using VAS scale) was 2,9 (0-10), 47 patients *(26%)* experienced pain during the night after surgery, 61*(34%)* took tramadol and 18*(10%)* patients experienced nausea and vomiting. 5.7% of the patients were unable to leave the hospital, for medical or personal reasons.
Conclusion(s): Those results show the feasability of ACL Reconstruction Surgery in ambulatory conditions. This requires significant multidisciplinary organisation and the planning and execution of pain management.
References:
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2. DIM - Base ATIH MCO France 2013

2AP2-2

Gastro-laryngeal tube usage in ERCP sedo-analgesia cases

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Background and Goal of Study: We aimed to analyze the effects of Gastrolaryngeal tube (GLT) use on intraoperative and postoperative hemodynamic parameters, comfort of the procedure, and patient satisfaction in endoscopic retrograde cholangiopancreatography (ERCP).
Materials and Methods: A total of 40 patients who were scheduled for elective ERCP, between the ages of 20- 75 years were enrolled in the study. ASA classification of patients was class 1 or 2. Patients were randomized into two groups; first group underwent routine sedation procedure without any airway instruments while airway management was done with GLT in second group (Group 2). Intraoperative and postoperative vital signs as well as satisfaction of patients were recorded.
Results and Discussion: In group 1 the duration of the esophageal visualization was found significantly higher (16 sc) rather than group 2 (7 sc) respectively ($p< 0.05$). Aldrete recovery score ≥ 9 was 7 minutes in group 2 while it was 16 minutes in group 1 ($p< 0.05$). Mean VAS was significantly higher in group 2 (1.85) rather than group 1 (0.45) ($p=0.016$). In terms of the endoscopists and patients satisfaction; Group 2 was having higher satisfaction scores rather than group 1 respectively (p:0.008, p:0.001). There was a significant difference in changes of intraoperative SpO2 values ($p< 0.05$). In group 2, change in the saturation was 3 points in average during the first 10 minutes while it was 13 in group 1.
ERCP procedure comfort may be increased for both endoscopist and patients with the aid of anesthesia. However Airway control without intubation in ERCP procedure is difficult due to the risk of aspiration especially in prone position. To reduce the risk of aspiration and increase the procedure comfort, GLT application has gained popularity in recent years.[1]
In our study, oxygenation levels in group 1 had predominant drops during intraoperative follow-ups while group 2 had a more stable oxygenation pattern. GLT application had increased the success of airway control, enabled intraoperative stabilization of oxygenation and increased endoscopist and patient satisfaction considerably.
Conclusion(s): GLT is safety, comfortable and effective technique that avoids the occurrence of unwanted complications such as aspiration in ERCP procedure.
References: 1. Gaitini LA et all. Gastro-Laryngeal Tube for endoscopic retrograde cholangiopancreatography: a preliminary report. Anaesthesia. 2010 Nov;65(11):1114-8

2AP2-3

How many outpatients remember the anesthesiologist?

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Background and Goal of Study: Frequently outpatients remember their surgeon but fail to remember who their anesthesiologist was and his key role in perioperative care. Using an opinion survey, our goal in this study was to analyze the current perception of outpatients (ASA I and II) about the anesthesiologist-patient relationship during the immediate postoperative period.
Materials and Methods: The trial design was descriptive, cross-sectional, including patients who came for ambulatory surgery at the Private Hospital Medstar 2000 Constanta, from May 2014 to November 2014. An opinion survey during the immediate postoperative period was used to collect the data. Inclusion criteria: adults ≥18 years of age undergoing ambulatory surgery (ASA I and II) with Aldrete recovery score of 10 prior to discharge and who had signed their informed consent to participate the trial.Exclusion criteria: patients with a history of psychiatric or psychological conditions; patients who required hospitalization following surgeryThe information collected was uploaded to an EXCEL database (Microsoft Office® 2010) and exported to the statistical package IBM® SPSS Statistics version 19.0 for processing and analysis.
Results and Discussion: A total of 124 surveys were completed in the course of seven months by patients in their 20s to 70s.(56% males.) When we asked the patients whether they would recognize the individual that administered their anesthesia, 74.2% said yes and 51.6% remembered their name. About 25.8% of the patients did not know who their anesthesiologist was and only 66.12% of the people acknowledged their anesthesiologist as a specialized physician. 33.8% of the patients were unaware of the professional training required to become an anesthesiologist. 59.6% of the patients said they experienced some fear before the anesthesia.
The main fears experienced were not being able to wake up after surgery (14.4%), feeling pain (11.2%) and experiencing nausea and/or vomiting (10.1%).
Conclusion(s): Some strategies are required to change the perception about our specialty. The anesthesiologist-patient relationship should not be limited to a preoperative evaluation for the surgical procedure, but should be more comprehensive. There is a need to establish closer links with the community to create awareness about the role of the anesthesiologist and his/her outstanding contribution to the patient's care and safety.

2AP2-4

Hysteroscopic surgery: is a drowsy patient a scary situation?

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Background: Hysteroscopy is an established diagnostic and therapeutic procedure. Although hysteroscopic techniques require less operating time, they are not devoid of complications, especially when combined with endometrial resection or ablation. Fluid overload, water intoxication, electrolyte disturbances and systemic toxicity can occur after absorption of large amounts of a hypotonic irrigating solution. This syndrome is well recognized during transurethral prostatic resection procedures, but can also occur during hysteroscopic surgery[1].
Case report: Female, 55 years old, ASA II, treated for fibromyalgia and depression, was submitted to endoscopic resection of endometrial polyp in ambulatory surgery. General anesthesia was performed. Surgery lasted for 1 hour with difficult cannulation of the cervical os, with pure water used as irrigating solution. At the end of the procedure, rectal prolapse and abdominal distension were observed. The patient remained drowsy after the procedure. Her serum sodium concentration was 122 mmol/L. Fluid overload (water intoxication) was suspected. Treatment was began with sodium reposition and diuretic. Abdominal ultrasound showed extensive peritoneal effusion, with echogenic debris e dependent position. She remained stable, so an observant attitude was taken. Laboratory results returned to normal the next day and the patient was discharged.
Discussion: The irrigation fluid can be absorbed through the open vessels or through the patent's fallopian tubes into the peritoneal cavity producing a syndrome similar to the transurethral resection syndrome of the prostate (TURP). The incidence of fluid overload in hysteroscopic endometrial ablation procedures is 1%-5%. Large amounts of irrigation fluid (2 L or more) must be absorbed before symptoms or signs appear [1].
References: 1. Rev Bras Anestesiol, 2004; 54: 6: 832 - 835
Learning points: Anesthetists must remain alert in hysteroscopic surgery as serious complications may occur with fluid overload. Clinical status and hydro-electrolyte balance should be carefully managed.

2AP2-5

Inter-scalene block for ambulatory shoulder surgery

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Background: Arthroscopic shoulder surgery is usually performed as an inpatient surgery for pain management.
Goal: Evaluate the postoperative pain control with inter-scalene block in patients undergoing shoulder arthroscopy with an outpatient admission regimen.
Methods: We enrolled 95 patients (41% men, 59% women), with a mean age of 51 years (SD: 15,15)
Procedures included: rotator cuff repair (54), chronic instability (21), calcified tendonitis (6) and acromioplasty (14).
Inclusion criteria were: patients over 18 years old and ASA I or II.
Exclusion criteria were:
- ASA III-IV
- Cognitive disorders
- Previous shoulder surgery
- Failed block
- Contraindications for regional anesthesia

Patients underwent eco-guided interscalene block in the preoperative area. A 35mm 23G needle was used to deploy 20ml of Levobupivacain 0.5%. Once in the operating room, patients underwent general anesthesia induction with Propofol (2.5mg/kg), Fentanyl (100 μg), and Rocuronium (20 mg), and Sevoflurane (1MAC) for maintenance.
We evaluated the patients in the post-operative care unit and afterwards by telephone call. Pain was evaluated with VAS. We recorded:
1. Acute pain during the first 2 post-operative hours
2. Acute pain from post-operative hour 2 to 4
3. Analgesic medications prior to dismissal
4. Pain control during the first 24 hours after surgery (telephone call)
5. Additional pain medication used after dismissal
6. Secondary effects

Results:
Mean VAS pain during the first 2 hours: 0.59 (SD: 1,36)
Mean VAS pain from hour 2 to hour 4: 0.66 (SD: 1,36)
Mean VAS pain 24 hours after surgery: 5.43 (SD: 2,40)
68% of patients did not required additional pain medication prior to dismissal. Acetaminophen alone, or associated with NSAIDs and /or Fentanyl was required in 18% of the cases.
3 patients contacted our postoperative pain control unit due to poor pain control, and one patient required hospital admission for pain management.
We found some secondary effects as: dizziness, nausea and vomits, occurring in 15% of patients. In 3 cases, nausea and vomits were associated to tramadol administration.
One patient showed a Claude Bernard Horner syndrome that resolved expontaneously.
Conclusion: Shoulder arthroscopic Surgery can be performed as an outpatient procedure when a single injection inter-scalene block is administered with good postoperative pain control.

2AP2-6

Intra-operative Oxycodone offers better pain relief when compared to Morphine in day case arthroscopic shoulder decompression surgery

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Background and Goal of Study: Day surgery is a well-established practice that is becoming increasingly popular worldwide. Shoulder surgery is associated with significant post-operative pain, which is a common cause for extended hospital stay and is also associated with an increased incidence of nausea and vomiting, cardiovascular instability and delays in mobilization. The aim of this study is to develop an effective multi-modal pain management protocol and specifically highlight the role of Oxycodone.
Materials and Methods: We conducted a retrospective observational study. We selected 60 ASA 1-2 patients who underwent laparoscopic cholecystectomies over one month and assigned them into Group A (n=30) who had 10 mg of i.v Morphine and Group B (n=30) who had 10 mg of i.v Oxycodone administered intra-operatively. The patients' mean age was 41.5 years (range 19 - 65), their operative duration ranged from 30 to 35 minutes and only those with a BMI < 35 kg/m^2 were included. They all received intra-operative i.v Paracetamol 1g, Parecoxib 40mg, Droperidol 1.25mg, Ondansetron 4mg and local infiltration (20 ml of 0.5% L-Bupivacaine intra-articular and wound site). We compared pain scores and presence of nausea and vomiting after 1 hour in the post anaesthetic care unit.
Results and Discussion: Group B had a noticeably superior pain score profile in comparison to Group A (Figure.1). Although none of the 60 patients had severe pain, the majority of the morphine group had mild to moderate pain (90%), whereas 80% of the Oxycodone group had no pain and only 20% reported mild pain. Both groups had the same figures for nausea and vomiting (13%). We would like to emphasize the importance of multimodal analgesia in day surgery as it facilitates discharge and minimizes nausea and vomiting.
Conclusion: Oxycodone appeared to provide higher quality post-operative pain relief compared to morphine in our patients. However, its use has to be judicious and only considered as part of a multi-modal analgesic regimen that can potentially lead to earlier discharge in the day surgery context.
References:
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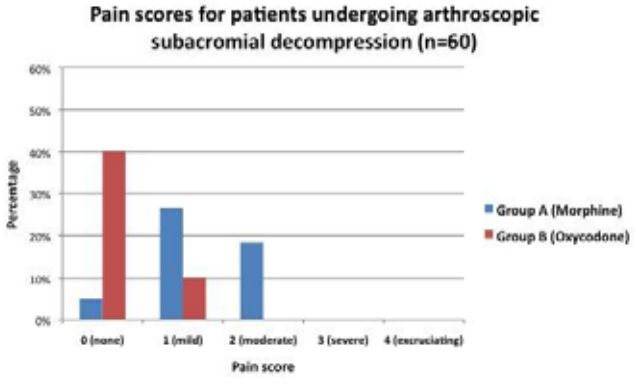

[Figure 1]

2AP2-7

Is a single shot ultrasound-guided distal selective blocks using 5 ml of 0,125% levobupivacaine effective for postoperative analgesia after ambulatory hand surgery?

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Background and Goal of Study: Postoperative pain is the most common problem for patients after ambulatory distal upper extremity bone surgery. Peripheral nerve blocks (PNB), especially under ultrasound guidance (USG), have become increasingly popular for the management of this complication. Our objective was to analyze if a low volume, low concentration USG selective distal blocks using long acting local anesthetic (LA) provides optimal pain control in especially painful hand procedures.
Materials and Methods: Prospective observational study. We included 50 patients scheduled for outpatient surgery to threat trapeziometacarpal osteoarthritis. All patients received an USG axillary block using a short acting LA (1% mepivacaine) and two distal USG analgesic blocks (median and radial at the elbow) using long acting LA (0,125% levobupivacaine). PNB were performed postoperatively, before discharge. All patients received a prescription of dexketoprofen with opioids as rescue analgesia and were contacted by phone first day postoperatively.
The outcomes were: efectiveness and duration of PNB, pain and maximum pain at 24h by means of visual numeric scale (VNS), requirement of rescue analgesia, opioid-related side effects and upper limb motor block.
Results and Discussion: Most distal analgesic blocks were effective (94%), with an average duration of nearly 12 hours. 6% of patients had moderate pain on call. 24% of patients had maximum pain VNS greater than 3. The incidence of postoperative nausea and vomiting was 2%. No patient reported motor block.

VNS 24 hours		VNS maximum 24 hours	Rescue analgesia
Median (IQR)	1 (0-2)	3 (2-3.25)	3 (0.25-5)
0-3, n(%)	47 (94)	38 (76)	5 (83.3)
4-6, n(%)	3 (6)	10 (20)	1 (16.7)
7-10, n(%)	0 (0)	2 (4)	0 (0)

[Pain and rescue analgesia]

Conclusion(s): The association of a short acting axillary block for surgery with long acting PNB for postoperative analgesia, in combination with nonsteroidal antiinflamatory drugs, might be an ideal anesthetic technique for painful ambulatory hand surgeries.
References:
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2. Fredrickson MJ , Smith KR. Importance of volume and concentration for ropivacaine interscalene block in preventing recovery room pain and minimizing motor block after shoulder surgery. *Anesthesiology 2010; 112:1374-81.*

2AP2-8

Myocardial injury after electroconvulsive therapy: a prospective cohort study

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Background and Goal of Study: Electroconvulsive therapy (ECT) - an effective treatment for severe psychiatric illness - can lead to cardiovascular adverse events. It is unclear if ECT is associated with myocardial injury.
Materials and Methods: This was a prospective cohort study to determine myocardial injury using high sensitivity cardiac troponin I (hs-cTnI) (Abbott

Architect STAT) before and immediately after ECT in a series of up to 3 treatments. In a subgroup, additional blood samples were obtained 2 hours after ECT. ECGs and clinical signs of myocardial ischemia were also obtained. Hs-cTnI above the sex-specific 99th percentile of the upper reference limit was defined as abnormal. Myocardial injury was defined as abnormal hs-cTnI novel after ECT. Myocardial infarction was defined as myocardial injury plus ECG changes and/or clinical signs of ischemia.

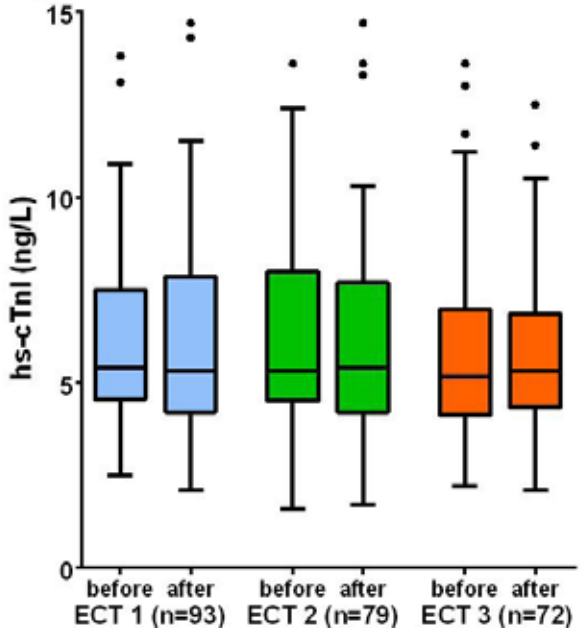
Results and Discussion: The analysis included 100 adults. Hs-cTnI was abnormal before ECT in 6 patients (6%) and after ECT in 12 patients (12%). The composite incidence of myocardial injury and/or infarction after ECT was 6% (n=6 of 94) comprising an incidence of 4% of myocardial injury (n=4 of 94) and an incidence of 2% of myocardial infarction (n= 2 of 94). The median [IQR] of hs-cTnI did neither change immediately (Table 1 & Figure 1) nor 2 hours after ECT (Table 1).

Conclusion(s): ECT led to myocardial injury in 4% of patients and to myocardial infarction in 2% of patients.

Acknowledgements: This study was supported by the Max Kade Foundation (New York City, NY) and the Washington University Clinical Research Training Center (St. Louis, MO, US) (UL1TR000448). Hs-TnI essays were provided by Abbott (Wiesbaden, Germany).

		Before ECT	Immediately after ECT	2 h after ECT
	N	hs-cTnI, ng/L, median [IQR]	hs-cTnI, ng/L, median [IQR]	hs-cTnI, ng/L, median [IQR]
All patients	100			
ECT 1	93	5.4 [4.6 - 7.5]	5.3 [4.2 - 7.9]	not applicable
ECT 2	79	5.3 [4.5 - 8]	5.4 [4.2 - 7.7]	not applicable
ECT 3	72	5.2 [4.1 - 7.0]	5.3 [4.4 - 6.8]	not applicable
Subgroup	14			
ECT 1	13	6.1 [4.6 - 8.2]	6.1 [4.2 - 7.4]	6.4 [3.8 - 9.5]
ECT 2	12	5.3 [5.0 - 7.8]	6.1 [4.9 - 7.7]	5.5 [4.0 - 13.1]
ECT 3	10	6.0 [4.2 - 10.1]	6.3 [4.5 - 9.5]	6.4 [4.1 - 9.2]

[Table 1. Hs-cTnI levels before and after ECT]



[Figure 1. Hs-cTnI before and after ECT]

Boxplots represent hs-cTnI plasma levels (median [IQR]) before and immediately after ECT in a series of 3 treatments. Numerical data are shown in table 1. Friedman's ANOVA: P=0.4. ECT = electroconvulsive therapy. hs-cTnI = high sensitivity cardiac troponin I.

2AP2-9

Outpatients to inpatients: are we choosing correctly?

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Background and Goal of Study: The outpatient preoperative evaluation is fundamental to develop an appropriate medical conduct, to reduce perioperative morbidity and mortality and to reduce costs and cancellation of surgeries. At our hospital, the Ambulatory Surgery Center (ASC) is located 17km from the main central building, thus limiting access to differentiated support in case of unpredicted complications.

The purpose of this study was to assess the impact of the pre-anesthetic evaluation on outpatient surgeries held at our ASC.

Materials and Methods: This retrospective observational study analyzed all outpatient pre-anesthetic visits at the ASC during the first half of 2013, aiming to report reasons for not being eligible for outpatient surgery and complications during subsequent inpatient stay.

Results and Discussion: 2.214 pre-anesthetic visits were performed, 22 of which were re-evaluations. Of the 2,192 patients evaluated, 4.4% were considered "unfit" for outpatient surgery with a median age of 59 years (21-84). The main reasons for ineligibility were severe or decompensated cardiac and/or pulmonary disease (47.5%), a potentially difficult airway (15.5%) or inadequate socio-demographics (12.4%). Among patients ineligible for outpatient surgery, 70.1% had been operated as inpatients. The peri-operative complications were: 1 generalized tonic-clonic seizure at the first postoperative day and 1 postoperative bleeding requiring immediate re-intervention.

Therefore, the complication rate was 2.9 %. The average length of stay of the inpatients was 1.7 days.This study demonstrated that complications in patients considered not eligible for outpatient surgery are low with no related deaths, but the length of stay has been higher than allowed in the ambulatory setting. These are probably influenced by limited resources available in this unit, especially the readiness of access to more differentiated care, which may explain a low threshold for determining a inpatient status.

Moreover, this is a small retrospective study and must be validated by larger series.

Conclusion(s): Although the incidence of complications was low for inpatients, they required a higher length of admission than allowed for ambulatory surgery. This supports the important role of pre operative assessment, contributing to higher efficiency and quality of care, as well as avoiding unforeseen inpatient admissions and cancellations.

2AP2-10

Pain relief after day case shoulder surgery with brachial plexus block

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Introduction: Shoulder surgery often results in significant pain postoperatively [1]. Regional anaesthesia is increasingly used as part of the intraoperative regimen, with the benefit of extending pain relief into the postoperative period thus allowing more complex procedures to be performed as day cases.

An observational study was performed, examining the quality of pain relief provided from using single shot brachial plexus blockade after a variety of shoulder procedures.

Method: Patients undergoing shoulder surgery as a day case procedure (including subacromial decompression, acromioclavicular joint excision, cuff repair and stabilisation) performed by a single surgeon, had a brachial plexus block performed (either interscalene or supraclavicular) by a variety of anaesthetists using a local anaesthetic preparation of their choice (which included levobupivacaine, +/- lidocaine +/- dexamethasone or clonidine). A telephone interview was conducted within 5 days postoperatively. Duration of block was when the patient reported return of normal sensation. Pain scores after the block had regressed were recorded at rest and with movement using the numerical rating score[NRS] and verbal rating score[VRS]. Patient satisfaction was scored using a 5 point scale.

Results: 155 patients were recruited. However 6 patients were excluded as it was deemed

that their blocks had failed in the recovery room. The duration of regional block lasted 22.18(±10.83) hours. The pain score at rest was NRS median (IQR)4 0-6 and with movement 6 (3-8). At rest 45 patients reported moder-

ate pain and 21 reported severe pain. With movement 44 patients reported moderate pain and 49 reported severe pain. Only one patient reported being unsatisfied with their pain relief.
Discussion: Once pain relief from the block subsided, 14% of patients suffered severe pain at rest. This increased to 33% on movement. The analgesia taken was variable and inconsistent.
Single shot brachial plexus blockade provides effective analgesia for complex surgery. However stronger analgesia is required for discharge with improved patient education on the frequency and use of analgesia [2]. We have since introduced oxycodone to our multi-modal analgesic regime and developed a specific discharge information leaflet.
References:
1. Fredrickson M et al Anaesthesia 2010;65;608-624
2. Usichenko T et al BJA 2013;110;87-95

2AP2-11

Patient satisfaction with the use of dexmedetomidine as a sedative for endobronchial ultrasound-guided procedure. A preliminary study

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Background: Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) allows minimally invasive evaluation of intrathoracic lymph nodes and other paratracheal structures. The use of dexmedetomidine (Dex) as hypnotic in conscious sedation of these procedures has allowed us to significantly improve the patient's satisfaction and comfort.
Goal of Study: To study the impact of conscious sedation with Dex on the comfort of the patient during endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA).
Materials and Methods: Ten consecutive patients underwent EBUS-TBNA under conscious sedation with Dex: initial loading bolus (1μg/kg in 10minutes) followed by continuous infusion at a rate of 0,5-1μg/kg/h during the procedure. All patients completed a self-administered questionnaire 2 hours after the procedure asking whether they had any recall or any distressing symptoms. Satisfaction was determined by patient willingness to return for the procedure in the future.
Procedural data and complications were also recorded.
Results: All patients underwent EBUS-TBNA with no serious complications. All patients were extremely satisfied and reported to be willing to return for the procedure in the future if required.
Conclusion: In our experience, our preliminary results suggest that the use of dexmedetomidine is suitable and comfortable for the patient undergoing endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA).

2AP3-1

Post operative analgesia and day case surgery: are we doing enough?

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Background: Day surgery delivers cost effective surgical interventions and decreases morbidity and mortality relating to admissions[1]. With more procedures comes a greater number of patients recovering at home unobserved. Studies have noted up to 45% of these patients experience some degree of post operative pain, from mild to severe[2]. Little information about the efficacy of medication in dealing with post operative pain, when initiated solely by patients is known.
Methods: A prospective audit was conducted examining day case surgery patients at a London teaching hospital over one week. Paediatric patients and surgical termination of pregnancy cases were excluded. The audit followed the Royal College of Anaesthetists audit recipe, which assessed six criteria with corresponding targets:
1.% of discharged patients with regular analgesia (100%)
2.% of discharged patients with instructions about analgesia (100%)
3.% of discharged patients with a verbal pain score (VPS) of severe at 48 hours (<5%)
4.% of discharged patients achieving a VPS of mild or none at 48 hours (>85%)
5.% of discharged patients satisfied with their management (>85%)
6.% of discharged patients with instructions on completion of analgesia (100%)
Data was gathered from notes and telephone consultations at 48 hours.
Results and Discussion: The initial audit found deficiencies in the prescription of regular analgesia and it´s effectiveness. Patients described lacking perioperative information regarding analgesia. As a result, an analgesia information leaflet was produced and distributed to all patients undergoing day case surgery. Following an intervention period, a repeat audit was performed. This revealed more patients being discharged with regular analgesia (89 to 100%), more patients being discharged with information about their analgesia, less experiencing moderate levels of pain and greater satisfaction.
Conclusion: This audit supports the supposition that patients experience variable and significant levels of post operative pain at home. The introduction of a focused effort to improve standardisation of analgesia prescribing and accessibility of information can improve frequency and severity of post operative pain. Further research should focus on planning and amelioration of this problem.
References:
1. AAGBI Guidelines, 2011: Day case and short stay surgery 2, *Anaes*, 66 417-434
2. Rawal, 2001: Analgesia for Day Case Surgery, *Br J Anaes*, 87 (1) 73-87

2AP3-2

Post-discharge nausea and vomiting after ambulatory surgery

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) remains an unsolved problem. Especially in outpatient surgery on post-operative day one and two (then called post discharge nausea and vomiting, PDNV), there is a paucity of data.
Materials and Methods: Consecutive adult patients undergoing outpatient surgery in general anesthesia were included after giving informed consent. Patients were mainly treated with propofol-based intravenous anesthesia. PONV prophylaxis was performed depending on the Apfel risk-score ([1]; 0-4) with ondansetrone 4 mg IV for patients with a score of 2, adding dexamethasone 4 mg IV (score 3), and droperidol 0.5 mg IV (score 4). If there was a contraindication for any of these drugs, stimulation of acupuncture point P6 was performed.
A trained study nurse called the patients on post-operative days one and two and asked to rate the occurrence of nausea and/or vomiting on a verbal analogue scale of 0 (not at all) to 10 (worst imaginable). During the second interview, patients were asked to rate any disturbance in quality of life or sleep by PDNV and/or pain during the study period.
The study was approved by the local ethics committee.
Results and Discussion: One hundred eleven patients were included (54 female). Patients were 44.2±16.9 years old, anesthesia lasted 91.1±27.6 min. During this time, 0.21±0.06 mg fentanyl and 3.3±3.4 mg morphine were given IV.
On the day of surgery, 66.7% of the patients did not experience any nausea, 16.2% complained about mild (VAS 1-3), 9.0% about moderate (VAS 4-6), and 8.1% about severe (VAS >7) nausea. On the first and second postoperative day, VAS was 0 in 92.8% of patients (0.9% VAS > 7), and 96.4% (0.9% VAS > 7), respectively. 5.4% of patients suffered from vomiting or retching at least once on the day of surgery, none thereafter. 36.0% of patients reported a disturbance in quality of life (VAS > 3) by PDNV or pain, with pain being worse than PDNV in 77.5% of these patients. Disturbance of sleep (VAS > 3) was reported by 21.6% of the patients, with 83.3% rating pain as the main reason.
Conclusion: In conclusion, with the proposed concept for PONV prophylaxis acceptable rates for PONV and PDNV can be achieved. For more than 90% of patients, PDNV is not a topic after the day of surgery. More disturbances in quality of life and sleep are caused by pain.
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2AP3-3

Predictors of perioperative hyperglycaemia in patients with diabetes type 1 or 2 undergoing ambulatory surgery

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Background: In 2012, a consensus statement on perioperative management of patients with diabetes (DM) undergoing ambulatory surgery was published. However, studies on perioperative glucose management in ambulatory surgery are scarce, and many questions (e.g. predictors of hyperglycaemia) are left unanswered. Recommendations were derived from studies of patients with DM 2; if these are applicable for patients with DM 1 is still unclear. Therefore, we assessed the differences in perioperative glycaemic control and possible predictors for perioperative hyperglycaemia in patients with DM 1 and 2.
Methods: We retrospectively collected pre- and postoperative glucose values and HbA1c of patients with DM undergoing ambulatory surgery. We used linear regression analyses to identify predictors for pre- and postoperative hyperglycaemia, adjusted for gender, age, BMI, type of DM and HbA1c. Preoperative glucose, dexamethasone and length of surgery were added to the postoperative regression analysis.
Results: The patient characteristics of patients with DM 1 and DM 2 are shown in table 1.

		DM type 1	DM type 2	p-value
		n=21	n=207	
Male	n (%)	14 (66.7)	96 (46.4)	0.076
Age (years)	Mean (SD)	45.4 (14.7)	59.1 (11.3)	<0.001
BMI (kg/m2)	Mean (SD)	26.3 (3.9)	29.5 (6.2)	0.010
Treated with oral antidiabetics	n (%)	4 (19.0)	164 (79.2)	<0.001
Treated with insulin	n (%)	21 (100)	80 (38.6)	<0.001
HbA1C	Median (IQR)	66 (59 - 78)	56 (47 - 67)	0.011
Duration of surgery	Median (IQR)	49 (25 - 90)	45 (23 - 80)	0.434
Received dexamethasone	n (%)	3 (14.3)	56 (27.1)	0.203

[Table 1. Patient characteristics]

Patients with DM 1 were significantly more prone to perioperative hyperglycaemia.

		DM type 1	DM type 2	p-value
		n=14	n=153	
Preoperative glucose (mmol/l)	Median (IQR)	11.8 (5.7 - 16.2)	7.8 (6.5 - 9.7)	0.124
Preoperative hyperglycaemia (> 10 mmol/l)	n (%)	8 (57.1)	33 (21.6)	0.003
		n=21	n=159	
Postoperative glucose (mmol/l)	Median (IQR)	9.8 (7.1 - 13.5)	8.4 (6.5 - 10.2)	0.138
Hyperglycaemia (>10 mmol/l)	n (%)	10 (47.6)	42 (26.4)	0.044

[Table 2. Perioperatie glycaemic control]

HbA1c (β 0.13, 95%CI 0.08-0.18, p< 0.001) was a predictor for higher glucose values preoperatively. Preoperative glucose (β 0.56, 95%CI 0.29-0.84, p< 0.001) was predictive for higher postoperative glucose.
Conclusion: Patients with DM 1 have poor perioperative glucose regulation during ambulatory surgery as compared to patients with DM 2. Optimization of preoperative glycaemic control should be pursued, especially in patients with DM type 1 presenting for ambulatory surgery.

2AP3-4

Prevalence of postoperative pain and poor global surgical recovery four days after ambulatory surgery

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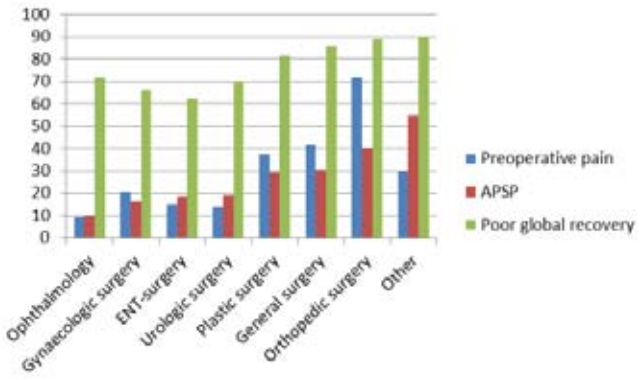
Background: After ambulatory surgery, most patients expect fast recovery without suffering moderate to severe pain. The prevalence of moderate to severe postoperative pain in the first 48 hours after ambulatory surgery varies from 9-40%. However, most studies focused on the immediate postoperative course. Also, recovery after ambulatory surgery is not well studied. The purpose of our study was to analyze prevalence of postoperative pain and poor recovery on the fourth postoperative day after ambulatory surgery.
Methods: We performed a prospective cross-sectional study in the outpatient clinic at Maastricht University Medical Centre+. Over 18 months, 1243 patients undergoing ambulatory surgery were included. A baseline questionnaire one week before surgery assessed demographic factors and preoperative pain, measured by an 11-point numeric rating scale (NRS; 0 = no pain, 10 = worst pain imaginable). NRS >3 was defined as moderate to severe pain. In the follow-up questionnaire, 4 days after surgery, pain intensity and the 1-item global surgical recovery index (GSR) (´if 100% recovery is back to the usual health you had before you got sick and had surgery, what percent of recovery are you at now?') were measured. GSR <80% was defined as poor global recovery.
Results: 37.2% of patients experienced moderate to severe pain one week before surgery. Four days after surgery, 28% of the patients experienced moderate to severe pain. General surgery and orthopedic surgery were most often associated with moderate to severe preoperative as well as acute postsurgical pain (APSP) (figure 1). Average GSR index was 63.4% (SD 24.9%). A total of 955 patients (79.1%) suffered poor global recovery. Plastic surgery, general surgery and orthopedic surgery were most often associated with poor global recovery (figure 1).



[APSP and global outcome (%) day 4]

Conclusion: Our study demonstrates that acute pain after outpatient surgery remains a problem, even at postoperative day four. Moreover, almost 80% percent of patients suffered poor global surgical recovery. This implies better patient information provision is warranted to adjust patient expectations.

2AP3-5

Prolonged fluid fasting time associated with post-operative sore throat

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Background and Goal of Study: It is well recognised that general anaesthesia is associated with post-operative sore throat with an incidence of between 20-40% (1). For many patients this can be an unpleasant experience and have a negative impact for future anaesthesia.
We aimed to identify the perioperative factors associated with post-operative sore throat and introduced methods to minimise these. Post-operative sore throat rates were subsequently re-audited to determine if improvements had been made.
Materials and Methods: An initial audit of 110 patients was undertaken to determine the perioperative factors influencing postoperative sore throat rates recorded in recovery.
Interventions were made to reduce these factors and a further 80 patients were re-audited.
Results and Discussion:

	Initial audit	Re-audit
Mean age (yrs)	39	38
Female (%)	60	49
Male (%)	40	51
Enodtracheal tube (%)	60	72
Throat pack (%)	11	14
Volatiles (%)	33	24
Mean fluid fasting time (mins)	360	312
Sore throat (%)	38	31

[Table 1. Peri-operative data]

	Initial audit fluid fasting time (mins)	Re-audit fluid fasting time (mins)
No sore throat	348	300
Sore throat	378	342

[Table 2. Sore throat and fluid fasting time]

38% of patients in our initial audit complained of a sore throat in the immediate postoperative period. Statistically significant increase (unpaired student t-test) in sore throat rates were associated with endotracheal tube, throat pack and a prolonged fluid fasting time.
After interventions were made re-audited data showed a reduction in fluid fasting times by 48 minutes (table 1) and a reduction in the overall rate of post-operative sore throat (table 2).
Conclusions: Of the main perioperative factors associated with post-operative sore throat, a reduction in fluid fasting time was introduced. Clinical or surgical requirements prevented other intervention strategies to be changed. Re-audited data confirmed initial findings and our intervention strategies did indeed lead to a reduction in sore throat rates.
As anaesthetists we should be aiming to improve the overall patient experience. This is important for our own practice, patient outcomes and increasingly at a monetary level too.
References: 1. http://www.rcoa.ac.uk/system/files/PI-RISK2-SORETHROAT-2013.pdf

2AP3-6

Recovery time after oral and maxillofacial ambulatory surgery with dexdor

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Background and Goal of Study: Despite the extensive literature published, few works have studied the relationship between the use of dexmedetomidine (with bradycardia and hypotension as side effects and an elimination half-life between 1.9-2.5h) for ambulatory surgery and the recovery time (RT) required to be discharge from the hospital. We evaluated the association between the RT after Oral and Maxillofacial Ambulatory Surgery with Dexdor and demographic patient data, loading dose, and type and duration of the procedure.
Materials and Methods: The study was approved by the IRB of Navarra, after to be classified as a post authorization study by the Spanish Agency of Medicines and Medical Devices, for the off-label use of dexmedetomidine (CUN-DEX-2013-01) between February 2013 and September 2014 with 80 patients. We used the Spearman´s rho correlation coefficient (age, BMI, duration of surgery), Kruskal-Walls test (ASA status, loading dose, type of surgery) and Mann - Whitney test (sex) using Stata 12.0.
Results and Discussion: The median of the overall RT was 125 (range: 61-360) min. Neither sex [median RT for men, 118 (range: 61-215) vs woman, 127 (61-360) min; p=0.126]; age (Spearman´s rho correlation coefficient: -0.065; p = 0.56); BMI (Spearman´s rho correlation coefficient: -0.084;
p = 0.45); ASA [median RT for "I", 121 (range: 61-360) vs "II", 127 (range: 69-185) vs "III", 126 (range: 61-215) min; p=0.327]; loading dose [median RT for <0.5 μg/kg, 122.5 (range: 61-200) vs 0.5 μg/kg, 126
(range: 61-360) vs >0.5 μg/kg (range: >0.5-1.0 μg/kg), 124 (range: 88-185) min; p=0.718]; type of surgery [median RT for ≤2 third molars extractions, 123 (range: 80-200) vs >2 third molars extractions, 123 (range: 61-360) vs ≤4 dental implants, 126 (range: 93-137) vs >4 dental implants, 131 (range: 61-163) min; p=0.98] and duration (Spearman´s rho correlation coefficient: 0.044; p=0.69) showed a statistically significant association with the RT after the procedure.
Conclusion: The median of RT after Oral and Maxillofacial Ambulatory Surgery with Dexdor was 125 (range: 61-360) min. We did not find any statistically significant association between RT and demographic patient data, loading dose, or type and duration of the procedure.
References: Makary L et al. Prolonged recovery associated with dexmedetomidine when used as a sole sedative agent in office-based oral and maxillofacial surgery procedures. Int. J. Oral Maxillofac. Surg 2010;68(2):386-91.

2AP3-7

Recovery time on ambulatory vein varicose surgery - can we manage it?

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Background and Goal of Study: Ambulatory surgery has been developed over the last decades with the improvement of anesthetics and minimally invasive surgical techniques. Operating room turnover rates and length of recovery can have a significant impact on costs. The anesthesiologist may also contribute to reduce costs by selecting patients and procedures.
The objective of this study was to examine how anesthetic procedures on varicose vein stripping surgeries (VVSS) relate to clinical outcomes and time efficiency.
Materials and Methods: This was an observational, cross-sectional retrospective study on outpatients submitted to VVSS in our ambulatory center during 2013. We excluded patients who were operated on the afternoon period, as they would have to stay overnight. We analyzed demographic data, recovery times, anesthesia techniques (general anesthesia (GA) vs spinal anesthesia (SA)) and 24h post-operative pain scores,
Results and Discussion: 396 patients were included in our analysis, of which 15 had incomplete data and were, therefore, excluded. The time to discharge was faster in GA group (5´45min vs 6´10min, p=0,0093) and this difference is due to duration of phase II recovery (the duration of phase I was similar in both groups). We found no significant difference in 24h postoperative pain control between groups (odds ratio 0.99). No patient reported of post-puncture headache in the SA group.
In order to take advantage of the spinal anesthesia technique benefits with respect of decrease recovery time it is necessary to administer the most appropriate local anesthetic and the lowest adequate dose as each additional mg of drug causes an increase in time of recovery. The principal limiting factors of the use of SA are the secondary effects of residual block (postural hypotension, delayed deambulation and inability of void) and these may be reasons for delayed discharge in SA group. Also, the statistical power of our analysis maybe limited by the fact that the GA group was much larger than the SA. Moreover, this is a retrospective observational study with the inherent limitations of this study design.
Conclusion(s): This study suggests that GA and SA provide effective anesthesia and a good postoperative pain control in VVSS, but spinal anesthesia seems to lead to a slightly higher length of recovery.

2AP3-8

The controlled neuromuscular blockade in children outpatient dental practice

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Background and Goal of Study: Rapid postoperative recovery have a great importance in the pediatric patient population, especially in outpatient dental procedures. For many years, the main muscle relaxant, used in children for tracheal intubation, was succinylcholine. However, its side effects forced to look for new alternatives. Neuromuscular blockade with rocuronium and reversing neuromuscular blockade with sugammadex could be considered as such an alternative. The aim of this study was to evaluate the efficacy and safety controlled neuromuscular blockade with rocuronium and sugammadex in pediatric outpatient dentistry.
Materials and Methods: 52 patients, aged 2-10 years, scheduled for outpatient treatment of three or more teeth were enrolled in this study. 38 of them (73%) were children under 4 years. The mean duration of treatment was 112,4 ± 3,1 minutes. For the induction and maintenance of anesthesia was used sevoflurane. Neuromuscular blockade was achieved with 0,55 ± 0,02 mg/kg rocuronium and monitorized with train-of-four. Sugammadex administered in a dose of 2 mg / kg at the end of treatment. Intubation time, extubation time (time from the reversal of neuromuscular blockade to extubation), train-of-four ratio during this time, time to reach train-of-four > 0.9, and probable complications were recorded.
Results and Discussion: The average time to reach the neuromuscular blockade, sufficient for intubation, was 101,4 ± 3,6 seconds. The conditions for intubation were rated as excellent in 41 (78.9%) of the child, and as good - in 11 (21.1%) children. There were no marked hemodynamic changes, arrhythmias, and other complications during tracheal intubation. Infusion of sugammadex not accompanied by any reactions and complications. The average extubation time with the possibility of transfer to spontaneous breathing and extubation was 140,3 ± 13,1 seconds.
Conclusion(s): Rocuronium provides optimal conditions for intubation of children without risk of hemodynamic, anaphylactic reactions and reflexes; sugammadex at a dose of 2 mg / kg provides a complete, fast and safe reversal of neuromuscular block in children.

2AP3-9

The impact of anesthesiology in the management of patients with special needs in dental medicine: retrospective observational study of 19 months

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Background and Goal of Study: The discussion whether non-anesthetic personal should administrate anesthetic drugs in dental care in the outpatient setting is a debate in which regards patient safety[1]. A specific multidisciplinary consultation was created, unique in the country, to treat people with special needs. Our goal is to characterize used anesthetic techniques and to emphasize the importance of the anesthesiologist in the success of this consultation.
Materials and Methods: Consultations between May 2013 and November 2014 were reviewed. Data on demographics, ASA anesthetic risk classification, comorbidities, anesthetic practice, complications and overall consultation success rate were established. Data were analysed with SPSS 20.0®.
Results and Discussion: A total of 365 consultations and 358 anesthetic procedures in 249 patients were collected. Main anesthetic technique: (A) sevoflurano +/- N_2O sedation with nasal mask (N=149; 41,6%); (B) propofol sedation (n=42; 16,6%); (C) intranasal midazolam (N=31; 8,6%); A+C (n=34; 9,5%); B+C (N=7, 2%); (D)behavioral therapy (N=95; 26,5%). Rate of complications was 6,9%, mainly ASA 1 or 2. Overall anesthetic procedure success: 95,6%, only 4,4% were referred to general anesthesia. A multidisciplinary team with an nesthesiologist, a nurse and two stomatology allowed a set of care that otherwise would not be possible. The anesthesiologist has proved essential to create conditions so that such procedures could take place minimizing patients risk: the environment was prepared in the event of a critical complication; complex procedures were done because of the anesthetic management that was planned. Complications were managed without consequences. Furthermore, the anesthesiologist must have a set of non-technical skills based on communication which make him capable of create behavioral strategies to do the proposed procedure without a pharmacological intervention if patients safety is the main regard.
Conclusion(s): The role of the anesthesiologist in conscious sedation to dental care includes: the anesthetic act, training and leadership of the team if a critical event occurs, establishment of a good patient-relationship based on communication, promotion of a safe work environment and high quality health care. The anesthesiologist must assume its role, regardless the patients anesthetic risk. A multidisciplinary team is a good solution in this population.
References:
1. Anesthesiology.2002;96:1004-17

2AP3-10

The role of catastrophizing and other psychosocial variables in postoperative pain in ambulatory surgery

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Background and Goal of Study: Pain during postoperative period is considered a parameter which complicates patient's recovery and is difficult to be managed as it depends from various factors. We examined the impact of psychosocial variables on postoperative pain in ambulatory surgery and their role in analgesic consumption, postoperative morbidity and discharge time.
Materials and Methods: 52 patients were included in this study who were planned to undergo laparoscopic cholecystectomy or inguinal hernia repair on ambulatory basis. A questionnaire was administered to patients preoperatively concerning pain catastrophizing, anxiety and depression. The used psychometric tools were Pain Catastrophizing Scale and Hospital Anxiety and Depression Scale. Demographic data, pain intensity through Visual Analogue Scale, need for supplemental analgesia, complications and time of discharge were recorded as well and examined whether a correlation with the psychological variables exists.
Results and Discussion: Pain catastrophizing predicted postoperative pain during rest and activity in 8 and 24 hours, anxiety predicted postoperative pain during rest and activity in 3, 8 and 24 hours, depression predicted postoperative pain during rest in 24 hours and overall anxiety and depression scale predicted postoperative pain during rest in 3,8 and 24 hours. Gender differences occurred only in postoperative pain during rest in 24 hours while psychological variables didn't seem to be related with analgesic consumption, postoperative morbidity and discharge time.
Conclusion(s): The presence of these specific psychological factors could predict postoperative pain in ambulatory surgical patients and preoperative detection of them could be a part in pain management optimization.

2AP3-11

Transcarinal biopsy through laryngeal mask in a obese patient under inhalatory anesthesia with spontaneus ventilation

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Background: The most modern halogenated anesthetic gases present some properties which make them an excellent alternative to face nonsurgical procedures. Inhalatory induction of anesthesia with sevoflurane provides an adequate tool for airway management. It produces very deep hypnosis, has an intrinsic analgesic effect superior to other intravenous hypnotics and finally the muscle relaxation that produces is also suitable, all of these without losing patient's spontaneous ventilation. It is possible to introduce an iGel laryngeal mask with this conditions, and it allows to work through the light with devices such as bronchoscopes.
Case report: The aim of this abstract is to share our experience in a case of a 55 years old patient who underwent ecobronchoscopy to biopsy a 2 cm adenopathy near the tracheal carina. The patient was obese (115 kilogrames) and presented a personal history of cronic obstructive pulmonary disease and cervical osteoarthritis. He did not tolerate the procedure under sedation with propofol and midazolam, so we decide to proceed under general anesthesia. He presented some predictors of difficult ventilation and intubation (obese, Mallampati III, tiromentonian distance <6 cm). The anesthetic induction was performed with 8% sevoflurane through the face mask for 5 minutes. After that, number 5 iGel laryngeal mask was introduced without incidences, and

we check the patient was still breathing spontaneously. 5 minutes later with patient breathing 6% sevoflurane and 94% oxygen, bronchoscope started. Neumologist introduced bronchoscope through the laryngeal mask´s light and passed through the vocal cords without cough stimulus. It was necessary to reconnect the laryngeal mask once because oxygen saturation decreased under 92%. After recovering saturation, the remaining procedure lasted 10 minutes and run without incidences. No opioids were needed during the procedure.

Discussion: Inhalational induction of anesthesia with sevoflurane provides great conditions on airway management to keep spontaneous ventilation, and enables to develop nonsurgical procedures such as bronchoscopies on a safe way. The use of iGel laryngeal mask helps to maintain spontaneous ventilation and allows to introduce endoscopes across its light.

References: Ambrogi MC et al. "Nonintubated thoracoscopic pulmonary nodule resection under sponteous breathing anesthesia with laryngeal mask". Innovations (Phila); 2014 Jul-Ago; 9(4):276-80

Regional Anaesthesiology

3AP1-1

Peripheral nerve block in primary ankle fracture surgery - exploring rebound pain

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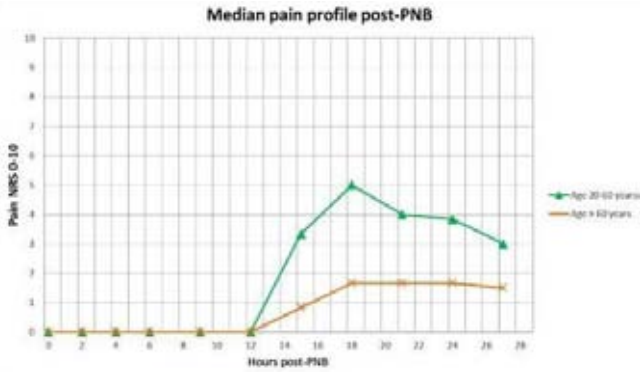
Background and Goal of Study: Peripheral nerve blocks (PNB) are increasingly used for anaesthesia and postoperative pain control in acute orthopaedic limb surgery. However, evidence of beneficial effects is generally based on elective patients with other pain profiles. In ankle fracture surgery it has been suggested that "rebound pain" upon cessation of PNBs challenge the overall benefit on the postoperative pain profile.[1]
We aimed to explore the pain profile following primary ankle fracture surgery under PNB anaesthesia and investigate if rebound pain could pose a clinical problem.
Materials and Methods: Approved by the Data Protection Agency and Ethics Committee we performed an exploratory, prospective, observational study at our centre. We consecutively included adult patients scheduled for primary internal fixation of an ankle fracture under PNB anaesthesia. Key exclusion criteria were cognitive impairment, > 5 days from fracture to surgery and unavailability of the investigator at time of surgery.
PNBs were ultrasound guided popliteal sciatic and saphenal nerve blocks using ropivacaine 7,5 mg/ml 20 ml + 5 ml. Patients registered pain on a numeric rating scale 0-10 every 3 hours postoperatively. All received paracetamol and ibuprofen with access to i.v. morphine on demand via a patient controlled pump.
Results and Discussion: We included 21 patients aged 20-83. Pain profiles and peak pain scores are displayed.



[Pain profile]

Age group	Peak pain score Median NRS (range)	Severe pain, NRS ≥7 n (%)	Moderate pain, NRS ≥4 n (%)
20-60 years (n = 9)	7 (2-10)	6 (67 %)	7 (78 %)
> 60 years (n = 11)	5 (0-8)	1 (9 %)	9 (82 %)

[Peak pain score]

PNB supplies effective postoperative pain control for many hours, but cessation of the PNB does lead to a clinically relevant spike in pain scores (figure) and 67 % of the 20-60-year-olds reached severe pain levels (table). The impact on the pain profile for patients >60 years old was less pronounced and only 9% experienced severe pain.
Conclusion(s): This study suggests rebound pain is a clinically relevant issue, with a possible exception for older patients. The conclusions are tentative and a randomised clinical trial is planned.

References:
1. Goldstein RY et al. J. Orthop. Trauma. 2012 Oct;26(10):557-61.

3AP1-2

Quadriceps strength during patient-controlled or continuous infusion femoral nerve block after total knee arthroplasty *Double-blinded randomised controlled trial*

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Background and Goal of Study: The femoral nerve block (FNB) induces quadriceps weakness, which causes ambulation disability and falls after total knee arthroplasty (TKA). Patient-controlled bolus of nerve block provides a good pain relief with smaller local anaesthetics compared with continuous delivery. We hypothesised that patient-controlled FNB (PCA-FNB) preserves quadriceps muscle strength after TKA compared with continuous FNB (cFNB) as a primary outcome. Secondary endpoints were effect on local anaesthetics consumption, pain and mobilisation ability.
Materials and Methods: We performed a double-blind, randomised controlled trial, including patients scheduled for TKA in general anaesthesia. The trial was approved by the Institutional Review Board and registered at www.umin.ac.jp (JPRN-UMIN000010105). All patients received a FNB via a catheter and a selective tibial nerve block with each bolus of 10 mL 0.25% levobupivacaine preoperatively, and followed by a continuous infusion of 0.08% levobupivacaine 6mL/h between immediately after surgery and postoperative 24 h. At postoperative 24 h, infusion bottle was changed to the blinded trial bottle. Either of one was a PCA-FNB (PCA bolus infusion 3 mL with a lockout time of 30 min and no continuous infusion) of 0.08 % levobupivacaine and the other was a cFNB (basal infusion 6mL/h and dummy PCA button). Infusion continued between postoperative 24 and 48 h and a catheter was removed at 48 h. Additional analgesics consisted of celecoxib, diclofenac, and pentazosine. Quadriceps strength was assessed with a hand-held dynamometer preoperatively, 24 and 48 h postoperatively. Pain and mobilisation ability were assessed at postoperative 24 and 48 h.
Results and Discussion: Fifty-six patients were randomised and 53 patients analysed. Quadriceps strength at 24 h was not different between two groups (cFNB vs. PCA-FNB; mean ± SD 31.0 ± 11.5 vs. 33.1 ± 9.0%; p = 0.47). Quadriceps strength at 48 h, as a primary outcome, was not statistically different (47.3 ± 18.3 vs. 49.7 ± 15.7%; p = 0.61). The local anaesthetics consumption during postoperative 24 to 48 h in PCA-FNB was significantly lower than cFNB (148 ± 4.6 mL vs. 102 ± 10.8 mL, p<0.001). There was no difference between the groups regarding pain and mobilisation ability at 24 and 48 h postoperatively.
Conclusion: Although PCA-FNB provides acceptable analgesia with smaller local anaesthetics, this delivery could not maintain the quadriceps strength compared with cFNB.

3AP1-3

Adductor canal block versus continuous femoral nerve block for analgesia after anterior cruciate ligament repair

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Background and Goal of Study: Adductor canal block (ACB) has been demonstrated to be effective in treatment of post-operative pain after major knee surgery reducing quadriceps weakness major side effect of femoral nerve block (1). We aimed to compare the efficacy of ACB versus continuous femoral neve block (CFNB) for postoperative analgesia (Numeric Rating Scale (NRS) pain scores) after anterior cruciate ligament reconstruction (ACLR) (2).
Materials and Methods: Following Research Ethics Board approval, 64 patients undergoing ACLR were enrolled into this prospective, randomized trial. Patients were randomly allocated to receive either ultrasound guided (US) ACB (G1; n=32) induced with 20 mL of 0.25% bupivacaine or US CFNB (G2; n=32) where a femoral nerve catheter was induced with 20 ml of 0,25% bupivacaïne then a continuous infusion was intiated with 5 ml/h of 0,125% bupivacaïne during the first 36 postoperative hours. Data collected included success rate, performance time, NRS pain scores until 48h, opioid consumption motor block quoted according to the ASIA motor score, sensory block using the ASIA sensory score, time of total sensory regression and incidence of complications. P<0.05 was considered as significant.
Results and Discussion: Sixty-four patients were analyzed. Patient demographics and clinical baseline characteristics were similar between the 2 groups.one hundred percent success was recorded in both groups. NRS scores at movement were significantly lower in the G1 from the 9th until the 48th postoperative hour. There was no significant difference between the two groups in the time to first analgesic request, morphine consumption was significantly lower in the G1 at the 3rd (0.2 ± 0.6 vs 2.36 ± 0.81 mg)and the 12th (2.18 ± 4.10 vs 4.47±6.06 mg) postoperative hours. Cumulative morphine consumption over the 48h were not different between the 2 groups (4.28 ±7.54 vs 7 ±8.81 mg).There was no difference in the mediane of sensitive score between the two groups at all measurement point. Motor score was significatively higher in the G2 during the first PO day.
Conclusion(s): This study demonstrated that patients receiving ACB had NRS pain scores below the moderate-to-severe pain threshold for the first 2 PO days .The ACB is an effective alternative to the CFNB for patients undergoing ACLR. ACB allowed ambulatory surgery for arthroscopic ACLR.
References:
1. David H et al.Anesthesiology 2014
2. Brian A et al. Anesthesiology 2006

3AP1-4

Nervus cutaneus femoris lateralis block after total hip arthroplasty: a randomised, controlled, double-blinded trial

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Background and Goal of Study: There is no gold standard for pain management after total hip arthroplasty (THA). The Nervus cutaneus femoris lateralis (NCFL)-block is a pure sensory block and seeks to remove wound pain after THA. We hypothesize NCFL-block would reduce pain during movement (primary end-point) without delaying mobilisation.
Materials and Methods: This prospective, randomised, placebo-controlled trial was approved by the Danish Medicine Agency (EudraCT: 2013-004501-12), the Regional Ethics Committee and the Danish Data Protection Agency and monitored by the Copenhagen University GCP-Unit. The trial was conducted at Næstved Hospital, Denmark.
All subjects provided written informed consent before participating. Eligible participants were patients scheduled for primary THA with spinal anaesthesia. Exclusion criteria were general anaesthesia, allergy against local anaesthetics, revision arthroplasty, bilateral arthroplasty, fertile women and patients with daily use of opioids.
The NCFL-block was performed postoperatively. The subjects received an active (8 ml of 0,75 % ropivacaine) or placebo (8 ml of saline) NCFL-block according to randomization. The subjects, the investigator and the assessors were blinded to the intervention.
Sample size calculations were based on alpha=5%, beta=20% and a difference of 25 mm with sd=30. This gives 74 subjects but to account for the uncertainty of the true sd and to gain more power we decided to include 100 evaluable subjects.
Non-parametric statistics were used with a level of significance of 0,05.
Results and Discussion: 120 subjects were enrolled in the study from March 2014 to October 2014. 20 subjects dropped out and 100 subjects were analyzed for the primary endpoint.
The difference in VAS-score during 30 degrees flexion of the hip 4 hours postoperative (primary endpoint) between the Ropivacaine group and the Placebo group was -5 mm (95% CI: -15 - +5 mm), p = 0,41

	Group Ropivacaine (median (Q1-Q3))	Group placebo (median (Q1-Q3))	
VAS during movement 4 hours postoperatively	26,5 mm (15-40)	31 mm (19-50)	P = 0,41
Oxycodone first 24 hours	15 mg (8-28)	15 mg (5-20)	P = 0,17
CAS-score	5 (3-6)	5 (4-6)	P =0,26
Duration from surgery to mobilisation	368 min (330-519)	420 min (364-470)	P = 0,69
Length of stay	49 hours (10)	50 hours (20)	P = 0,53

[Fig 1]

At our institution we have a potent "fast-track" approach to the surgical patient.
Conclusion(s): We found the basic analgesic regimen to be sufficient after THA, thus there were no additional effects of a routine NCFL-block after this procedure.

3AP1-6

Simple approach to sciatic nerve anatomy revisited in lateral position

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Introduction: Performance of sciatic nerve blockade was simplified by Wadhwa et al in prone position, when compared with the conventional subgluteal approach perfomed in lateral Sims position. This study was performed to validate the comparison between conventional and experimental approaches in the lateral Sims position.
Methods: 40 patients undergoing lower limb surgery were randomized to experimental or conventional approach in lateral position. One investigator performed all the blocks. If a twitch was not obtained in first pass, the needle was redirected slightly medially or laterally until twitch was obtained or a maximum of 8 passes were reached. If no twitch was obtained in 8 passes, the needle was reinserted from the non-randomized approach and the process was repeated. The time taken to obtain the first sciatic nerve twitch at 1.5 mA and 0.5 mA was recorded as primary outcomes. Number of passes to obtain the sciatic nerve twitch and type of response were recorded as secondary outcomes
Results: 15 out of 19 patients (79%) in the conventional group; 13 out of 17 patients (77%) in the experimental group had successful placement. 15% patients with the conventional approach and 41% in the experimental approach had a sciatic nerve response in the first pass. The average numbers of passes to obtain the first twitch in the conventional and experimental groups were 5 ± 4.5 and 3.5 ± 2 times.The number of patients with twitch stimulating the tibial nerve was substantially higher in the experimental group (66% vs 87.5%).
Discussion: We have described the technique that is time efficient and accurate, both in prone and lateral position compared to the conventional technique. In normal clinical scenario, as the patient turnover times are getting shorter, we need techniques that are easy to perform independent of ultrasound. Ultrasound is technically difficult in morbidly obese patients especially in deep blocks. We need to continue to search landmark-based techniques that more accurately predict the location of deep nerves. We have successfully simplified one of the deep blocks in both lateral and prone position.
Conclusion: There was no difference in the primary success rate between the two approaches, however the number of passes required to reach the sciatic nerve were substantially lower in the experimental approach than the conventional approach.

3AP1-7

Comparison of two preparations of 1.5% mepivacaine with different sodium content for ultrasound guided popliteal block

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Background and Goal of Study: Commercially available local anesthetic drugs have high sodium content. As nerve excitability is determined by the state of sodium channels, it may be that an increase of perineural sodium modifies the analgesic effect of local anesthetic drugs. We hypothesized that a dilution of 1.5% mepivacaine with a decrease of 30% in sodium content could lead to a more effective blockade (requiring a smaller volume of local anesthetic) in the case of ultrasound-guided sciatic nerve block at popliteal fossa for unilateral "*hallux valgus"* repair. We compare the Minimum Effective Anesthetic Volume in 50% of patients (MEAV-50) of 1.5% mepivacaine diluted with 5% dextrose (with a lower sodium content) versus 1.5% mepivacaine diluted as usual.
Materials and Methods: This is a prospective, randomized, double-bind (for patients and physicians evaluating the block), comparative study between two groups. An ultrasound-guided sciatic nerve block at popliteal level was performed to all patients; then they were randomized to receive 1.5% mepivacaine obtained by dilution we use habitually (1% mepivacaine with 2% mepivacaine) or obtained by dilution with 5% dextrose, thus lowering the sodium content. We started with a volume of 25 milliliters in each group; this volume was increased or decreased by increments of 1 ml in subsequent patients, depending on the efficacy of the block in the previous patient of the same group, using the technique of "*up-and-down"* sequential allocation described by Dixon[1]. To model the probability of block in 50% of patients we made a logistic regression analysis with "*probit*" transformation. Efficacy of block was defined by a complete sensory block in the cutaneous distribution of the sciatic nerve within 30 minutes of the blockade.
Results: Thirty-five patients were included in each group. There were no statistically significant differences in the volume required for sciatic nerve block at the popliteal level in 50% of patients (MEAV-50) between the group with the usual dilution of 1.5% mepivacaine (6.2 ml; 95% confidence interval, 5.2-7.5 ml), compared with the dilution with lower sodium content (5.8 ml; 95% confidence interval 5.1-7 ml).
Conclusion: A dilution of 1.5% mepivacaine with 30% less sodium content does not decrease the volume requirements for ultrasound guided sciatic nerve block at popliteal level.
Reference: 1. Dixon WJ. Staircase bioassay: the up-and-down method. *Neurosci Biobehav Rev* 1991;15:47-50.

3AP1-9

Postoperative analgesia in total knee arthroplasty (TKA) after femoral nerve block (FNB) and sciatic nerve (SNB) with a single doses of ropivacaina by neurostimulation (NS) versus ultrasound (US)

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Background and Goal of Study: It is estimated that the knee surgery will increase by 300% until 2030. It is followed by severe pain in over 50% of the patients. Older patients with multiple co-morbidities are more sensitive to the adverse effects of opioids, increasing the incidence of postoperative nausea and vomiting, the average hospital stay and the delayed rehabilitation. It is recommended multimodal analgesia including NSAIDs associated with peripheral nerve block (PNB). In our hospital is usually to perform a PNB-NS with single puncture, administering ropivacaine. However, the US was proposed as an alternative using lower concentration and volume of local anaesthetic (LA).
Our study objetive compares the degree of postoperative analgesia in TKA after a single puncture making FNB and SNB using NS versus US with a single doses of ropivacaine 0.2% and 0.3%.
Materials and Methods: A prospective study by one year was done. Eighty-three patients scheduled for TKA were divided into groups by the blocking method (NS and US) and concentration of LA (ropivacaine 20 ml 0.2% and 0.3%). The visual analogue scale (VAS) was evaluated in three instances after the surgery (6 Hours, 12 hours and 24 hours).
Results and Discussion: VAS at 6h, 12h and 24h was not found with significant differences ($p > 0.05$), using both groups of ropivacaine 0.2% and 0.3%. A similar situation was found when comparing the NS versus US. The commencement of pain started in average 14 hours after surgery and 40% of the patients was required rescue analgesia in the first 24 hours.
Conclusion(s): Our study shows that the efficiency of the ropivacaine in low doses of 0.2% allows a better security to the patient, as proved by the literature. Furthermore, differences were not found with regards to the quality of analgesia between BP guided by NS vs. US. The situation can be justified by the main experience of the NE in our environment, and the utilization of the US has been included gradually.
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3AP1-10

Comparison of parasacral and posterior approaches to the sciatic nerve block with single injection for ankle and foot surgery

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Background and Goal of Study: Several different proximal approaches to the sciatic nerve block(SNB) have been described in the literature, however the classical posterior approach is undoubtedly the most used. Aim of our study was to compare the parasacral approach with the posterior approach in terms on onset time and success rate of SNB for ankle and foot surgery.
Materials and Methods: Twenty-four ASA I-III patients scheduled for ankle and foot surgery were randomized to receive a parasacral SNB using Mansour landmarks (Group M, $n=17$) or posterior approach using Winnie landmarks (Group W, $n=17$). All blocks were performed with the use of a nerve stimulator seeking either a tibial or peroneal motor response ,a solution of 10 mL 2% lidocaine and 10 mL 0.5% bupivacaine was slowly injected through the needle. The sensory blocks were assessed for 20 min after performing the block. The nerve block was considered as adequate, if neither sedation nor analgesics were required during surgery.The onset time and the success rate of blocks were assessed.
Results and Discussion: The onset time of sensory block was significantly faster in Group M then Group W,11 ± 2 min vs 16 ± 3 min ($P < 0.001$). The success rate of complete block was higher in the Group M then Group W, 100% vs 89%. Two patients in groups W required surgical infiltration by the surgeon. All surgeries were performed under SNB.
Conclusion(s): We conclude that parasacral SNB provided a faster onset time and a higher success rate block then the traditional posterior approach for ankle and foot surgery.
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3AP1-11

Effects of anesthesia versus peripheral nerve block on high-risk patients undergoing lower limb amputation

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Mortality after lower limb amputation for diabetic complications or peripheral disease is high. Patients undergoing amputation often have significant co-morbidities and risk factors for surgery such as diabetes, hypertension, renal disease and poor cardiovascular state. Peripheral nerve blocks (PB) have recently gained popularity due to their safety and reliability, but supporting evidence in patients with poor circulation is lacking. We analyzed anesthetic methods, cardiac function and lower limb amputation outcomes in high-risk patients.
Methods and Results: Retrospective data on lower limb amputation at TWMU from 2007 to Sep 2014 were analyzed. We studied 25 patients with ASA PS-3 or 4 (4 women,21 men, mean age 56.5 [range 40-85] years). Nine

patients had general anesthesia/spinal block (GA/SB) and 16 (6 with minimal sedation) had PB. Whether patients received GA/SB or PB was decided by attending anesthesiologists. PB was administered with nerve stimulation and ultrasound techniques.
Seventeen cases had ASA PS3 (E 6), and 4 had 8. Five cases underwent above-knee amputation and 20 below-knee amputation. Co-morbidities were diabetes in 20 cases, stage 5 chronic kidney disease in 20 and heart disease in 17. Cardiac function was evaluated by fractional shortening (FS) on TTE (mean 0.20, range 0.05-0.47). One patient underwent IABP insertion. One, two, three and no cardiac support drugs were given to 9, 8, 1 and 7 cases, respectively.
One GA case died before day 30, due to pneumonia and sepsis. The mortality rate was thus 0.04%. There were 2 in-hospital deaths. The other 22 cases were discharged. Twelve are alive, as of Dec 2014, 3 have died and long-term status is unknown in five cases.
Patients were divided into GA and PB groups. Anesthesiologists selected PB when cardiac function was low (FS 0.35 VS.0.16, p=0.03). Operative time was longer with PB (72.1 vs.109.9 min, p=0.01). Cardiac support drug use (1.4 vs.0.9; p=0.18) duration of hospitalization (72.9 vs.45.3 days; p=0.203) did not differ between the two groups.
Conclusion: Reported in-hospital mortality rates for patients undergoing major lower limb amputation range from 9% to 20%. In this study, there were no deaths in the short-term in PB cases. Our findings suggest PB to be both feasible and beneficial in high-risk patients.

3AP2-1

Perioperative ultrasound-guided truncal blocks improve early recovery after urgent abdominal surgery

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Background and Goal of Study: Critical-care patients in urgent abdominal surgery are often associated with hemodynamic instability, blood clotting defect and susceptibility to infection, which exclude the option of epidural anesthesia. In our hospital, these patients were treated with intravenous analgesia (IVA) and had more frequent complications like atelectasis and paralytic ileus. As a solution, we introduced multimodal analgesia (MA): a combination of IVA and truncal blocks, since April 2014. The aim of this study was to evaluate the influence of truncal blocks on early postoperative recovery.
Materials and Methods: Data were retrospectively collected on 50 consecutive unselected ASA 1E-2E patients who underwent laparotomy and admitted to the intensive care unit (ICU) between July 2013 and November 2014. Fentanyl and Dexmedetomidine were administered as basic analgesia. IVA group (n=30) was treated with IVA. MA group (n=20) was performed transversus abdominis plane block and rectus sheath block (0.2% ropivacaine 50ml) with the onset of postoperative somatic pain.
We compared the dosage of fentanyl and Dexmedetomidine during 3 postoperative days, length of ICU stay (LOS) and time to early ambulation between the two groups. We also assessed the analgesic effect of truncal blocks using visual analogue scale and Prince Henry Pain Scale. Data are presented as mean ± SD. Analysis was performed with Mann-Whitney U test and Fisher exact test.
Results: Demographic data and surgical characteristics were compatible between the two groups. Fentanyl consumption, LOS and time to early ambulation reached statistical significance (Table 1).

	IVA group (n=30)	M group (n=20)	p value
Fentanyl (µg)	612 ± 574	1622 ± 1192	0.01
Dexmedetomidine (µg)	300 ± 392	825 ± 850	0.06
Length of ICU stay (days)	2.7 ± 1.9	5.8 ± 5.7	0.01
Time to sitting square (hours)	24.6 ± 11.8	61.7 ± 29.5	0.01
Time to passage of gas (hours)	35.1 ± 19.1	68.4 ± 30.8	0.01
Atelectasis (%)	5	46.7	0.01

[Table 1: Comparison between the two groups]

Truncal blocks had a beneficial analgesic effect on postoperative somatic pain (table 2).

	VAS	PHPS	Duration (hours)	Number of blocks during 3PODs
Analgesic effect of truncal blocks	75.7 → 8.1	3.0 → 0.3	16.8 ± 5.6	1.6 ± 0.7

[Table 2: Analgesic effect of truncal blocks]

Technical complications and accidental side effects like local anesthetic toxicity were not reported.
Conclusion(s): Our study suggests that perioperative truncal blocks reduce opioid consumption and the risks of postoperative complications and therefore improve early recovery after surgery.

3AP2-2

Optimal levobupivacaine concentration for ultrasound-guided rectus sheath block in pediatric patients

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Background: Levobupivacaine, a new local anesthetic, was recently introduced for clinical use. However, to date, a reliable analgesic concentration of levobupivacaine for performing rectus sheath block (RSB) has not been reported. Therefore, we investigated the concentration of levobupivacaine required for ultrasound-guided RSB in pediatric patients undergoing laparoscopic inguinal hernia repair.
Method: Twenty-three pediatric patients (ASA PS 1-2; age range, 1 - 9 years) participated in this study with informed consent from their parents and with RSB approval. All patients received general anesthesia with sevoflurane and RSB. After slow induction with 5% sevoflurane in oxygen, intravenous infusion was mainteined and tracheal intubation was performed without muscle relaxants or narcotic analgesics. Anesthesia was maintained with sevoflurane, oxygen and air. RSB was performed with a linear probe of S-Nerve™ (6-13 MHz). The volume of levobupivacaine was maintained at 3 ml (right)+ 3 ml (left), and its concentration was started from 0.5%. The step size of the testing concentration was 0.05%, and the next concentration was determined according to Dixon's up-and-down method. The surgical procedure was started at least 15 minutes after levobupivacaine infusion. When the subject showed no movements and hemodynamic changes (heart rate and systolic blood pressure) were < 20% in comparison with baseline values, RSB was classified as "a complete block" at the testing concentration. ED_{50} and ED_{95} were calculated by the logistic analysis.
Result: ED_{50} was 0.17%, and ED_{95} was 0.35%. In all subjects who received 0.3% levobupivacaine, RSB was complete according to the up-and-down method.
Conclusion: In laparoscopic surgery, a concentration of 0.35% levobupivacaine was required to accomplish ultrasound-guided RSB in pediatric patients with inguinal hernia.

3AP2-3

Multimodal analgesia in laparoscopic nephrectomy: transversus abdominis plane block versus trocar site infiltration

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Background and Goal of Study: Transversus abdominis plane (TAP) block is useful in reducing post-operative pain in laparoscopic nephrectomy compared to placebo. We compared intraoperative remifentanil consumption and post-operative pain using TAP block or trocar site infiltration (TSI) in laparoscopic nephrectomies.
Materials and Methods: A prospective, randomized, controlled, single blind study was conducted after hospital ethics commission approval. Patients scheduled to laparoscopic nephrectomy with signed consent were randomized to TAP group - unilateral ultrasound-guided TAP block after induction or TSI group at end of surgery. Ropivacaine 0.375%, 30 ml was used. Remifentanil with target controlled infusion and sevoflurane were used to maintain a Bispectral Index <60 and >40.
Analgesia: Pacetamol 1gr and tramadol 100mg (repeated 8/8h thereafter) and morphine 0.05mg/Kg before end of surgery. Visual Analog Scale (VAS:0-

100mm) applied in recovery room at 15min (T1) and before discharge (T2) and 24h after surgery (T3) at rest and with cough.
Rescue drug: Morphine for a VAS< 30mm. Data: demographics, opioids consumption, VAS.
Statistics: A sample of 40 achieved by power analysis for mean VAS: 19mm and standard deviation: 15mm. Applied Student t, chi-squared and linear regression model; p-value < 0.05 for significance.
Result: Mean ± standard deviation.
Results and Discussion: Included 39 patients, 1 excluded for surgical complication. No differences in demographics.
VAS (mm) at rest: TAP vs TSI: T1=33±29 vs 39±32; T2=10±9 vs 17±18; T3=7±12 vs 10±18.
With cough: T1=51±34 vs 45±32; T2=24±24 vs 33±23; T3=20±23 vs 23±23; p>0.05 in all results.
Remifentanil: TAP=0.16+0.07mcg/Kg/min; TSI=0.18+0.9mcg/Kg/min (p>0.05).
Rescue opioid: TAP=4.4+3.49mg; TSI=6.87+4.83mg (p>0.05).
Conclusion(s): Remifentanil consumption, VAS score at rest and with cough and post operatory morphine consumption had no statistically significant difference between TAP and TSI. Multimodal analgesia with TAP block has not shown a significant clinical benefit compared with trocar site infiltration in laparoscopic nephrectomies.

3AP2-4

Does tramadol or bupivacaine intra-incisional infilteration with inguinal canal block during hernioplasty change postoperative pain profile?

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Background and Objective: Inguinal hernias are considered the most common primary true hernias and their incidence is estimated to be 3% in women and 27% in men in lifetime . Inguinal hernia repairs are the commonest procedures performed allover the world. A peripheral mechanism for opioids analgesia is investigated. Endogenous opioid-like substances released by immune cells infiltrating the inflammation site act on the opioid receptors found on the primary sensory neuron . Preemptive local anesthetics use is recommended to block central sensitization. The subcutaneous route has the advantages of avoiding first pass metabolism, improved patient comfort and good analgesia.
The study aimed to evaluate the effect of inguinal canal block together with intraincisional injection of tramadol versus bupivacaine 0.25 % on both intra and postoperative pain relief in patients undergoing inguinal hernioplasty under general anesthesia.
Materials and Methods: The study was conducted on 60 male patients scheduled for elective inguinal herinoplasty under general anesthesia in Kasr Alainy School of medicine.
Patients were randomly allocated into three groups:
Group (C) ***[****Control group, (n= 20)]*.
Group (B): *[bupivacaine 0.25% Group, (n = 20)]*
Group (T) *[Tramadol Group, (n = 20)]*.
During the surgery, the MAP and HR were traced every 5 minutes. Total Intraoperative fentanyl requirement, and postoperative VAS and sedation scores as well as nausea and vomiting were recorded, patient and surgeon satisfaction were questioned.
Results and Discussion: The Intraoperative MAP, HR and fentanyl requirement were statistically lower in both the bupivacaine and tramadol groups compared with the control group. The Postoperative Visual Analogue score was statistically lower in both the bupivacaine and tramadol groups compared with the control group. Postoperative nausea & vomiting were statistically higher in tramadol groups compared with the control group and bupivacaine groups.
The scoring of postoperative patients' satisfaction was statistically higher in tramadol groups compared with the bupivacaine and control groups.
Conclusion: The study offered a new technique using tramadol as a locally infiltrated drug during inguinal hernioplasty aiming to decrease intra and postoperative pain together with reducing analgesic needs to minimum during and after the operation with the consequent beneficial reduction of narcotic side effects.

3AP2-5

Evaluation of topical anesthesia alone versus combined with intracameral lidocaine 1% in patients undergoing implantable collamer lens (ICL) procedure

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Background and Goal of Study: Local anaesthesia nowadays became the first choice in ophthalmic implantable collamer lens surgery, it shows fewer complications and patient satisfaction, in this study we test the efficacy and safety of topical anaesthesia alone versus topical anaesthesia with intracameral injection of 1% lidocaine.
Materials and Methods: A double blinded randomized study of 102 eyes, patients were prepared for bilateral ICL/TICL procedure on the same setting. Group I (1 eye) received topical anesthetic drops and Group II (the second eye) received topical anesthesia plus intracameral lidocaine 1%, both groups were tested for the pain score and the cornealendothelial cell count.
Results and Discussion: 27 patients (52.94%) in group I reported pain with peripheral iridectomy, 29 (56.86%) with ICL insertion and tucking of footplates and only 9 patients (17.647%) reported varying degrees of discomfort during irrigation aspiration of viscoelastic, no statistical differences between both groups regarding the endothelial cell count.
While in group II, most patients tolerated the operation well, Slight discomfort was noted as a sensation of minimal heaviness reported by some patients during the ICL implantation.
Conclusions: Topical anaethesia combined with intracameral 1% lidocaine is safe and more effective than topical anesthesia alone.
Keywords: Intracameral lidocaine 1%, topical anaesthesia, implantable collamer lens procedure.

3AP2-7

Dexmedetomidine and remifentanil as adjunct to regional anesthesia, a randomized controlled trial

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Background and Goal of Study: Spinal anesthesia is one of the most commonly preferred methods for orthopedic surgery. It is of quite importance to decrease anxiety of awake patient during the operation under spinal anesthesia. Plenty of drugs have been used for this purpose. We aimed to compare dexmedetomidine and remifentanil administered for sedation and evaluate it by Observer's Assessment of Alertness/Sedation (OAA/S) scale and Bispectral Index (BIS) scores.
Materials and Methods: Patients aged 18-65 years undergoing orthopedic knee surgery under spinal anesthesia were divided into two groups. Group D received dexmedetomidine 1 μg/kg bolus, then 0.2 μg/kg/h infusion; Group R received remifentanil 0.5 μg/kg bolus, then 3 μg/kg/h infusion. Hemodynamic variables and respiratory parameters were recorded. Sedation level was measured by OAA/S and BIS. Categorical comparisons were made with Chi-Square or Fisher's Exact Test. Mann Whitney U Test was used to compare whether any difference was existed or not between the groups and in independent groups t-test was used. P<0.05 was accepted as significant.
Results and Discussion: There was no marked difference in hemodynamic parameters between the two groups, but Group D had higher OAA/S and lower BIS scores compared with Group R. Recovery times in Group R and Group D were significantly different and measured as 7.67 ± 5.50 and 33.33 ± 6.17 minutes, respectively, (P<0.001) Although respiration was depressed more in Group R, recovery time was shorter in Group D.
Our study revealed that, lower BIS values and higher OAA/S scores, which mean deeper sedation, were observed with dexmedetomidine compared with remifentanil. On the other hand, shorter recovery time was observed with remifentanil. Sedation related risks are associated with sedation level. It should be monitored for prevention of these risks. In our study in order to monitor the consciousness and sedation levels of patients, we used BIS and frequent assessment of OAA/S scores.

Conclusions: Both remifentanil and dexmedetomidine can be used for sedation provided that the respiratory parameters are monitored. While faster recovery was provided by remifentanil, deeper sedation was achieved by dexmedetomidine.

3AP2-8

Comparison of tramadol and lornoxicam in IVRA, a randomized controlled trial

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Background and Goal of Study: Tourniquet pain is one of the major obstacles for intravenous regional anesthesia (IVRA). We aimed to compare tramadol and lornoxicam used in IVRA as regards their effects on the quality of anesthesia, tourniquet pain and postoperative pain as well.
Materials and Methods: After the ethics committee approval 51 patients of ASA physical status I-II aged 18-65 years were enrolled. The patients were divided into three groups. Group P (n = 17) received 3 mg/kg 0.5% prilocaine, group PT (n = 17) 3 mg/kg 0.5% prilocaine + 2 ml (100 mg) tramadol and group PL (n = 17) 3 mg/kg 0.5% prilocaine + 2 ml (8 mg) lornoxicam for IVRA. Sensory and motor block onset and recovery times were noted, as well as tourniquet pains and postoperative analgesic consumptions. Student's t-tests were used for comparisons of data which are commonly expected to be normally distributed, e.g. demographics, time of the onset and recovery of sensory and motor block, duration of the operation and tourniquet, duration of analgesia, and intraoperative and postoperative analgesic use. Kruskal-Wallis test was used for intraoperative and postoperative Visual Analogue Scale (VAS) comparisons. Significance was assumed at $P<0.05$.
Results and Discussion: Sensory block onset times in the groups PT and PL were shorter, whereas the corresponding recovery times were longer than those in the group P, ($P<0.001$). Motor block onset times in the groups PT and PL were shorter than that in the group P, whereas recovery time in the group PL was longer than those in the groups P and PT, ($P<0.001$). There was no difference regarding tourniquet pain among the groups. Group PL displayed the lowest analgesic consumption postoperatively, ($P<0.05$).
The main outcome of our study was that postoperative analgesic consumption was markedly less in the group where lornoxicam was added to prilocaine. In the groups with tramadol and lornoxicam sensory block onset times were shorter and recovery times were longer. Again, in the groups with tramadol and lornoxicam motor block onset times were shorter, whereas in the group with lornoxicam motor block recovery time was markedly longer.
Conclusions: Adding tramadol and lornoxicam to prilocaine for IVRA produces favorable effects on sensory and motor blockade. Postoperative analgesic consumption can be decreased by adding tramadol and lornoxicam to prilocaine in IVRA.

3AP2-9

First clinical evaluation of the vertical obturator nerve block: a prospective, randomized, double-blind, pilot study

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Background/Aims: The Institute of Anatomy at the Medical University of Graz developed a new morphological approach for the obturator nerve block (Vertical Obturator Nerve Block; VOB). Promising results on 88 cadavers (=176 lower limbs) encouraged us to test this new technique in patients in our daily hospital routine.
Methods: A prospective, 2:1 (study/control group, n=30) randomized, double-blind, parallel designed pilot trial was approved by our Institutional Ethics Committee and registered at clinicaltrials.gov (NCT01875289). We used 5 ml 0.75 % ropivacaine (37.5 mg) in the study group, and 5 ml 0.9% sodium chloride in the control group. The primary outcome was adductor muscle strength before and 15 minutes after nerve block, and the difference between both groups. The adductor muscle strength was measured with a manual sphygmomanometer: Patients were instructed to squeeze the cuff, already inflated to 40 mm Hg, between their extended knees. The maximal sustained pressure was taken as the baseline adductor strength.
Results: The difference between groups was not significant ($p=0.074$). A successful obturator nerve block was observed in the study group (n = 3), but not in the control group (n = 0), based on a cut off at 50 % decrease in muscle strength. The prep time before needling was 97.5 ± 96.8 seconds (mean; SD).The needle-in-body-time was 32.4 ± 18.3 seconds (mean; SD). The whole nerve block took 129.8 ± 100.7 seconds (mean; SD). Mean patient´s pain intensity during needling was 2.9 ± 1.73 (SD) on a Numeric Rating Scale (0-10). Every patient would be willing to agree to this nerve block in future.
Conclusion: The VOB appears to be a simple, safe, painless and outstanding fast compared to the common obturator nerve blocks. Nevertheless, the lower count of success indicates needs for improvement. We consider to use electro-stimulated plus/minus ultrasound targeting in future to increase the success rates.

3AP2-10

Smoking and post-dural puncture headache

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Background and Goal of Study: Post-dural puncture headache (PDPH) is a well-known complication of spinal anesthesia. Many factors like age, sex, pregnancy, previous history of PDPH, needle size and shape, clinical experience of the operator are involved in its development. However, there are little information about the relationship between tobacco exposure and PDPH in the current literature. We aimed to investigate possible relationship between smoking habit and PDPH development, taking into consideration the effects of tobacco on coagulation cascade.
Materials and Methods: Data of 254 pregnant female patients undergone cesarean delivery under spinal anesthesia were collected for the study. Patients were divided into two groups regarding their smoking status as Group S (smokers, n = 100) and Group N (non-smokers, n = 154). Postoperative 1 week records of the patients were evaluated and headache incidences were noted. Independent samples t-test and Chi-square tests were used for statistical analysis.
Results and Discussion: Data of two hundred fifty four patients were collected for the study. Twelve (12%) patients in the Group S and 12 (7.8%) in the Group N had experienced PDPH. No significant difference was found between the two groups.
The main finding of our study was that smoking had no prominent effect on PDPH development. Dodge et al.(1) have demonstrated that smoking results in decreased rate of PDPH. They have speculated that clot-promoting and coagulation-inducing effects of smoking can promote better sealing of the dural hole, the main pathophysiological factor in PDPH. However, our findings were not coherent with Dodge et al. Other etiological factors might have been involved, including race. Our second hypothesis was the possible effect of neurochemical factors related with tobacco exposure on PDPH generation. Nicotine stimulates central nervous system activity of dopamine, which is converted into norepinephrine, which can result in vasoconstriction facilitating dural sealing, thus limiting PDPH.
Conclusions: Tobacco exposure does not seem to affect the risk of PDPH. More studies can be made in this respect, considering scarcity of the material regarding the issue in the current literature. Further studies should contain data about the quantity of tobacco exposure.
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3AP2-11

Validation of a low cost training device to limit injection pressure during regional anaesthesia

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Background and Goal of Study: During regional anaesthesia injection pressures >75 kPa indicate intraneural injection and potential nerve injury [1]. We developed a simple training tool to measure injection pressure, using a sealed air filled 20mL syringe (Fig. 1). We performed a blinded randomised study to test accuracy and repeatability.
Materials and Methods: Real time pressure from the syringe was measured using a water-filled manometer line, calibrated pressure transducer, and A/D converter connected to a laptop.
An 11x11 randomised Latin Square [2] provided 11 unique permutated sequences of 11 calibration values (0 to 200 kPa). Operator 1 moved the syringe plunger to scale positions indicated by the randomised sequence. Operator 2 recorded plateau pressures indicated by the laptop. Operator 1 was blinded to transducer readings: Operator 2 was blinded to sequence and syringe.
Syringe readings were plotted against mean transducer readings and Bland-Altman analysis was performed to assess agreement.
Results and Discussion: The device demonstrated good accuracy and repeatability (95% CI < +/- 5 kPa) over the clinically important pressure range of 0 to 100 kPa (Fig.1,2). Increasing under-read and decreased repeatability occurred as pressure increased due to non- ideal behaviour of gas and reduction of scale size with increasing pressure.
Conclusion(s): Our simple low-cost device is suitably accurate and precise over the range of pressures which may cause nerve injury, and could be used as a training tool in the clinical setting.
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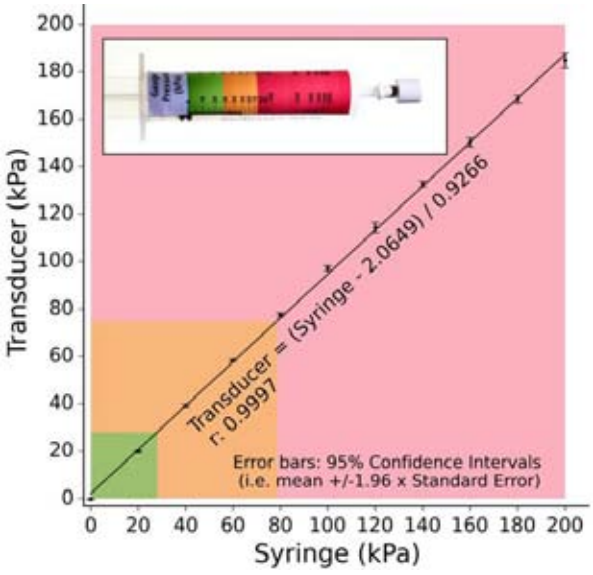
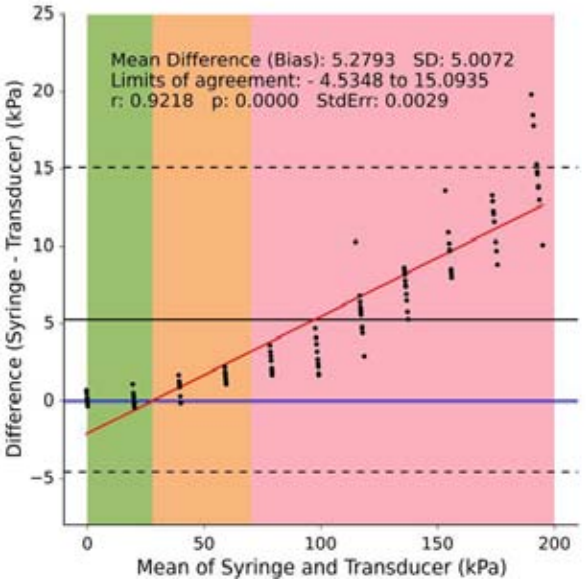


[Figure 1]



[Figure 2]

3AP3-1

Local toxicity from bupivacaine: sustained release PEG/PLA formulation versus continuous peripheral nerve catheter

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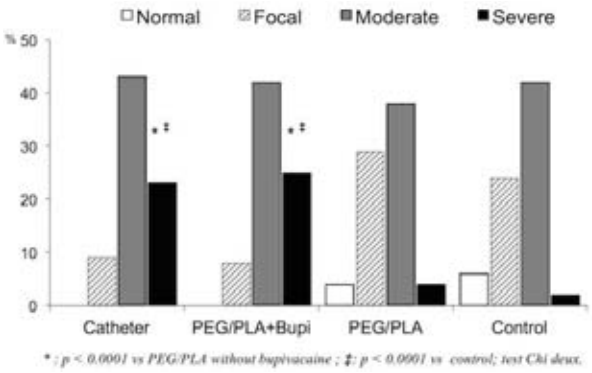
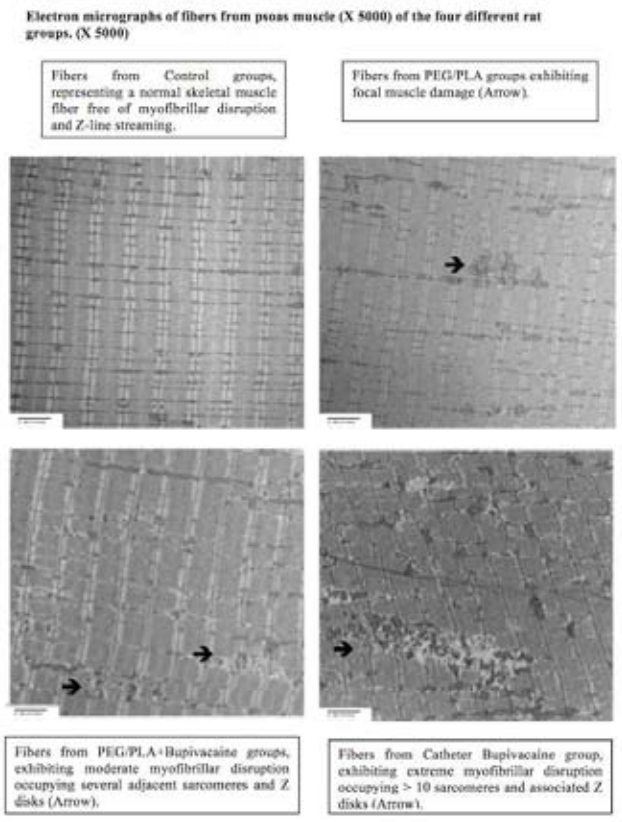
Background: The inclusion of local anesthetic (LA) in a gel of poly (lactic-co-glycolic) acid (PEG/PLA) sustained release formulation has been developed to provide a prolonged duration local analgesia over many days from a single injection. This study aims to assess the PEG/PLA (without bupivacaine) and PEG/PLA+bupivacaine formulations on muscle and neural damage compared to the intrinsic local toxicity induced by a prolonged bupivacaine exposition through a perineural femoral catheter.
Methods: Twenty rats were randomized into four groups: the catheter group received a prolonged bupivacaine infusion; the PEG/PLA and PEG/PLA+bupivacaine groups received single injection of gel formulation; the control group was only exposed to the surgical procedures. Tissue from the site of injection was harvested for histological assessment using both light and transmission electron microscopy (TEM).
Results: At 72h, histological examination showed no difference on muscle damage score between the catheter group and both the PEG/PLA groups (with and without bupivacaine). A non-specific local inflammatory reaction and necrotic myocytes were present in all groups. TEM ultrastructural muscle analysis revealed a significative quantitatively and qualitatively more severe architectural destruction of the sarcomeres in the catheter and PEG/PLA bupivacaine groups compared to the two groups unexposed to bupivacaine (PEG/PLA and control groups).



[Percentage of psoas muscle fibers exhibiting ultrastructural muscle damage under electron microscopy]



[Qualitative ultrastructural muscle damage]

Light microscopy of femoral nerve sections showed no significant endoneural edema and no alteration of axon-myelin integrity.
Conclusion: Our results show no specific neural or muscle toxicity of the gel of PEG/PLA. Further evaluation of the effectiveness of this sustained release formulation of LA could lead to consider its use in humans, with great impact on patient´s comfort and quality of care provided after surgery.

3AP3-2

Antiarrhythmic effect of pentadecapeptide BPC 157 after bupivacaine toxic dose is NO-system related

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Background and Goal of Study: Bupivacaine cardio toxicity causes cardiac rhythm disturbances very hard to treat. Pentadecapeptide BPC 157 antiarrhythmic efficacy was established in previous studies of digoxin toxicity, hyper- and hypokalemia. These effects are realized through NO-system.
The aim of the study is to establish the efficacy of BPC 157 when cardiac rhythm disturbances are caused by bupivacaine toxic dose and to explore whether they are NO-system related.
Materials and Methods: Female Wistar rats, 200-250 mg were divided into groups of 6, anesthetized with diazepam 5mg/kg and thiopental 40 mg/kg intraperitoneally (i.p.), with Ethics comity approval.

Experimental groups							Control group
Applicated i.p.*	L-NAME (5mg/kg)	L-NAME + BPC 157 (10 µg/kg)	L-ARGININ (100 mg/kg)	L-ARGININ + BPC 157	L-NAME+ L-ARGININ	L-NAME+ L-ARGININ + BPC 157	0.9% NaCl (5ml/kg)
The number of animals	6	6	6	6	6	6	6

[The design of the study]

*Therapeutic protocol: 1 minute after bupivacaine 100 mg/kg i.p.

Three standard leads ECG was recorded continuously for 60 minutes. The duration of the waves and intervals (P, PR, QRS, QT, RR) and the amplitudes of the waves (P, R, S, T) were analyzed. The results were compared using ANOVA with $p < 0.05$.
Results and Discussion: Bupivacaine caused conduction disturbances with prolongation of all of the observed waves and intervals, as well as lowering of R-wave amplitude and augmentation of S and T wave amplitudes, while 50% of the animals in the control group developed higher degree AV-block with respiratory arrest and asystolia.
L-NAME, NOS inhibitor, aggravated bupivacaine toxicity, with inevitable death, while L-arginin as NO-precursor abolished those effects with mutual counter effect when combined. BPC 157 was superior to L-arginine, prevented or counteracted those ECG changes, with lower mortality and significant prolongation until time of death.

Experimental groups							Control group
Applicated i.p.	L-NAME	L-NAME + BPC 157	L-ARGININ	L-ARGININ + BPC 157	L-NAME+ L-ARGININ	L-NAME+ L-ARGININ + BPC 157	0.9% NaCl
Mortality	6/6	4/6	0/6	0/6	3/6	0/6	3/6
Time of death (min)	25.0+8.5	40.5+2.5*	-	-	21.5+1.5	-	19.7+5.8

[The effect of BPC 157 on mortality]
*$p < 0.05$

Conclusion(s): BPC 157 has antyarrhythmic effect after bupivacaine toxic dose was applied, realized through the interaction with NO-system.
References:
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3. Barisic I, Balenovic D, Klicek R et al: Mortal hyperkalemia disturbances in rats are NO-system related. The life saving effect of pentadecapeptide BPC 157. Regul Pept 2013;181:50-66

3AP3-3

Lidocaine hydroxyl derivative produces long-lasing regional anesthetic effects by combined with surface-active agent

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Background and Goal of Study: Long-lasing regional anesthetic effect is useful in clinical setting. However, the commonly used local anesthetics are relatively with short durations. In this study, we designed lidocaine hydroxyl derivative, which is more polar than lidocaine. We hypothesized that surface-active agents could facilitate permeation of lidocaine hydroxyl derivative through membrane and produce long-lasting regional anesthesia with its higher polar property. All the study was designed to evaluate this hypothesis.
Materials and Methods: Rat model of sciatic nerve block was performed with lidocaine (30 mM), lidocaine (30 mM) + Tween 20 (4 mM), lidocaine hydroxyl derivative ((30 mM, lidocaine-OH), and lidocaine hydroxyl derivative (30 mM) + Tween 20 (4 mM), respectively. Sensory block was evaluated by pin-prick stimulus and motor block by motor function score scale. Durations of sciatic nerve block were determined. For the experiments in vitro, HEK293 cells were applied for cell uptake observations. HEK293 cells were incubated with lidocaine, lidocaine + Tween 20, lidocaine-OH and lidocaine-OH + Tween 20, respectively. For evaluation of entry, concentrations of lidocaine and/or lidocaine-OH in cytoplasm were determined by HPLC after 10 min of incubation. Then, all the compounds were washout by fresh media. Thirty minutes after washout, concentrations of lidocaine and/or lidocaine-OH in cytoplasm were determined by HPLC.
Results and Discussion: In sciatic nerve block, durations of lidocaine were not prolonged by adding Tween 20. For lidocaine-OH, its durations were significantly prolonged by Tween 20 both in sensory (83±7 vs. 180±11 min, $P < 0.01$) and motor blockade (54±4 vs. 120±9 min, $P < 0.01$). No nerve injury was found after all the nerve block. In cell uptake experiments, membrane permeation of lidocaine and/or lidocaine-OH were both facilitated in addtion of Tween 20, while the facilitation of membrane permeation (calculated as Cwith

Tween/Cwithout Tween ×100%) was significantly higher for lidocaine-OH than lidocaine (109.6% vs. 180.4%, P< 0.001). At the same time, elimination of cytoplasm lidocaine-OH was slower than lidocaine and both of them were unaffected by adding Tween 20.
Conclusions: Combination of lidocaine derivatives with Tween 20 might be used as long-lasting local anesthetic, which could be of clinical value.

3AP3-4

Histomorphometric evaluation of liposomal bupivacaine induced sciatic nerve injury in the porcine model

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Background: Liposomal bupivacaine (LB) is a novel local anesthetic formulation which contains encapsulated bupivacaine in concentration of 1.3%. Due to its prolonged release, local anaesthesia can last up to 72 hours. That could lead to a useful clinical application for peripheral nerve blocks, i.e. as in terms of a replacement for the currently used catheters. However, given its novel formulation and prolonged nerve exposure, it is not well determined whether LB can lead to neurotoxicity. The purpose of this study is to assess the potential neurotoxic effect of LB after perineural and intraneural (interfascicular) injections in the sciatic nerve in piglets by using a quantitative histological analysis.
Material and methods: After Review Board for Animal Research approval, 15 piglets were studied in this double-blind prospective randomized trial. 4 ml of 1.3% LB (Exparel, Pacira Pharmaceuticals, Inc. San Diego, CA) was injected either perineurally (n=5) or intraneurally-interfasciculary (n=5). Intraneural-interfascicular injection of 0.9% NaCl 4 ml (n=5) was used as a control for injection injury evaluation. Injection pressure monitor was used to minimize the risk of intrafascicular injection. At a 2-week end point, the treated and the control sciatic nerves were harvested to perform a histomorphometric analysis.
Results: No changes in axonal density or myelin structure indicative of a nerve injury were observed. The detailed histomorphometric analysis revealed a similar distribution of small and large diameter myelinated and unmyelinated nerve fibers as well as almost equal proportion between myelin sheath thickness and a fiber diameter (Table 1). There were no statistically significant differences observed between the three groups.

Type of injection	Total fibers per nerve	Fiber area (µm²)	Fiber density in fascicles (fibers/ mm²)	Percent area of fascicles per nerve (%)	Percent of large fibers from all fibers (%)	Axon (large fibers) diameter (µm)	Large fibers diameter (µm)	Myelin width (µm)
Intraneural LB (n=5)	29816,71± 10837,55	34,096 ±16,20	15074,49 ±7017,88	47,49 ±10,58	50,77 ±17,10	3,72 ±1,97	8,96 ±2,07	2,62 ±0,50
Perineural LB (n=5)	34527,40± 14515,50	24.100 ±3,99	15015,11 ±5571,71	54,47 ±8,34	65,36 ±19,07	3,07 ±0,350	8,32 ±1,60	2,63 ±0,74
Intraneural 0.9% NaCl (n=5)	33051,0944 ±20870,18	29,136 ±9,332	12254,05 ±3008,43	56,26 ±7,61	67,74 ±15,73	3,51 ±0,56	8,95 ±0,86	2,72 ±0,58
Negative control, non-injected (n=5)	37218,44± 20870,18	30,187 ±13,36	15211,87 ±7266,80	54,20 ±3,71	61,38 ±21,89	3,49 ±0,96	8,75 ± 1,36	2,63 ±0,38
P-value	P= 0,843	P=0,100	P=0,214	P=0,059	P=0,450	P=0,844	P=0,905	P=0,990

[Tbl.1 Summary of Histomorphometric Analysis]

The data is presented as mean ±SD
Conclusion: Under the conditions of our study, the use of LB in clinically relevant concentrations for either perineural or intraneural (interfascicular) injection did not exhibit neurotoxicity. However, the data we gathered are insufficient to make direct translation into clinical practice.

3AP3-6

Comparison of blood methemoglobin levels in patients who had upper extremity operation with different regional blocks

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Background and Goal of Study: RIVA (regional intravenous anesthesia) and axillary block are the commonly used regional anesteshia technics in upper extremity surgery. Local anesthesic drugs which are used in these technics may cause methemoglobinemia. In this research, our targets are the noninvasively measurement of blood methemoglobin levels by using pulse co-oximeter (Radical 7 Masimo,USA) in patients who had upper extremity surgery with RIVA and axillary block, early diagnosis of methemoglobinemia which is based on usage of local anesthesic drug and preventing the complications of this situation.
Materials and Methods: This research is done on 48 patients which are ASA group I-III and 18-70 years old had hand, wrist, forearm surgery by using axillary block or RIVA. RIVA was applied in forearm, hand, wrist operations which have durations below the 60-90 minutes. Axillary block was performed to the elbow, forearm, wrist and hand surgeries which had more operation time (8-12 hours).
Axillary block with neurostimulation technic was performed to the group I (n=24) by administrating prilocaine %2 (5 mg/kg). RIVA was performed to the group II (n=24) by administrating prilocaine %2 (3 mg/kg). Heart rate (HR), electrocardiography on DII derivation, noninvasive systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and peripheral oxygen saturation (SpO2) values were watched by using the anesthesia monitor before and during the surgery.
Also, basal methemoglobin values were measured with pulse co-oximeter in all patients. These measurements were performed at 0th, 30th, 60th, 90th minutes in group I patients. The measurements on group II patients were performed at 0th, 30th, 60th minutes, during taking off tourniquet and 30 minutes after taking off tourniquet.
Results and Discussion: After the measurements, the mean of methemoglobin level on group I was 1.77%. We have found the mean of methemoglobin levels on group II as 4.43%.
Conclusion(s): As a result, methemoglobin level was higher in patients had axillary block than patients had RIVA.
References:
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3AP3-8

Incidence of local anaesthetic systemic toxicity and adoption of intravenous lipid emulsion treatment in Finnish anaesthesia departments in 2011-2013

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Background and Goal of Study: The incidence of local anaesthetic systemic toxicity (LAST) is declining, but despite new technical nerve blocking aids, the risk of LAST remains.[1] National LAST treatment guidelines including administration of intravenous lipid emulsion (ILE) have been published, e.g., in the UK.[2] A national survey was performed in Finland, a country lacking national LAST treatment guidelines, to obtain facts about incidence of LAST, outcome of treatment and existence of treatment protocols.
Materials and Methods: A structured electronic questionnaire was sent to anaesthesia department chiefs of all Finnish public hospitals (*n*=45) including five university hospitals with their affiliations (*n*=18), and central and district hospitals (*n*=27) in spring 2014. Non-responders were contacted by telephone. We collected information about the occurrence and outcomes of LAST in 2011-2013, and if the departments had their own treatment protocols possibly including lipid emulsion.

Results and Discussion: The questionnaire response rate was 100% covering approximately 95% of regional anaesthesias managed by anaesthesiologists in Finland (total number of regional anaesthesias excluding spinal anaesthesia was 211,700 in 2011-2013). Fifteen LAST cases were reported resulting in incidence of 0.7 (95% confidence intervals [CI] 0.4-1.2) per 10,000. In university hospitals the incidence (95% CI) was 0.3 (0.09-0.9) per 10,000, and in non-academic hospitals 1.1 (0.6-2.0) per 10,000. One patient (caudal block) developed cardiac toxicity symptoms and fourteen patients (nine interscalene brachial plexus blocks) convulsions; ultrasound guidance had been applied in five cases. ILE, in addition to other medications, was given to five patients; all recovered without sequelae. Relative risk of occurrence of LAST in non-academic vs. university hospitals was 3.3 (95% CI 1.0-10.3; $P=0.04$). In 21 (47%) departments LAST treatment protocols included lipid emulsion.
Conclusions: The incidence of LAST in nerve blocks performed by anaesthesiologists was very low (0.7:10,000), and slightly higher in non-academic than in academic units. LAST may occur despite the use of ultrasound guidance. Almost half of the Finnish anaesthesia departments have adopted ILE treatment for LAST despite the lack of national guidelines and knowledge of possible mechanisms of action of ILE.
References:
1. Reg. Anesth. Pain. Med. 2013;38:289-97
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3AP3-9

Impact of anesthesia method on cancer recurrence after laparoscopic colorectal surgery (LCS)

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Background and Goal of Study: The surgical-stress-induced release of hormones mediates inhibitory effects on immune functions. Neuroaxial blockade in the perioperative period may influence the immune response and cancer recurrence of several cancer types. The goal of the present study was to determine the correlation between perioperative epidural analgesia, lower inflammation response and time to cancer recurrence in LCS.
Materials and Methods: Local Bioethics Committee's approval was received, patients ASA I-III scheduled for LCS were randomised to receive general anaesthesia (GA) or combined general anaesthesia with epidural analgesia (EA) between June 2010 and November 2012. Follow up ended in December 2013. Cox proportional model was used. 52 records were analysed.
Results and Discussion:

Data	Total (n=52)	Group GA (n=24)	Group EA (n=28)	p value
Age group [years, n, (%)]/40-59/60-69/>70	18(34.6)/16(30.8)/18(34.6)	9(37.5)/8(33.3) /7(29.2)	9(32.1)/8(28.6)/11(39.3)	0.747***
ASA [n, (%)]/1/2/3	1(1.9)/31(59,6)/20(38.5)	1(4.2)/ 15(62.5)/8(33.3)	0/ 16(57.1)/12(42.9)	0.464 ***
Anaesthesia duration (min, mean±SD)	209.04±52.53	211.67±62.67	212.86±42.83	0.576**
Surgery duration (min, mean±SD)	169.33±50.93	170.63±60.19	168.21±42.56	0.867**
Morphine consumption (surgery, mg, mean±SD)	6.14±3.54	10.00±0	2.96±0.19	0.000****
Morphine consumption, postoperative (mg, mean±SD)	6.77±3.02	10.00±0	4.13±0.87	0.000****
Morphine consumption, total (mg, mean±SD)	13.47±7.88	20.04±7.16	7.84±4.05	0.000****
Cortisol before surgery (nmol/l, mean±SD)	303.42±119.46	284.17±99.05	319.29±133.63	0. 301**
Cortisol after surgery (nmol/l, mean±SD)	424.82±222.54	514.65±196.72	351.04±218.31	0.008**

[General characteristics of the study population]

n - number of patients, SD - standard deviation; * - Fisher's Exact Test; ** - T-test; *** - Pearson Chi-Square; **** - Mann-Whitney U.

There were statistically significant differences in cancer recurrence between the gender in EA group, p-0.021. Statistically significant differences in morphine consumption with lover counts in EA group, p-0,000 (during operation and for postoperatively). There was lower secretion of cortisol in EA, p-0,008 after surgery. No differences in cancer recurrence were determined between age groups.

Figure A. Overall survival for the general anaesthesia with intravenous analgesia and general anaesthesia with epidural analgesia methods.

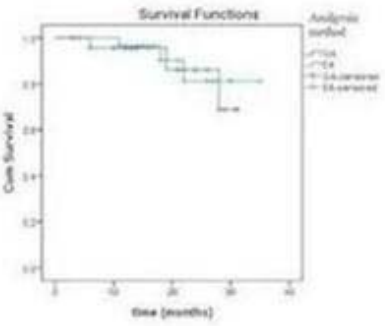


Figure B. Overall survival for the general anaesthesia with intravenous analgesia according gender of patients.

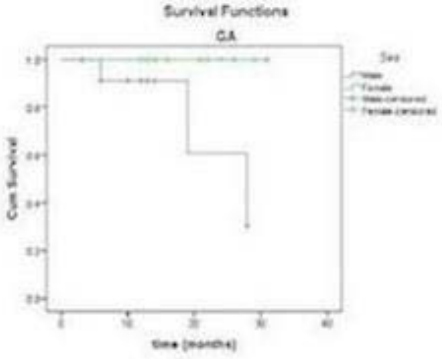
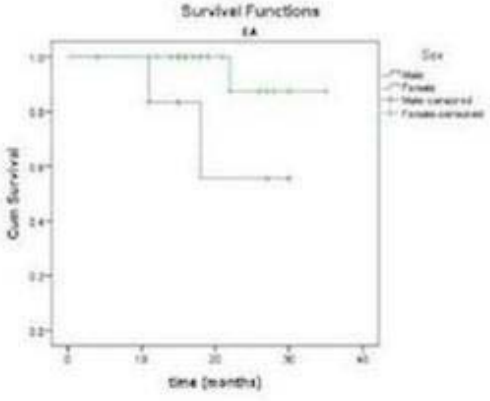


Figure C. Overall survival for the general anaesthesia with epidural analgesia method according gender of patients.



[Overall survival for GA, EA methods and gender]

Conclusion(s): Cancer recurrence according to patients' gender was better in female compared to male in both groups. No additive benefit was detected in cancer recurrence with epidural or older patients. EA warranted lower morphine consumption perioperatively in LCS and attenuate stress response reducing secretion of cortisol.

3AP3-10

Comparison of Meperidine and Fentanyl for prevention of shivering during spinal anesthesia

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Background and Goal of Study: Postoperative shivering is an unpleasant side effect after spinal anaesthesia.The incidence can vary from 5% to 60% of patients after spinal anesthesia.Shivering increases oxygen consumption, metabolic rate, lactic acidosis, carbon dioxide production, plasma catecholamines, and cardiac output. Meperidine is a well-known effective drug for prevention and treatment of shivering. Fentanyl is a opiate analgesic and also known to have an anti-shivering effect. We compared Fentanyl with Meperidine for efficacy of prevention of shivering during spinal anesthesia.
Materials and Methods: Six hundred and fifty (650) patients, American Society of Anesthesiologists physical status I or II, aged 40-75 years, scheduled for elective urologic surgery under spinal anesthesia were investigated. Patients with ASA physical status >II ,Obesity (BMI>28kg/$m^{2)}$, Parkinson›s disease, Rayaud›s syndrome, ischemic heart disease,or cerebrovascular disease requiring blood transfusion during surgery were excluded from the study. Patients were randomly divided into two groups, Meperidine (Group M, n =325) and Fentanyl (Group F, n = 325) groups. Group M and F received Meperidine 0.4 mg/kg or Fentanyl 1.5 mcg/kg.respectively, in 100 ml of isotonic saline intravenously. All drugs were infused for 15 minutes by a blinded investigator before spinal anesthesia. Blood pressures, heart rates, body temperatures and side effects were checked before, during and after spinal anesthesia.
Results and Discussion: The incidences and scores of shivering were not similar between the two groups. Shivering was seen in 5 (1.5%) patients who received meperidine, while in the fentanyl group,shivering occurred in 80 patients (24.6%).In Meperidine group compared to Fentanyl group was seen to have a significance in preventing intraoperative and postoperative shivering in recovery without increasing the side effects (P<0 .001). Blood pressure, body temperature, and arterial oxygen saturation did not have a clinically significant change and they were not different between the two groups. Side effects of opioids were unremarkable.
Conclusion(s): We conclude that Meperidine infusion in the periopertaive period significantly reduced shivering associated with spinal anaesthesia in urologic procedures.Meperidina is a better alternative than Fentanyl for preventing shivering in patients during spinal anaesthesia (P<0.001).

3AP4-1

Measurement of interpedicular area as a possible alternative for cerebrospinal fluid volume

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Background: The interpedicular (IP) area, defined as the area between the medial surfaces of the pedicles, might correlate with cerebrospinal fluid (CSF) volume, resulting in a significant correlation between IP area and peak sensory block level of spinal anesthesia.
Methods: We reviewed the lumbar spinal radiographs of 186 patients who were candidates for our previous studies; 141 patients underwent spinal or epidural anesthesia. Lumbosacral CSF volumes were calculated from axial magnetic resonance images. The IP areas were calculated from plain lumbar films. Spinal anesthesia (3 mL plain or hyperbaric 0.5 % bupivacaine) was administered using a 25-gauge pencil-type needle (n = 41,74 each). Epidural anesthesia (10 mL of 1.0 % ropivacaine) was performed using a 20-gauge Tuohy needle (n = 26). The spread of sensory anesthesia was assessed by pinprick.
Results: CSF volume correlated with height (r = 0.27, *P*<0.001) and body mass index (r = -0.19, *P*<0.05), but not with age or weight. There was a significant correlation between CSF volume and IP area (r = 0.56, *P*<0.001). Similar to CSF volume, IP area correlated with the peak sensory block level of plain bupivacaine spinal anesthesia (r = -0.36, P = 0.021), hyperbaric bupivacaine spinal anesthesia with the patient in the lateral (r = -0.45, P = 0.0006, n=37) and seated positions (r = -0.53, P<0.001, n=37), and epidural anesthesia with ropivacaine (r = -0.53, P =0.005). Among the correlations examined between patient characteristics and peak sensory block level, only body mass index correlated with the peak sensory block level of plain bupivacaine spinal anesthesia (r = -0.33, P =0.035).
Conclusions: These findings indicate that IP area correlates more strongly than age, weight, height, and body mass index with CSF volume and peak sensory block level of neuraxial anesthesia, suggesting that the IP area is a possible alternative measurement for CSF volume.

3AP4-2

Enhanced recovery programme in major gynacological surgery. A comparison of pain scores and length of stay in patients receiving spinal diamorphine compared to a general anaesthetic alone

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Background: Patients undergoing major elective gynaecological surgery at our hospital are offered an enhanced recovery programme. Patients can have a spinal alone or in combination with a general anaesthetic. Previous data in the department showed that patients on the programme had reduced post-operative pain and were discharged earlier. However there were individual reports from patients that they were not receiving adequate post-operative analgesia. This may be secondary to restriction of opioids in the post-operative period in patients receiving spinal diamorphine. This audit aimed to analyse the current analgesia practices in the department. This included: Intra-operative analgesia, post-operative prescriptions and documentation of pain scores. We aimed to compare pain scores and length of stay in patients having a spinal compared to a general anaesthetic alone.
Methods: We conducted a retrospective case note review of patients undergoing elective major gynaecological surgery between 27th June- 23rd August 2013 at Whiston hospital. A convenience sample on 40 patients was selected.
Results and Discussion: Data from 39 patients was collected.19 patient's had a vaginal hysterectomy and 20 had a total abdominal hysterectomy. 85% of patients were offered the enhanced recovery programme with a spinal. 74% of patient´s had the spinal. Diamorphine was used in all cases. 20% patient´s received no additional analgesia intra-op other than a spinal block. In the post-operative period 51% of patient´s had pain scores at least 4 hourly and 84% at least 8 hourly. 5% patient´s had no pain scores recorded. 20% of patient´s had persistently high pain scores; all of which had a spinal. Paracetamol was prescribed and given regularly in most cases; other analgesia was mostly prescribed and given PRN. Only 50% of patients with pain score of 3 received Oromorph; this was a combination of not being prescribed and not being administered. The average length of stay in patients with a spinal block was 3.3 days, compared to 2.6 days in patients without a spinal.
Conclusion: This audit showed that the majority of patients are being offered and having a spinal. These patients had higher pain scores and increased length of stay compared to patients having a general anaesthetic alone. We hypothesise this may be due to a tendency to restrict opioids in the post-operative period in patient´s receiving spinal diamorphine, leading to increased pain scores from day 2 post operatively.

3AP4-3

Hemodynamic stability on subarachnoid anesthesia with low doses of hyperbaric bupivacaine and sufentanil for transurethral procedures: a retrospective analysis

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Background and Goal of Study: Subarachnoid block is a universally accepted anesthetic technique for transurethral procedures but is associated with sympathetic block, responsible for intra-operative hypotension. The aim of this study was to evaluate the security, efficacy and hemodynamic stability of the use of low doses of local anesthetic drug during transurethral procedures.
Materials and Methods: For this retrospective study, the authors analysed anesthetic records of every transurethral procedure done from January 2013 to December 2014, under subarachnoid block with 7.5 mg of bupivacaine 0.5% combined with 25 μg of sufentanil. Fifty-eight out of ninety-two patients were selected. Patients were excluded due to missing data. Median blood pressure (MBP) at the beginning of the procedure and the minimal MBP were recorded. Other variables were registered: demographic data, age, ASA physical status, presence of cardiac disease (ischemic heart disease, cardiac

insufficiency and arrhythmia) and pulmonary disease (obstructive and restrictive disease and obstructive sleep apnoea syndrome), use of vasopressor drugs (ephedrine) and sedative drugs. Patients were assigned to two groups: patients with hemodynamic stability (PHS group) - MBP variation < 25% - and patients with significant MBP variation (PHI group). Using IBM SPSS Statistics (Version 22)®, a descriptive analysis and correlation of variables using Chi-Square was conducted.
Results and Discussion: The population studied had a mean age of 74 years old; 86% were male; 22% were submitted to transurethral resection (TUR) of prostate tissue and 78% to TUR of bladder lesion. Seventy-seven per cent of patients were ASA 2, the remain were ASA 3. PHS group constituted 69%. Only 4 patients (6,9%) had a MBP lower than 55 mmHg, requiring vasopressor use. A lowering in MBP ≤10% was found in 20.7% of all cases. The average drop in MBP was 20.9% (SD 13%). Good anesthetic conditions were achieved in all cases, without requiring induction of general anesthesia. No statistic association was found between the PHS group and age ≥75 years old (p 0,829), ASA physical status (p 0,554) and cardiovascular comorbidity (p 0,671).
Conclusion: Subarachnoid block using 7.5mg of bupivacaine plus 25 μg of sufentanil provides good anesthetic conditions for transurethral procedures whilst maintaining hemodynamic stability.

3AP4-5

Intraocular pressure changes after spinal anesthesia: acute and subacute effects

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Background and Goal of Study: Although body's physiological responses to spinal anesthesia are well-understood, it hasn't been mentioned about its effects on intraocular pressure (IOP) before. The aim of this study was to investigate possible effects of spinal anesthesia on IOP.
Materials and Methods: Forty patients receiving spinal anesthesia for subumblical surgery were recruited for the study, after ethics committee approval and patients' written informed consents. IOP was measured by Icare PRO tonometer (Icare, Finland) before spinal anesthesia (BS), immediately after spinal anesthesia (AS) and finally at the first postoperative day (PO1). Both eyes of the patients were participated in the study. Repeated measure ANOVA was used for statistics.
Results and Discussion: Thirty eight patients had completed the study. Mean BS, AS and PO1 intraocular pressures were 16.53±3.17 (9.40-24.00), 17.08±3.16 (10.00-24.00) and 16.76±2.80 (10.20-23.00) mmHg, respectively. No significant difference was detected among the three groups (P=0.104).
The main consequence of the study was that spinal anesthesia alone had no prominent effect on IOP. The hypothesis of the study was based on the possible relationship between CSF pressure and IOP.(1) Increased trans-lamina cribrosa pressure difference (TLCPD), i.e. the difference of intraocular and orbital CSF pressures, has been investigated as a possible risk factor in the pathogenesis of glaucoma.(2) Spinal anesthesia may result in formation of glaucoma increasing TLCPD by decreasing CSF pressure. Furthermore, some studies had shown systemic blood pressure dysregulation to be associated with changes in IOP.(3)
Conclusions: Spinal anesthesia alone has no acute and subacute effects on IOP. Studies can be made to evaluate chronic effects. Further studies must be focused on the relationship between postdural puncture headache and intraocular pressure changes after spinal anesthesia.
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3AP4-6

Passive leg raise (PLR) response in normotensive elderly patients and the effects of subdural block - measured by LiDCOplus™ and transthoracic echocardiography (TTE)

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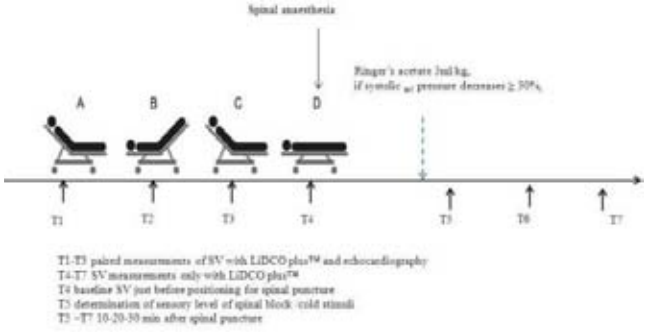
Background and Goal of Study: Our research group has found that maximization of stroke volume by fluid challenge (SV), i.e. the first step of Goal Directed Haemodynamic Treatment (GDHT) at high age may reduce the SVI in a majority of patients.[1] A reversible fluid challenge, a "self-volume loading" (PLR) might guide the maximazation step of GDHT. The interpretation and the relevance of positive PLR response in normotensive patients[2] in perioperative clinical scenarios is unclear. We ran a pilot study with two aims: to assess the ability of LiDCOplus™ to follow SV variations following PLR; and to describe the hemodynamic responses to subdural block in PLR responders/non-responders.
Materials and Methods: observational pilot study (ethical ID: 2013/995-31/3). Patients >80 years scheduled for urologic elective surgery in spinal anesthesia giving informed consent. The SV measurements were performed by LiDCOplus™ (calibrated two times) and TTE.



[Illustration of measurements]

Results and Discussion: Preliminary. We have investigated nine of the ten planned patients, mean age 84 years. Bland-Altman plot will be used to describe the paired SVI measurements. The trending ability and the concordance of LiDCOplus™ will be illustrated by four quadrate plot.[3] The echocardiography method will be used as a reference method and concordance rates>90% will be taken as good ability.[4] The percental changes of hemodynamic parameters and the frequency of hypotension after subdural block in PLR responders/non-responders will be given.
Conclusion(s): Our data may be used to design future trials addressing the value of PLR to guide fluid challenge in patients undergoing spinal block.
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3AP4-7

Incidence and risk factors of severe bradycardia during spinal anesthesia with chronic beta blockade

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Background and Goal of Study: Spinal anesthesia has been considered a safer technique than general anesthesia. But, it has many side effects too. Severe bradycardia and asystole after induction of spinal anesthesia had caused serious consequences. Many studies and case reports were published of this bradycardia and asystole, but the exact causes and mechanisms is still cloudy. B-blockers are among the most commonly prescribed drug in patients presenting for surgery. These agents lower blood pressure with decrease in resting heart rate and left ventricular function.In this study, we retrospectively recorded the incidence of severe bradycardia and asystole

during spinal anesthesia in patients who take beta-blockers and risk factors contributing the incidence of severe bradycardia.
Materials and Methods: We investigated retrospectively anesthesia chart from March, 2009 to June, 2014, total 693 cases. All of the patients receive elective surgery in our institute with spinal anesthesia and they took beta-blockers until the operation day. Bradycardia was defined as a heart rate less than 50 beats per minute for at least 1 minute. We selected ten variables as risk factors contributing to bradycardia: gender, age, body mass index (BMI), spinal drug dose (0.5% hyperbaric bupivacaine), peak sensory block height, initial heart rate (HR), baseline systolic blood pressure (SBP), baseline diastolic blood pressure (DBP), baseline mean blood pressure (MBP), history of diabetes (DM).
Results and Discussion: Total 642 cases were included in this study. 86 patients experienced bradycardia, the incidence was 13.4%, and no asystole. On univariate analysis, patients with male gender, absence of diabetes, low baseline heart rate showed statistically higher incidence of bradycardia (p=0.02, < 0.00, < 0.00). In multivariate logistic regression, risk of bradycardia was elevated 10.44 fold (95% CI, 6.26 - 17.42) in the case of low baseline heart rate (< 60 BPM). And in case of absence of diabetes, risk of bradycardia was elevated 2.6 fold (95% CI, 1.40 - 4.81). Male gender, risk of bradycadia was elevated 1.65 fold (95% CI, 1.0 - 2.74, p=0.06).
Conclusion(s): The incidence of bradycardia during spinal anesthesia was 13.4% within the patient who take the beta-blockers. And none of hemodynamic instability happened with bradycardia. But, in case of low baseline heart rate and absence of diabetes, they would be more susceptible to develop of severe bradycardia.

3AP4-8

At which intervertebral level is your palpated L3/4 actually placed?

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Background and Goal of Study: Accurate identification of an intervertebral level is essential to avoid spinal cord injury during neuraxial analgesia. It is known that palpatory estimation of L3/4 (palpated L3/4) based on the intercristal line is inaccurate. The objective of this study was to evaluate the accuracy of L3/4 palpation in Japanese parturients according to ultrasonography (US).
Materials and Methods: The institutional ethics committee approval was obtained. The subjects were term parturients who underwent induction of labor and requested neuraxial labor analgesia. With the patients in the sitting position, the attending anesthesiologist marked the intervertebral space estimated as L3/4 based on the intercristal line and palpation. Another attending anesthesiologist who was blinded to the markers performed US to identify L3/4.
Results and Discussion: Sixty-three consenting women were included in the study. The overall concordance rate of palpation and US of L3/4 was 69.8% (44/63). Palpated L3/4 was actually L2/3 in 12.7% of cases (8/63) and L4/5 in 17.5% of cases (11/63), as determined by US. Compared to women whose palpated L3/4 correlated with US findings, women whose palpated L3/4 was actually L2/3 were more likely to be multiparous (52% versus 100%, p<0.05), and women whose palpated L3/4 was actually L4/5 were younger (36 ± 4 years vs. 33 ± 4 years, p<0.05) and gained less weight during pregnancy (10 ± 4 vs. 7 ± 4 kg, p<0.05). The women whose palpated L3/4 was actually L2/3 were all multiparous. Recent studies showed that the clinical puncture level was accurate in 36.4% of patients with neuraxial labor analgesia, and the intercristal line identified by palpation was located higher than L2/3 in 27%-35.5% of pregnant women. In contrast, our accuracy rate of palpation was much higher. Furthermore, there was no significant difference in the misidentified directions (cephalad vs. caudal). The small difference could be attributed to the lower body mass index (BMI) in our subjects (24.9 ± 3.4 kg/m2) compared to that in previous studies (approximately 30 kg/m2) because obesity can cause palpated L3/4 to appear higher than actual L3/4. A delivery can change the positional relation of pelvic bones.
Conclusion: The accuracy rate of L3/4 palpation in pregnant women was 69.8%. Not only weight gain but also parity and maternal age may influence estimation of L3/4 by palpation.

3AP4-9

The minimal effective dose of hyperbaric spinal bupivacaine for successful reliable saddle block for minor perianal surgeries

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Background and Goal of Study: To determine the minimal effective dose of hyperbaric spinal bupivacaine required to induce a reliable and satisfactory saddle block for perianal surgeries.
Materials and Methods: The study was approved by the Research and Ethics Committee of University of Dammam and registered as NCT02299167 at clinicaltrials.gov. After written informed consent 24 adult patients scheduled for outpatient perianal surgeries were enrolled in this study. Dural puncture was performed using a standard midline approach in the sitting position at the L3-L4 intervertebral space, using a 25-gauge Whitacre needle. A small dose (1.5mg) of hyperbaric bupivacaine was injected. All patients remained in the sitting position for 10 min. immediately before and after surgery, the block was tested using a long surgical toothless clamp and modified Bromage scale. A successful block was defined as one that was sufficient to proceed with the surgery without any supplementation. The dose of bupivacaine given to the next patient was guided by modified Dixon's up-and-down method using 0.5 mg as a step size. Patient ability to self-position, ambulation time, time of hospital discharge, patient's and surgeon's satisfaction, and any complications were recorded. The minimal dose of hyperbaric bupivacaine for successful saddle block in 50% (ED50) of patients was determined by calculating the midpoint dose of all independent pairs of patients after at least seven crossover points.
Results and Discussion: ED50 of hyperbaric bupivacaine for successful saddle block for perianal surgeries was 1.9 mg (95% confidence interval = 1.7-2.1 mg). There were zero motor blockades, early ambulation, early hospital discharge, as well as no complications and excellent patient's and surgeon's satisfaction. The small volume of bupivacaine used, localized the block to the caudal spinal nerve and the amount remaining (after 10 min sitting) was not enough to induce significant up spread after lithotomy position.
Conclusion(s): The ED50 of spinal hyperbaric bupivacaine for satisfactory and successful saddle block for perianal surgery was = 1.9 mg (95% CI = 1.7-2.1 mg). This block was reliable, had short duration, early ambulation, no complications and excellent patient's and surgeon's satisfaction.
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3AP4-10

Urinary retention after spinal anesthesia

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Background and Goal of the Study: Urinary retention is a frequently observed side effect of anesthesia. After spinal anesthesia, incidences are reported between 0-69 percent. Until now, it is still not undisputed, whether sex or age influence the risk, and if, in which direction. One study suggests that males over 70 years are of higher risk, while another showed an increased incidence in females aged below 40 years.[1,2]
The aim of our study was to investigate the effect of sex and age on the incidence of urinary retention after spinal anesthesia in a large scale sample.
Materials and Methods: This study was conducted as a prospective cross-sectional trial. Patients undergoing elective surgery under spinal anesthesia were interviewed 24 hours postoperatively about the occurrence of urinary retention defined as need of catheterization. Data were analyzed for effects of age and sex.
Results and Discussion: In a 50 month interval, a total of 2492 patients was recruited. The overall risk for developing urinary retention was 5.41%. The relative risk is 25% higher in males, the differences were however not significant (p=0.236). We found no significant effect of age (p=0.507). A multivariate analysis did not show a significant interaction of age and sex (p=0.325)
Conclusion: In our sample, males tend to have a 25 % increased relative risk to develop postoperative urinary retention after spinal anesthesia. Age did not affect the results. Remarkably, our overall incidence of 5% is very low when compared to current literature; this is mainly explained by our strict definition of urinary retention.

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3AP4-11

Does Atraucan cause more post-dural puncture backache?

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Background and Goal of Study: Post-dural puncture backache (PDPB) is the most frequent complaint after spinal anesthesia. In the literature its importance is generally overshadowed by post-dural puncture headache. We studied two different kinds of spinal anesthesia needles from the point of their technical handling capacities and incidences of PDPB.
Materials and Methods: Data of two hundred fifty six pregnant female patients undergone cesarean delivery under spinal anesthesia were collected for the study. Patients were put into one of the two groups according to the spinal needle used. Patients that had spinal puncture with 26-Gauge Atraumatic needle (Atraucan®, B.Braun Melsunger, Germany) were put into the Group A (n = 109) and those having puncture with 26-Gauge Quincke (Spinocan®, B.Braun Melsunger, Germany) into the Group Q (n = 147). Backache incidence for postoperative one week period, severity, onset time and duration were recorded, as well as puncture attempts and spinal anesthesia procedure duration.
Results and Discussion: Spinal anesthesia had been successfully performed at one attempt in 92.7% and 86.4% of patients in the Groups A and Q respectively. PDPB was encountered in 62.4% and 44.2% of the patients in the Groups A and Q respectively, and the difference was statistically significant (P = 0.037).
Two hypotheses may be suggested about the issue. The first is that the thicker spinal needle you use, the more PDPB you encounter. The thicker needles cause greater trauma and more inflammation in the tissue resulting in more PDPB. The second hypothesis is that repeated spinal puncture attempts cause PDPB. Atraucan spinal needle is used with an introducer that is quite thicker than the subarachnoid needle itself. It may cause more PDPB than needles without introducers. But introducers have an advantage of keeping the needle straight and so preventing it from bending. Omission of introducer needle has decreased tissue damage and lessened PDPB incidence in some studies. We are in accordance with these facts and think that adding an introducer may stabilize the subarachnoid needle itself, decreasing redirections, thus resulting in less PDPB; for all that it can cause more PDPB as a result of being thicker than the subarachnoid needle itself and causing more trauma to the tissue.
Conclusion: Both 26-Gauge Quincke and Atraucan needles have excellent handling characteristics. PDPB seems to be less with 26-Gauge Quincke than with Atraucan needle.

3AP4-12

Incidence of post-dural puncture headache: two different fine gauge spinal needles of the same diameter

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Background and Goal of Study: The young obstetric population displays the highest rate of post-dural puncture headache (PDPH). The aim of this study was to compare two spinal needles with different bevel designs regarding their technical handling capacities and complication rates.
Materials and Methods: After the Investigational Review Board approval and written informed consents from the patients, 220 pregnant female patients undergoing elective cesarean delivery under spinal anesthesia were recruited in the study. Patients were divided into two groups as, Group A (*n* = 110) and Group Q (*n* = 110); who received spinal anesthesia via 26 gauge (26-G) atraumatic spinal needle (Atraucan®, B. Braun Melsunger, Germany) and via 26-G Quincke spinal needle (Spinocan®, B. Braun Melsunger, Germany), respectively. Procedure duration, puncture attempts and PDPH incidences were recorded. The costs of the spinal needles were also noted. Differences between categorical variables were evaluated with Chi-square test. Continuous variables were compared by Student's *t*-test for two independent groups.
Results and Discussion: Spinal block was established in a single attempt in one hundred and one patients (92.7%) in Group A and ninety-one patients (85.0%) in Group Q. The procedures of the spinal block were completed within 60 seconds in 93 (85.3%) and 78 (72.9%) of the patients in the Groups A and Q, respectively. There were no significant differences between the two groups in spinal puncture attempts and procedure durations. Similarly, incidence, severity, onset time and duration of headache were not found to be significantly different between the two groups. Ten patients (9.2%) in Group A and 11 (10.3%) in Group Q had developed PDPH. The rate of success at single attempt for spinal anesthesia puncture and duration of the procedure were best compared with the current literature. We attribute this to the experience of the operators. However, the rates of PDPH were one of the highests given in the current literature. Genetic factors might have been involved.
Conclusions: Both spinal needles offer good handling characteristics with comparable insignificant incidence of PDPH. Taking into account economic factors 26-G Quincke needle may be preferred to 26-G Atraucan®.
Acknowledgements: The authors would like to thank Dr. Cumali Güzel for the incentive idea putted forward, that resulted in commencement of the investigation.

3AP5-1

Comparison of two approaches of infraclavicular brachial plexus block for elbow surgery

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Background and Goal of Study: The infraclavicular block (ICB) had a high success rate and was as good as all other blocks in providing anesthesia of the lower arm, especially in elbow surgery where is required blockade of all the five nerves. Aim of this study was to compare two approaches of ICB: the vertical infraclavicular block (VICB) and the coracoid infraclavicular block (CICB) in terms of success rate, tourniquet tolerance and complications in patients scheduled for elbow surgery.
Materials and Methods: Forty eight patients, aged 18-78 yr, ASA I,II, requiring surgery in elbow were randomly assigned to receive nerve stimulator guided ICB either by VIC -Kilka approach (group V, *n* = 24) or CIC - Wilson approach (group C, *n* = 24). In both the groups, the block was performed using a nerve stimulator with an only puncture . After the evoked a distal motor response (radial or median) was obtained, at a current of 0.3-0.4 mA, an equally mixture of Lidokaine 2%-20ml and Bupivacaine 0.5%-20 ml was slowly injected through the needle. The sensory blocks were assessed for 30 min after performing the block. Blocks were considered successful if the procedure could be completed without any supplementation.The success rate, tourniquet tolerance and complications were assessed.
Results and Discussion: Successful block was observed in 100% and 91.7% patients in groups V and C, respectively (p< 0.25).Two patients in groups C required surgical infiltration by the surgeon Tourniquet was well tolerated in all patients . All surgeries were performed under ICB without any complications.
Conclusion(s): VICB represents a highly successful method compared to CICB in patients undergoing elbow surgery. Variations of the musculocutaneous nerve, which often leaves the lateral cord at or above the level of coracoid process, may be explained the cause of an incomplete block by coracoid approach
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3AP5-2

Tramadol added to levobupivacaine and duration of analgesia in interescalene brachial plexus block guided by ultrasound. A clinical trial

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Background and Goal of Study: Shoulder arthroscopy is a very common and minimal invasive procedure but develops severe postoperative pain. The goal of study was to evaluate if tramadol added to levobupivacaine improves duration and quality of analgesia in the interscalene brachial plexus block.
Materials and Methods: A prospective randomized, doubled blinded clinical trial was performed between January and July 2013. The inclusion criteria were patients who were scheduled to elective shoulder arthroscopy, older than 18 years and ASA I or II. The exclusion criteria were chronic treatment with opioids, Beta-antagonist, coagulation disorder or puncture area infection. The patients were randomized between two groups. The intervention group (I) received Tramadol (1.5mg/kg) added to Levobupivacaine 0.5% (0.3ml/kg). The control group (C) received Levobupivacaine 0.5% (0.3ml/kg) with physiologic saline. After the ecoguided interscalene brachial plexus block supported by neurostimulation a general anaesthesia was performed. The primary endpoint was sensitive block duration, defined as hours without pain. The pain was evaluated by Visual Analogue Scale. Patients were asked to notify of adverse effects and rescue analgesia between first 24 hours. An expectation and satisfaction survey was performed. Sample size was calculated using data from EPIDAT program. The statistical analysis was performed using SPSS 17.0. The threshold of statistical significance was set at $P<0.05$. The study was approved by Hospital Universitari Mútua Terrassa Ethics Committee.
Results and Discussion: 127 patients were scheduled to shoulder arthroscopy in that period. 46 were randomized in two homogeneous groups. There was not statistical difference in sensitive block duration (C: 20.5+/-8.18; I: 20.8+/-5.07 hours), frequency of adverse effects and rescue analgesia. Morphine was not administrate in the postoperative period to any patient. Satisfaction after surgery about pain and nausea and vomiting was better than expectation before surgery with statistical significance.
Conclusion: The use of tramadol added to Levobupivacaine 0.5% in ecoguided interscalene plexus block does not prolong sensitive block duration and doesn't improve analgesia quality. Therefore, based on the results of this trial, we don't recommend its use.

3AP5-3

Interscalene brachial plexus block for early mobilization after arthroscopic shoulder surgery

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Background and Goal: The purpose of this study was to evaluate whether continuous interscalene brachial plexus block can achieve adequate pain management and facilitate early and safe shoulder mobilization.
Materials and Methods: Forty two patients with a large rotator cuff tear underwent arthroscopic repair. Light pendulum exercises were commenced for all patients at 10 days after the operation, for a period of 15 days. At the end of this period passive motion exercises were initiated. Patients were divided in two groups with similar demographic data. In Group A (21 patients) a continuous interscalene block (ropivacaine 0.2%, 7-10 ml/h) was instituted for 48 hours. In Group B (21 patients) the same rehabilitation protocol was followed without nerve block assistance. The evaluation of the method was done using the VAS score, range of motion measurements and recordings of the patient's satisfaction at 24, 48 and 72 hours after initiation of exercises. Final functional evaluation was performed 6 months postoperatively using the UCLA and Constant scores.
Results: Three patients of Group A were excluded from the study. In 2 patients the catheter was dislocated after the first physiotherapy and no analgesic effect existed. Another one patient developed temporary Horner's syndrome and dyspnea immediately and no block was performed.In the remaining 18 patients of Group A with interscalene nerve block the mean VAS score was 1.45 during the first 72 hours. In these patients the mean forward flexion was 155°, the abduction 130°, the external rotation 30° and the internal rotation 30°. All 18 patients with nerve block were very satisfied from the method. Six months later the mean UCLA and Constant scores were 32 and 85 respectively.
During the first 72 hours, in Group B patients, the mean VAS score was 7.1, the mean forward flexion was 60°, the abduction 40°, the external rotation 10° and the internal rotation 20°. The patients expressed difficulty to start passive movement exercises. However, six months post-operatively the mean UCLA and Constant score was 31 and 83 respectively.
Comparing the two groups the differences for movement parameters were statistically significant ($p< 0.05$).
Conclusions: Continuous interscalene nerve block is an effective method of faster and painless mobilization of the shoulder joint after rotator cuff repair procedures.

3AP5-4

A clinical study comparing two anaesthetic/analgesic techniques for shoulder surgery intra- and post-operative pain control. A comparison of both techniques in rehabilitation

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Introduction: Shoulder surgery post-operative pain may be very severe in many patients and may be exacerbated by rehabilitation manoeuvres.
Purpose: To compare two pain control techniques
Patients and methods: Consecutive prospective study.
ASA I-II patients proposed for shoulder surgery / post-operative rehabilitation.
Surgery: Induction: Propofol/cisatracurium/fentanyl.
Maintenance: Sevoflurane/remifentanil.
Emergence: Dexketoprofen.
Group A: Ultrasound-guided interscalene block (UGIB): 0.5 Ropivacaine
Group B: Combined suprascapular and axillary nerve block (CSAB): 0.5 Ropivacaine.
Rehabilitation: Group A': UGIB with 0.2 Ropivacaine. Group B': CSAB with 0.2 Ropivacaine.
Measures:
All: Patient satisfaction.
Surgery: Intra-operatory remifentanil requirement (T0); pain in PACU (T1), at 6h (T2), 12h (T3) and 24h (T4), measured by resting/motion VAS; motor block: proximal/distal; sensory block (pinprick test); total morphine consumption.
Rehabilitation: VAS during rehabilitation manoeuvres and at T2.
Preliminary results:
Surgery: 20 (12A/8B).
T0 > higher remifentanil doses in Group B. Pain control similar except for some cases of severe pain in group B at T1. Morphine requirements > Group B. Distal motor and sensory block > Group A. Satisfaction similar.
Rehabilitation: 12 patients (7´/5B'). No significant differences. Higher satisfaction in group B due to lower distal blocking. Morphine consumption similar.
Comments and conclusions: UGIB provides greater anaesthesia/analgesia in the earlier hours compared to CSAB. It also allows catheters to be placed for continuous blocking.
CSAB gives lower distal motor and sensory blocking. This alternative is effective and safe in patients with respiratory problems.
No differences were observed during rehabilitation. Lower distal block levels (B´) contributed to higher patient satisfaction.

3AP5-5

The brachial plexus block versus general anesthesia for elective upper extremities surgery

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Background and Goal of Study: Both general anesthesia (GA) and brachial plexus block are effective anesthesia methods for surgery on the upper extremities, but exists different opinions which method is more suitable. We hypothesized that peripheral nerve blocks (PNB) on brachial plexus performed with neurostimulaion method would result in faster recovery, better analgesia and greater patient satisfaction compared with GA in patient for upper extremities surgery.

Materials and Methods: After obtaining written informed consent 832 patients (aged 18-89 yr), scheduled for upper extremities surgery from January 2008 to January 2012 were recruited in this study and randomized into two groups receive either an PNB or GA. PNB were performed using a standardized protocol (PNB =Lidokaine 2% -20 ml+Bupivacaine0.5%.GA = was inducted with Tiopentale+ Pavulon followed by endotracheal intubation and isoflurane+fetanyl for maintenance. Data were collected regarding included the type of block, success rates, time to discharge by post anesthesia (used a modified Aldrete score), requested treatment for pain postoperative and patient satisfaction. Data were compared using the test Chi square and presented as median ± DS.
Results and Discussion: The blocks included; interscalene blocks 48 pacient (5.76%), infraclavicular vertical blocks 164(19.7%), infraclavicular coracoidale blocks 178 (21.4 %),axilare blocks 442(53.1%). The success rates of all blocks were 98.05%.
Patients in the PNB group met earlier criteria to discharge times by postanesthesia care unit 11 vs 37 min ($p<0.001$).Total anesthesia time did not differ significantly between the two groups 96.5min vs102 min ($p<0.05$). None of the patients in the PNB group requested treatment for pain at 12 hours postoperatively while in the GA group requested treatment for pain.
Fewer patients 4(0.4%) in PNB group had nausea and vomiting compared with 191(23%) in the GA group ($p<0.001$). The patient satisfaction score in PNB group was better 8.6±2.02 compared with 6.1±1.4 in the GA group ($p<0.002$).
Conclusion(s): In this study, we found that brachial plexus block was associated with faster recovery, better analgesia and greater patient satisfaction than general anesthesia in patients for surgery on the upper extremities.
References:
Hadzic A, *et al*. *Anesthesiology 2005*;102:1001-1007. 26

3AP5-6

The effects of adding 5% LevobupivacaineDexamethasone in USG-guidedInfraclavicularBlock for Forearm Fractures

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Background and Goal of Study: Postoperative analgesia is a clinical condition that affects patient comfort and surgical success after surgery of forearm fractures. This study aims to evaluate the effects of adding 5 mg dexamethasoneinto 20 ml 0.5% levobupivacaine on postoperative analgesia for ultrasound (USG) guidedinfraclavicular block as an anesthesia technique.
Materials and Methods: A total of 90 patients between the ages of 18-70 in ASA I and II classification who would undergo surgery due to forearm fracture were included in the study.
Group I (n=45) was provided pre-operation surgical analgesia by administering a total of 20 ml 0.5% levobupivacaine at 5, 7 and 9 o'clock directions according to the subclavian artery using USG-guided infraclavicular block method.
Group II underwent pre-operative anesthesia by adding 5 mg dexamethasone to 20 ml 0.5% levobupivacaine by using USG-guided infraclavicular block method. All patients were followed up in terms of hemodynamics (non-invasive, blood pressure, saturation and pulse) during the surgery. Postoperative analgesia was achieved intravenously (IV) patient controlled analgesia (PCA) was provided by morphine. 1ml bolus 10 minute lock-out time maximum hourly limit was provided by 5 mg. Verbal rank score (VRS), patient satisfaction score (PSS) and morphine consumption were recorded at postoperative 48 hour 2., 4., 6., 8., 10., 12., 14., 16., 20., 24., 32., 40. and 48. hours.
Results and Discussion: Sensorial blockade and motor blockade initiation time was found to be longer in group I. Sensorial blockade time and motor blockade time was found to be longer in group II. Total 48 hour morphine consumption was found to be higher in group I, while HMS was found to be higher in group II.
Verbal Rank score was found to be significantly higher in group I.
HMS was found to be significantly higher in group II.
Postoperative hourly morphine consumption and total morphine consumption were found to significantly higher in group I.
Conclusion(s): We observed that combined use of local anesthetics with 5 mg dexamethasone for infraclavicular block as an anesthesia method for the surgical treatment of forearm fractures shortened sensorial and motor blockadeinitiation time, reduced surgical analgesia time and extended postoperative analgesia time. We believe that our results should be supported by further research.

3AP5-7

Thermovision - early predictor of successful infraclavicular nerve block?

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Goal of Study: Vertical infraclavicular nerve block causes sympathetic block with subsequent vasodilatation leading to local increase in skin temperature. This could be a useful method to predict block effectiveness. We are applying these principles.
Methods: The study was conducted with approval of Ethics committee of Louis Pasteur University Hospital Košice. Procedures were carried out in the rooms with a constant temperature and humidity. Midazolam 2 mg IV was administrated 10 minutes prior to the procedure, standard monitoring of vital signs was used. Patients-5 females/10 men were in a supine position. Sites of operation: hand 4, wrist 6, forehand 4, elbow 1. First image with thermocamera FLIR 320 was made 20 minutes after premedication. Brachial plexus nerves were identified with Stimuplex® HNS12 BBraun. Stimulating needle BBraun 5cm was inserted vertically to the base under continuous aspiration. Twitching of fingers during nerve stimulation with current of 0.3 mA was considered to be a successful response. Bupivacaine (0.5%) 75 mg+ Trimecain (1%) 50 mg were injected. Median nerve was initially stimulated in 10 patients, radial nerve in 5 patients. Second image was made immediately after local anaesthetic injection and subsequently each minute afterwards until 5th minute, than every second minute until 13th minute post injection. Thermoimages were processed with free software taken from Flir internet home page. Acquired temperatures of fingers and dorsum of the hand were manipulated by software SPSS Statistic17.0, Minitab15, MS Excel. We calculated when the skin temperature increase stopped and we evaluated difference between the group of patients with initially stimulated median nerve or radial nerve.
Results: Skin temperature of fingers increased in time and stopped in 5th minute. Skin temperature of dorsum of the hand decreased in the first 3 minutes, than increased until 13th minute. We identified time to warming by at least 1°C. 73.3% of patients reached 1°C warming in 5 minutes and 100% of patients reached 1°C warming in 10 minutes. Average time necessary to reach warming by at least 1°C in our study was 4.7±2.3 min. There was no significant difference in temperature changes between the group of patients with initially stimulated median or radial nerve.
Conclusion: Measurement of temperature changes using thermocamera is early and appropriate indicator of successful block, and we recommend it´s implementation into the clinical practice.

3AP5-10

Comparison between supraclavicular and interscalene brachial plexus blocks in patients undergoing arthroscopic shoulder surgery

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Background and Goal of Study: Supraclavicular brachial plexus block (SCBPB) has gained wide acceptance since ultrasound was introduced to the practice of regional nerve blocks. However, the usefulness of SCBPB in shoulder surgery has been less reported to date. We hypothesized that SCBPB provides sensory and motor blockades equivalent to those of interscalene brachial plexus block (ISBPB), reducing the incidence of side effects and complications associated with ISBPB in patients undergoing arthroscopic shoulder surgery.
Materials and Methods: In this prospective randomized controlled study, 93 patients scheduled to elective arthroscopic shoulder surgery were randomly assigned to 1 of 2 groups (ISBPB group: n = 47; SCBPB group: n = 46). Anesthesia was performed under ultrasound guidance and the surgery was conducted with the patients seated. Side effects and complications (Horner's syndrome, subjective dyspnea resulting from hemidiaphragmatic paralysis, hoarseness, direct vascular puncture, etc.) of the regional anesthesia, mean

sensory block score (graded as 0 [no sensation to alcohol swab] to 100 [intact sensation to alcohol swab]) for each 5 dermatomes (C5 - 8 and T1), and median motor block score (graded as 0 [complete paralysis] to 6 [normal muscle force]) for muscle forces corresponding to radial, ulnar, median, and musculocutaneous nerves were evaluated 20 minutes after regional anesthesia. Intraoperative hypotensive bradycardic events and medications (analgesics, antihypertensives, vasopressors, and inotropics) were recorded.
Results and Discussion: All the patients underwent the surgery successfully under the regional anesthesia. A significantly higher incidence of Horner's syndrome was observed in ISBPB group (59.6% [ISBPB group] versus 19.6% [SCBPB group], $p<0.0001$). Mean sensory block score was significantly lower in ISBPB group (26.4 ± 16.7) than in SCBPB (51.5 ± 28.2) (data are mean ± standard deviation, $p<0.00001$), whereas significantly lower median motor block score was found in SCBPB group (1 [0.5 - 2.75] [ISBPB group] versus 0.5 [0 - 1] [SCBPB group], data are median [interquartile range], $p=0.001$). Frequency of intraoperative medication use and incidence of the other side effects and complications were comparable between the 2 groups.
Conclusion(s): Although SCBPB provides a less intense sensory blockade than ISBPB, it offers a better motor blockade and a lower incidence of Horner's syndrome compared to ISBPB.

3AP5-11

Long-term neurological symptoms of brachial plexus block above the clavicle

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Background and Goal of Study: The incidence of neurologic symptoms after brachial plexus block (BPB) as reported in the literature varies substantially, with an incidence of 2,8% for ISB possibly the most reliable (1). Because the incidence may be affected by institutional techniques, injection monitoring techniques or pharmacologic choices, we undertook this study to determine the frequency of neurologic symptoms in our anesthesia practice.
Materials and Methods: We performed a retrospective study on all patients who received an interscalene (ISB) or supraclavicular (SCB) BPB between 02-2013 and 06-2013. At least 6 months post-operative, they were questioned about symptoms in the first week and 6 months after surgery. All blocks were under dual guidance (ultrasound and nerve stimulation).
Results: Of 272 patients who received BPB, 209 (ISB-n=108; SCB n= 101) had complete follow-up data and were included. Twelve patients (4.4%) reported symptoms at 6 months. Four patients had symptoms before BPB. Two patients with SCB for an AV fistula reported tingling and cold feeling in the fingertips. Two patients complained of a permanent loss of sensitivity around the scar after SCB, probably because of local nerve damage. One patient reported permanent pain in the wrist due to the osteosynthetic material. One patient suffered from noncontinuous aspecific sensory symptoms on the back of the hand after ISB for shoulder surgery. Finally, 2 patients had a permanent neuropathy in a well defined part of the limb, according to the dermatomes. One of them had a sensory deficit in the N. Musculocutaneous dermatome after ISB for shoulder surgery, which could be explained through multiple anterior luxations of the shoulder. The other patient experienced permanent paresthesia and dysesthesia in the dermatome of the N. Ulnaris. In this patient the SCB couldn't be ruled out as a potential cause of the symptoms. None of the patients with long-term symptoms recall pain or paresthesia during the block procedure. Two hundred and three patients (=97,1%) were satisfied and would choose this technique again.
Conclusion: This study demonstrates that the satisfaction rate in our hospital after upper limb plexus anesthesia is high. Of the 209 patients that went into the analysis, only one patient (0.48%) appeared to have symptoms suggestive of potential nerve injury(=0,48%) after 6 months.
Reference: 1. Brull R, McCartney CJ, Chan VW, et al. Anesth Analg. 2007 104(4): 965-74.

3AP6-1

The use of thromboelastometry to remove an epidural catheter with prolonged PT-INR in patients with chronic liver disease after major abdominal surgery

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Background: Analgesia through an epidural catheter provide effective pain control during and after major abdominal surgery[1]. Spinal hematoma may be a serious complication specially in patients with chronic liver disease. In this situation, routine coagulation tests have a low predictability and tromboelastometry may improve hemostatic monitoring[2].
Case report:

- 82 year-old man with a liver cirrhosis Child-Pugh A, who received a combined general inhalational and thoracic epidural anesthesia for hepatojejunostomy and Roux-en-Y due to cholangiocarcinoma. Routine coagulation tests on the first postoperative days indicated a coagulopathy due to chronic liver disease, hepatic resection and postoperative period. Epidural catheter was removed on the 8th postoperative day with PT-INR 1.83, platelet count of 294000 and ROTEM® results were within the reference intervals (EXTEM: CT 61s, MCF 72mm; INTEM: CT 187s MCF 72mm; FIBTEM: 44 mm).
- 90 year-old man with a liver cirrhosis Child-Pugh B, who received a combined general inhalational and thoracic epidural anaesthesia for left hemicolectomy due to colon cancer. Epidural catheter was removed on the 9th postoperative day with PT-INR: 1.43, platelet count: 95000 and ROTEM® results were within the reference intervals (EXTEM: CT 58s, MCF 69 mm; INTEM: CT 199s MCF 60 mm; FIBTEM 23 mm).

Discussion: The complex haemostatic changes that occur in liver disease during the pre and postoperative periods are difficult to asses using routine coagulation tests. These tests are known to be poor predictors for bleeding risk and procoagulant imbalance[3]. This calls into question the unrestricted use of plasma infusion to correct the results of conventional coagulation tests in patients undergoing invasive procedures. The ROTEM® results show us that despite altered routine coagulation tests, clot formation is good enough to remove epidural catheter in a safe way.
References:
1. Tzimas P. Epidural anaesthesia and analgesia for liver resection. *Anaesthesia* 2013; 68: 628-635.
2. Mallett SV. Clinical utilty of viscoelastic tests of coagulation in patients with liver disease. *Liver Int* 2013; 33: 961-974.
3. Tripodi A. The coagulopathy of chronic liver disease. *N Engl J Med* 2011;365: 147-56.
Learning points: To establish the clinical utility of thromboelastometry in chronic liver disease after major abdominal surgery and to determine threshold values that predict bleeding or thrombosis after removing an epidural catheter.

3AP6-2

Goal-directed fluid administration in colorectal surgery: does epidural increases fluid load and length of hospital stay?

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Background and Goal of Study: Despite its benefits in abdominal surgery, epidural use may lead to fluid overload, increasing the risk of anastomotic leak after colorectal surgery.(1)
The purpose of the study was to evaluate whether epidural increases fluid requirements and affects hospital stay after elective open colorectal surgery, during a goal-directed fluid therapy protocol.
Materials and Methods: 35 pts were included in the study. All patients received general anaesthesia. 17 were randomly assigned to receive also thoracic epidural anaesthesia (group E). Intraoperative cardiac indices obtained from Vigileo flotrack were registered at 15-min intervals in both groups. Fluid administration was guided by stroke volume changes. If MAP<60mmHg, phenylephrine infusion was given.
Intraoperative fluid volumes, urine output, haemodynamic parameters, vasopressor use and lactate concentrations were recorded. Serum concentrations of pro-BNP, urea, creatinine were measured before operation and on 1st, 2nd and 3rd postoperative days. Total length of hospital stay and readmissions

were also noted. Student's t-test, Mann-Whitney U test and Fisher's exact test were used for statistics. A p value <0.05 was considered statistically significant.
Results and Discussion: The groups were similar in somatometric characteristics, preoperative and intaoperative variables. Intraoperative crystalloid administration [1786.5(808.23) vs 2307(1123.06) group E, *mean(SD*], urine output [200 (150 - 300) vs 120 (100 - 300) group E, *median [IQR]*] and vasopressor use did not differ significanly between groups (p=0.155, p=0.237, p=0.793 respectively). Total length of hospital stay [10 [6 - 13.5] vs 8 [7 - 11], group E, *median [IQR]*], and number of readmissions were also similar (p=0.653, p= 0.326, respectively). Blood urea and creatinine did not increase significantly in either group. Lactate concentrations were kept within acceptable values, without significant differences between groups. Pro BNP values increased statistically significant
(p=0.021) in both groups.
Conclusion(s): Epidural does not seem to increase the fluid volume administered during open colorectal surgery, when a goal-directed fluid administration protocol is followed and it does not seem to affect postoperative course and length of hospital stay.
Reference: 1. J Surg Res. 2013;183:567-73

3AP6-3

Is there a rationale for epidural anesthesia additional to general anesthesia for laparoscopic prostatectomy?

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Background and Goal of Study: Enhanced recovery after surgery programs (ERAS) are currently recommended for major surgery including urological procedures. Regional anesthetic techniques are crucial components of ERAS and are known to improve surgical outcomes. Epidural anesthesia combined with general anesthesia is an established technique for open prostatectomy; however the role in laparoscopic prostatectomy (LRP) is not determined.
Materials and Methods: We conducted a prospective, observational, cohort trial, which included consecutive patients undergoing LRP in the Department of Urology, University Hospital, Krakow, Poland from July 2012 to December 2013. First group of patients had an epidural catheter (EC) placed before surgery. Analgesics (bupivacaine and fentanyl) were started epidurally in the beginning of surgery and continued in postoperative period either as a continuous infusion or intermittent bolus doses. The second group had their pain managed by strong opioids (morphine or oxycodone) in a pattern based on continuous infusion and rescue bolus doses (nurse controlled analgesia).
Results and Discussion: A total of 143 patients were included in the study. In EC group (76 patients) we observed statistically significant reduction in mean NRS during 3 postoperative days (0.8 vs 1.2; p< 0.01), less patients had maximal NRS exceeding 4 (17% vs 39%; p< 0.01) and a total number of complications per patient was smaller (0.4 vs 0.7; p< 0.05). Additionally, in EC group we less frequently noted delayed emergence from anesthesia (14 vs 33%; p=0.01). We observed adverse events associated directly with EC only in 2 patients and this was leg numbness in both cases, which resolved after dose modification.
Conclusion(s): Epidural anesthesia combined with general anesthesia for LRP gives advantage to patients compared to general anesthesia with postoperative analgesia based on intravenous morphine or oxycodone. More studies are needed to determine efficacy of other regional techniques such as Transversus Abdominis Plane (TAP) block, port-site infiltration or intra-abdominal local anesthetic administration, which might potentially be equally effective and less invasive.

3AP6-4

Clonidine as an adjuvant to local anaesthetics for epidural analgesia in adults and children undergoing surgery - systematic review and meta-analysis

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Background and Goal of Study: Efficacy and harm of clonidine when added to epidural local anaesthetics for surgery remain unclear.
Materials and Methods: We performed a systematic search (electronic databases; bibliographies; to 10.2014; no language restriction) for published full reports of RCTs comparing clonidine with placebo as an adjuvant to epidural local anaesthetics in patients undergoing surgery with or without general anaesthesia. We estimated WMD for continuous and OR for dichotomous data with 95%CI.
Results and Discussion: We analysed data from seven RCTs in adults (n=348) and six in children (n=324) undergoing different surgeries. Clonidine regimens varied widely. Local anaesthetics were bupivacaine, ropivacaine, levobupivacaine and 2-chloroprocaine. Clonidine decreased pain intensity in adults at 30 minutes postoperatively (WMD -1.42 cm [-1.71, -1.13] on a 0-10 cm VAS) and in children at 6 hours (OR 0.13 [0.06, 0.29] on the FLACC scale). Postoperative analgesia was prolonged in children (93.2 min [73.5, 112.9]); in adults the result was borderline significant (WMD, 143.8 min [-33.7, 321.3]). Supplementary need for analgesia at 24 hours was decreased in children (OR 0.12 [0.05, 0.30]). There was a tendency toward a decrease in the incidence of PONV in adults (OR 0.61 [0.28, 1.30]) and children (OR 0.46 [0.18, 1.19]). The risk of bradycardia was increased in adults (OR 3.38 [1.40, 8.17]). Arterial pressure was not significantly decreased. The variety of drug regimens and settings did not allow establishing dose-responsiveness.
Conclusion(s): There is surprisingly little evidence supporting the usefulness of clonidine as an adjuvant to local anaesthetics for epidural analgesia in adults or children undergoing surgery.

3AP6-5

Epidural anesthesia in patients with multiple sclerosis - a systematic review of literature

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Background and Goal of the Study: Multiple sclerosis (MS) is one of the most common chronic inflammatory diseases of the central nervous system in Central Europe and the most frequent cause of disability in young adults.
Due to potential neurotoxicity of local anesthetics and the absence of current guidelines the application of epidural anesthesia (EA) in MS patients is still discussed controversially.
The aim of this study was to evaluate if EA adversely affects the clinical course of MS.
Material and methods: A systematic literature search in PubMed using the keywords "anesthesia, analgesia, epidural, peridural and multiple sclerosis" was performed considering articles in English, German or French between 1970 and September 2013.
Results and Discussion: A total of seven studies (two of them dealing with EA and spinal anesthesia, five concerning EA only) and four case reports (three EA, one combined spinal and epidural anesthesia) was found.
One of the trials reported a patient suffering a MS relapse with incomplete remission of symptoms, another study revealed four patients experiencing a MS exacerbation. The remaining studies and case reports showed no postinterventional neurological complications.
In summary, in view of the current literature there is **no evidence** for an aggravation of neurological symptoms in patients with MS undergoing EA.
The interpretation of our data is limited by the overweighing number of case series and retrospective studies and the fact that any kind of stress can lead to an exacerbation of MS. In particular in obstetric anesthesia, the generally increased relapse rate in the first three months post partum has to be considered.
Conclusion: Due to the advantages of EA especially for parturients MS should not be seen as a contraindication for this neuraxial technique. However, we always have to create an individual risk-benefit profile including the patient's own expectations.

In future, the initiation of prospective studies with a correspondingly large number of cases is necessary.
Reference: 1. Toft F. Rückenmarksnahe Analgesie bei PatientInnen mit Multipler Sklerose. Literaturrecherche. Medizinische Universität Graz, 2014

3AP6-6

The effect of epidural anesthesia on tissue oxygenation in obese patients undergoing open lower abdominal surgery

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Background and Goal of Study: Epidural anesthesia may improve microcirculatory perfusion and tissue oxygen supply. In this study the effect of epidural anesthesia on tissue oxygen saturation was evaluated in obese patients undergoing open abdominal surgery.
Materials and Methods: With approval from faculty ethic committee and written informed consent, thirty eight patients with BMI 30-38 were included to the study. Patients were randomly divided into two groups: general (Group G, n:19) or combined general and thoracic epidural anesthesia (Group EG,n:19). Anesthesia technique and fluid management were standardized. Tissue oxygen saturation (StO_2) was measured continuously in anterior forearm and foot plantar side by near infrared spectroscopy. Heart rate, mean arterial pressure, core temperature, peripheral oxygen saturation, StO_2 were recorded at before induction, during induction, 30-minute intervals during surgery and on 0-20-40-60th minutes in the recovery room. Oxygen was given via facemask in the recovery room for 45 minutes. Blood viscosity and arterial blood gases were measured at certain times. Paired Samples Test and Pearson and Spearman's correlation analyses were used for statistical analysis. $P< 0.05$ was considered statistically significant.
Results and Discussion: Both groups were similar with regard to age, BMI, ASA classification, duration of anesthesia and surgery. Fluid management, core temperature, hemodynamic variables, arterial blood gases and blood viscosity comparable in both groups. Plantar and forearm StO_2 values began to increase from induction of anesthesia in both groups and continued until the end of surgery in Group EG. Plantar StO_2 reached to peak levels at 30th minute (17.84 and 21.69% in Group G and Group EG respectively). No statistically significant differences between perioperative plantar and forearm StO_2 values were observed between groups in all times. At the recovery room, 60th minute plantar StO_2 value was significantly higher in the Group EG than in the Group G.
Conclusion: We observed that in both groups, intraoperative StO_2 values were higher than preoperative values. Although there were no statistically significant differences, plantar StO_2 values were elevated in the combined anesthesia group. Thus, thoracic epidural anesthesia combined to general anesthesia might be useful to improve tissue oxygen tension in obese patients during abdominal surgery.

3AP6-7

Does epidural spread influence the clinical effect of paravertebral block?

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Background and Goal of Study: Paravertebral block (PVB) is commonly associated with some epidural spread of the local anesthetic injected in the paravertebral space. This has been previously demonstrated in various cadaveric and radiological studies.
We studied by computed tomography (CT) the incidence of this spread and evaluated its impact on the clinical effect of PVB.
Materials and Methods: After local ethical committee approval and informed patient consent, we studied 48 patients scheduled for percutaneous radiofrequency ablation of renal tumor. PVB was performed at two levels (T9 and T11) according to Eason and Wyatt technique. After CT control of the position of needles extremity, 13ml of levobupivacaine 3.75% and 2ml of radio-opaque iohexol 300, were injected at each level. A second CT control was realized 5 minutes later to study the anesthetic spread. Sensory block (cold test) was recorded at 20 and 90 min.
Results and Discussion:

	Number of patients	Level
Sensory block extension of patients without epidural spread	17	5.3 ± 1.9 dermatomes
Sensory block extension of patients with epidural spread	31	6.3 ± 1.9 dermatomes
Sensory block extension of patients with epidural spread > 3 vertebral levels	15	6.2 ± 2.1 dermatomes
Sensory block extension in all patients	48	6.0 ± 1.9 dermatomes
Radiological spread in all patients	48	4.4 ± 1.3 paravertebral levels

[Levels of spread of the local anesthetic in PVB]

CT showed a diffusion of PVB on 4.4 ± 1.3 paravertebral levels with an important epidural spread 31/48 patients (65%). In 15 patients, the epidural spread occurred in more than 3 vertebral levels (31%). Sensory block extended on 6.0 ± 1.9 dermatomes and was always superior to radiological diffusion ($p< 0.01$). On comparing sensory block extension between patients having epidural spread (6.3 ± 1.9 dermatomes) and those who did not have (5.3 ± 1.9 dermatomes), there was no significant difference ($p=0.1$). There was also no significant difference in sensory block extension between patients having epidural spread in more than 3 levels (6.2 ± 2.1 dermatomes) and those who did not have any epidural spread (5.3 ± 1.9 dermatomes) ($p=0.24$).
Conclusion: During PVB, the incidence of epidural spread was high. Although this might contribute in the mechanism of action of PVB, it did not affect the extension of the sensory block. This is probably due to the small amount of the local anesthetic diffused in the epidural space. It would be interesting to quantify this amount but this will need to overcome some technical difficulties.

3AP6-8

Comparison of analgesic techniques for open radical prostatectomy: transversus abdominis plane block and epidural anaesthesia: a retrospective analysis

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Background and Goal of Study: Anaesthetic technique can interact with the immune system and affect long term outcome. Regional anaesthesia has a sparing effect on opioids consumption, and may reduce perioperative immunosuppression. The present study's aim was to compare the transversus abdominis plane block (TAP block) and epidural block, both in association with general anaesthesia, for open radical prostatectomy regarding: intraoperative hypotension, volemic replacement, side effects and postoperative analgesia.
Materials and Methods: Retrospective chart review of patients who underwent open radical prostatectomy between March 2009 and March 2010. Groups were divided according to the analgesic technique: epidural group (n=223) and TAP block group (n=35). The groups were compared for demographic data, surgery duration, volemic replacement, intraoperative hypotension, blood transfusion, intraoperative opioid consumption, PACU length of stay, side effects and pain in the first day after surgery.
Results and Discussion: Overall, 258 patients were included in this retrospective study. The groups were similar regarding demographic characteristics, operating ward and PACU length of stay. The epidural block group received a greater volume of crystalloids ($p=0.03$). There was no difference between the groups concerning blood transfusion and use of vasopressors, although intraoperative hypotension was more often in the epidural group. The TAP block group had a greater intraoperative consumption of opioids ($p< 0.001$). There were no differences in pain scores, use of rescue analgesia and side effects between both groups.
Conclusion(s): TAP block requires less need for intraoperative volemic replacement and vasopressors. Important issues still to be compared between the two anaesthesia techniques are biochemical cancer recurrence and immune function; the results may point to a safe alternative to the epidural block in cancer patients.
References:
1. O´Riain SC BD, Kerin MJ, Watson RW, Moriarty DC: Inhibition of the stress responses to breast cancer surgery by regional anesthesia and analgesia does not affect vascular endothelial growth factor and prostaglandin E2. Anesthesia & Analgesia 2005; 100: 244-249.
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3AP6-9

Computed tomographic assessment of paravertebral block spread

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Background and Goal of Study: The paravertebral block (PVB) has an unpredictable metameric extension and efficiency. We studied by Computed Tomography (CT) the spread of the injected local anesthetic to different nearby spaces and secondly we measured the depth of the paravertebral space (PVS).
Materials and Methods: After local ethical committee approval and informed patient consent, we studied 24 patients scheduled for percutaneous radiofrequency ablation of renal tumour. PVB was performed at two levels (T9 and T11) according to Eason and Wyatt technique. After CT control of the position of needles extremity, 13ml of levobupivacaine 3.75% and 2ml of radio-opaque iohexol 300, were injected at each level. A second CT control was realized 5 minutes later to study the anesthetic spread and the depth of PVS (defined as its antero-posterior diameter between the tip of the transverse process and parietal pleura).
Results and Discussion:

Spread:	Number of patients (n=24)	Mean of Spread (Vertebral spaces)
PVS Cranial direction	3	1
PVS Caudal direction	11	1.25
Controlateral PVS	0	0
Intercostal	20	1
Epidural	17	3.1

[Spread of local anesthetic in PVB]

PVS depth was 35mm (31.5-38.5). It increased with Body Mass Index (p=0.02) and varied according to sex; men (39.2+/-12.9 mm) vs women (30.2+/-9 mm) (p=0.01), with no difference between T9 (34.4+/-9mm) and T11 (37.4+/-10.7mm) (p=0.5). The spread of the injected local anesthetic in the adjacent PVS was preferentially caudal than cephalic (11 : 3 patients). There was a high incidence of intercostal spread (20/24 patients) and of epidural spread (17/24 patients). Epidural spread was not correlated to the distance between the needle extremity and the midline (p=0.55). There was no vascular or pleural injuries only two hypotensions were observed. During treatment session, 75 % of the patients had a pain scale (NRS) < 3 and satisfaction was 84 %.
Conclusions: The spread of the injected local anesthetic to nearby spaces is unpredictable. There is an important intercostal and epidural spread which probably participate in the mechanism of action of PVB. The depth of the PVS and the position of the extremity of the needle show an important inter individual variability. That´s why, PVB need to be realized under radiological control. The PVB is an efficient well tolerated technique for realizing percutaneous radiofrequency ablation of renal tumors.

3AP6-10

Analysis of the efficacy of the greater occipital nerve block versus epidural blood patch in the treatment of post spinal puncture headache in puerperal women. Preliminary results

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Background and Goal of Study: The objective was to evaluate the efficacy of the greater occipital nerve block in comparison with gold standard treatment: the epidural blood patch, both used in the treatment of post dural puncture headache in puerperal women.
Materials and Methods: A prospective, longitudinal, analytical study on a sample of 9 puerperal women with post dural puncture headache, were randomly assigned to two groups. Group 1 (G1) with 5 patients treated with epidural blood patch with 10 ml autologous blood into the epidural space, on the same level as the dural puncture and Group 2 (G2) with 4 patients treated with bilateral greater occipital nerve block with triamcinolone 20 mg and bupivacaine 7,5 mg on both sides. Eligibility criteria were puerperal women with baseline pain > 7 in the visual analogue scale (VAS) after 48 hours of the procedure with conservative treatment. Exclusion criteria were patient refusal to provide informed consent. The ethics committee approved the study and the patient consent was obtained. Primary outcome was pain intensity measured with a visual analogue scale. Secondary outcomes were presence of tinnitus, photophobia, dizziness and early hospital discharge (< 48 hours). All these variables were explored before the treatment, on days 1, 7 and day 30 after treatment.
Results and Discussion: Demographic data were similar in both groups. Pain intensity measured with VAS was lower in group treated with epidural blood patch compared to the bilateral greater occipital nerve block in the first 24 hours after the treatment (G1: 0,2 ± 0,44 vs G2: 2 ± 1,82, p>0,05). In addition, we did not find any difference in the next 30 days of outpatient monitoring. Both techniques allowed an early hospital discharge of the patient in the first 48 hours after treatment with VAS < 3 (G1: 100% vs G2: 100% p> 0.05). The incidence of tinnitus, photophobia and dizziness was similar in both groups, with no significant statistic difference (p>0,05). There were no complications attributable to both treatments.
Conclusion(s): We consider that the bilateral greater occipital nerve block can provide similar efficacy than epidural blood patch in the treatment of post dural puncture headache in puerperal women, allowing an early hospital discharge after the treatment. Nevertheless, we observe that there is also a reduction in VAS in patients treated with epidural blood patch even though studies with a larger sample size are necessary.

3AP7-1

Bilateral ultrasound guided superficial cervical plexus (SCP) blocks on a morbidly obese patient with severe obstructive sleep apnoea (OSA)

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Background: The SCP supplies the anterolateral neck via roots C2-4.[1] The use of bilateral SCP blocks as sole anaesthesia for elective neck surgery has previously been described,[1] however we believe this to be the first report in urgent posterior neck surgery. With >70% of morbidly obese patients having OSA, general anaesthesia is not lightly undertaken in this cohort due to multiple potential complications.[2]
Case report: A 43 year old male, with a medical history including BMI 48 and OSA, required incision and drainage of a posterior neck abscess. After lengthy multidisciplinary and patient discussion, we decided upon SCP blockade. After establishing full monitoring and intravenous access, the patient was positioned sitting, facing away from the block side. Under full asepsis, a high frequency linear ultrasound transducer was placed transversely left sternocleidomastoid muscle midpoint, and the posterior border was identified at a depth of 4cm. The plexus was difficult to visualise due to excessive fat deposition, therefore a 22G 80mm sonotap needle was placed in the posterior sternocleidomastoid plane. 30mls of 1% lignocaine with 1:200,000 adrenaline was infiltrated with good spread posterior to the sternocleidomastoid muscle observed. Good left sided sensory blockade had been achieved, however in view of the size of abscess, we cautiously proceeded to perform a right SCP block, using the same technique and a further 28mls injected. The patient required no additional sedation or analgesia.
Discussion: Although described for elective anterior and anterolateral neck surgery, the use of SCP blockade for urgent posterior neck surgery does not appear to have been described before. In the case reported it provided excellent regional anaesthesia for the posterolateral aspect of the neck, and negated the need for general anaesthesia in a high-risk patient.
References:
1. Mukhopadhyay S, Niyogi M, Dutta M, et al. Bilateral superficial cervical plexus block with or without low-dose intravenous ketamine analgesia: effective, simple, safe, and cheap alternative to conventional general anesthesia for selected neck surgeries. Local Reg Anesth 2012; 5: 1-7.
2. Loadsman JA, Hillman DR. Anaesthesia and Sleep Apnoea. BJA 2001; 86(2): 254-266.
Learning points: Sleep apnoea is increasingly a problem encountered in anaesthesia. Regional anaesthesia can negate the need for G.A. and thus avoid potential complications. SCP blocks can provide good anaesthesia for neck abscesses.

3AP7-2

Mid-forearm peripheral nerve block provides surgical anesthesia while preserving distal motor function

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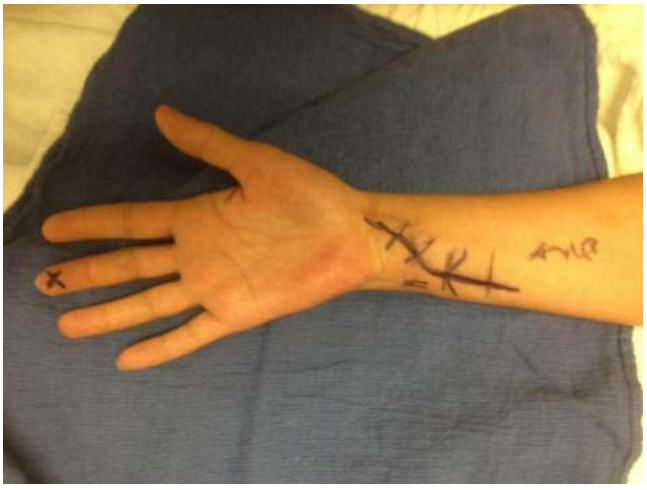
Background: Peripheral nerve blocks (PNB) are routinely used as a primary anesthetic for ambulatory surgery. Benefits include decreased opioid use, avoidance of general anesthesia, and faster discharge. Motor block is usually a prerequisite for adequate surgical conditions. However, there are some instances where preservation of motor function is essential for a successful procedure.
Case report: We present an otherwise healthy 40 y/o female scheduled for release of forearm flexor tendons. The procedure was dependent on patient cooperation, surgical anesthesia at incision site, and motor sparing of digit flexors. Ultrasound guided single shot PNB of ulnar and median nerves at mid-forearm provided surgical anesthesia at the incision site while maintaining flexor compartment motor function. Blockade of these peripheral nerves distal to the majority of the muscle preserved motor function. The patient received minimal sedation for the PNB and was discharged from PACU to home after completion of surgery.



[Incision site marked at distal forearm]

Discussion: Surgical procedures such as tenolysis of flexor compartment require the patient to have preserved motor function for confirmation of adequate release and satisfactory outcome. It has already been shown that distal PNB provides for better post-op recovery (including motor function and patient satisfaction) (1). This case demonstrates specifically that PNB at mid-forearm level allows for preserved flexor compartment function while maintaining adequate surgical anesthesia. Distal PNB of specific nerves may be helpful in hand surgeries where the surgeon needs preservation of motor function (2).
References:
1. Lam NC et al. A triple-masked, randomized controlled trial comparing ultrasound-guided brachial plexus and distal peripheral nerve block anesthesia for outpatient hand surgery. Anesthesiol Res Pract 2014; 2014:324083
2. Lalonde DH et al. Wide-awake flexor tendor repair and early tendon mobilization in zones 1 and 2. Hand Clin. 2013 May;29(2):207-13
Learning Points: Peripheral nerve block at mid-forearm provides surgical anesthesia while preserving distal flexor compartment motor function.

3AP7-3

Aseptic meningitis after epidural blood patch under fluoroscopy: a case report

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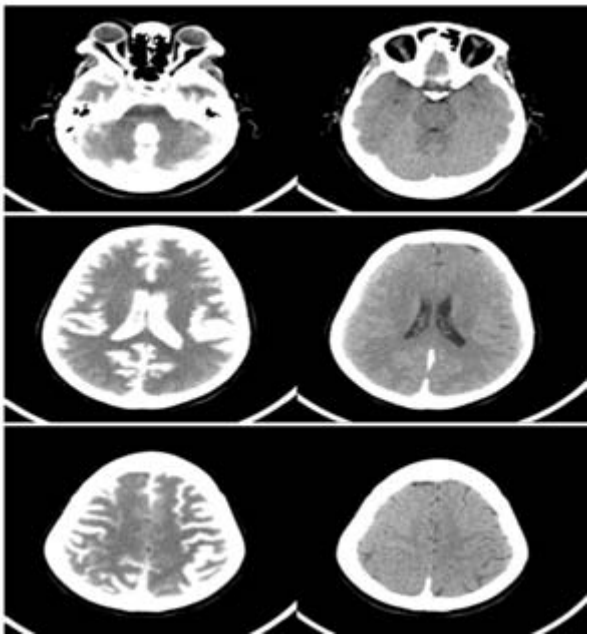
Background: Aseptic meningitis is a rare complication of use of non-ionic, iodinated, water-soluble contrast agents for myelography. We present a case of a 52-years-old female who developed aseptic meningitis after epidural blood patch (EBP) under fluoroscopy.
Case report: A 52-years-old female, ASA 2, who undergoes an EBP under fluoroscopy as a treatment of persistent CSF leakage after removal of lumboperitoneal bypass that was placed 14 years before due to benign intracranial hypertension. The access to epidural space at L2-L3 is achieved paramedially. After 10ml of iohexol contrast (Omnipaq 300®, GE Healthcare, Cork; Ireland) administration, an image of subarachnoid distribution is obtained. A new puncture is realised at L4-L5 and after a negative fluoroscopy (again with contrast) and test dose of Bupivacaine, the EBP is performed with 20ml of autologous blood. After one hour, when in PACU, she presents a sever headache, nausea and mild agitation resistant to usual treatment. A head CT is realised and radiopaque contrast spread in the subarachnoid space and ventricles is seen. Considering signs of meningeal irritation without signs of infection, diagnosis of aseptic meningitis due to iohexol subarachnoid spread is established.
Discussion: The most common minor adverse effects are headache, nausea, vomiting and dizziness. More sever complications include aseptic meningitis, meningoencephalitis, bacterial meningitis, intracranial hemorrhage, etc. Our patient could have increased risk for aseptic meningitis due to already existing communication between subarachoid and epidural spaces, aditional intradural puncture and administration of double volume of contrast agent.
References:
1. Aseptic meningoencephalitis after iohexol CT myelography. Romesburg J. AJNR Am Neuroradiol. 2009 May; 30(5): 1074-5.
Learning points:
- In general, iohexol is a safe and affective contrast agent for spinal procedures control.
- Clinicians should be aware of the rare occurrence of aseptic meningoencephalitis related to contrast medium use.
- The clinical symptoms, timeline, and other clinical items help us to differentiate aseptic meningoencephalitis from other complications of spinal procedures.



[TAC]

3AP7-4

Ankylosing spondylitis - anaesthetic management for hip arthroplasty

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Background: Ankylosing Spondylitis (AS) is a chronic inflammatory disease that affects the axial skeleton and peripheral joints. Patients have difficult airways, restrictive lung disease; general anaesthesia is a challenge. Performing neuroaxial blocks is also difficult due to spinal deformities, stiffness, bone bridges between the vertebrae and ossification of the axial ligaments.[1] Hip replacement surgery helps recovering some degree of functionality. There are few cases in literature of success performing spinal anaesthesia in AS patients.
Case report: Male, 37 years, severe AS, proposed for arthroplasty of the right hip. He had a typical column bamboo and stiffness throughout its length and the hip joints. His width of mouth opening was less than 2 fingers, the Mallampati score was 4 and he had no cervical mobility. These features predicted a difficult airway so it was obtained consent to attempt neuraxial anesthesia. He was monitored, pre-medicated with midazolam and fentanyl. It was performed a spinal block using the paramedian approach with a 26G needle and administered 11 mg levobupivacaine and 1mg sufentanil. Anaesthesia and postoperative analgesia were improved with a femoral block. This resulted in adequate sensory and motor block for the surgery. The patient referred good postoperative analgesia.
Discussion: Both airway management and neuraxial access may be difficult is AS patients. The trend has been to deal with the airway challenge, and avoid neuraxial anaesthesia[2]. Regional anaestesia for total hip arthroplasty has clear advantages[3]. Although the ossification of ligaments in the midline not allowed the placement of an epidural catheter, the spinal paramedian approach complemented with femoral block were adequate for surgery.
References:
1. J Parul, C Gaurav, C Amit et al, Saudi J Anaesth. 2009; 3(2): 87-90.
2. Sampaio-Barros PD, Bertolo MB, Kraemer MH et al. J Rheumatol. 2001;28:560-5
3. Young AC, Buvanendran A. J Surg Orthop Adv. 2014;23(1):13-21
Learning Points: This case demonstrates that although technically difficult, spinal anaesthesia with paramedian approach may be successful and a good alternative in AS patients.

3AP7-5

Use of infraclavicular catheters for early passive continuous mobilization after arthroscopic surgery in chronic elbow stiffness

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Background: Early elbow mobilization (Continuous passive motion or CPM with Kinetec®) after arthroscopic surgery in chronic elbow stiffness has been effective to avoid postsurgical adhesions and improve articulation flexibility. This early mobilization causes important pain.
Goal: Prove the utility of infraclavicular catheters in management of pain associated with both surgery and early mobilization.
Materials and Methods: We enrolled 26 patients (80% male and 20% female), with a mean age of 36,31 (SD: 12,64) who underwent arthroscopic elbow surgery with hospitalization.
Inclusion criteria were: patients older than 16 years old with elbow stiffness due to old elbow fractures. The only criteria exclusion was the presence of infection in the site of puncture o coagulation abnormalities that contraindicated the puncture; no patient was dismissed because of this reason.
In the preoperative area, we stowed the infraclavicular catheter using electrostimulation to locate the right place, and use it to deploy 20ml of levobupivacain 0,5%. Once in the OR, patients underwent general anesthesia or sedation.
We evaluated pain control during surgery and immediate postoperative pain by controlling additional requirements of analgesia. We also evaluated pain control during the first 72 hours of hospital stay with VAS.
As well we took in account the appearance of secondary effects.
Results: In the operating room, only 6% of patients required additional analgesia (usually fentanyl). During the stay in the recovery room, 22% of patient required additional analgesia, paracetamol was the most used drug.
Evaluating the VAS:
1. Mean VAS during the first 24 hours was 1,61 (SD: 1,94)
2. During 24-48 hours mean VAS was 1,31 (SD: 1,64)
3. Between second and third day, mean VAS was 1 (SD: 1,31)
We found that secondary effects were mainly dizziness and nausea, they appear in only 6% of cases, being in all of them auto-limited.
It caught our attention, that 20% of patients suffer accidental emergence of the catheter or need of repositioning it. In our opinion, this is an important point that needs improvement.
Conclusion: Settlement of infraclavicular catheter for pain control after arthroscopic elbow surgery, has been proved to be the best choice, due to its situation in an area with little mobilization during CPM; although it needs improvement to avoid accidental emergence.

3AP7-6

Chronic inflammatory demyelinating polyneuropathy and regional anesthesia - case report

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Background: Chronic inflammatory demyelinating polyneuropathy (CIDP) is an inflammatory, predominantly motor polyneuropathy. Literature is scarce regarding its anesthetic management.[1,2] We report a case of combined spinal and epidural anesthesia (CSE) in a patient with CIDP.
Case report: Male, 68 years old, ASA physical status III, with previous history of peripheral artery disease, arterial hypertension, CIDP, cerebrovascular disease (right hemiparesis), operated cervical spondylotic mielopathy (C3-C4 microdiscectomy and cage arthrodesis, reduced cervical mobility) and tobacco consumption. The patient was undergoing a left supra-articular ilio-popliteal bypass with prosthetic graft and bilateral iliac stent placement. He presented discrete tetraparesis (more severe on the right), right hemihypoesthesia, hyperalgesia in both legs and paresthesia in both hands. A combined spinal and epidural anesthesia with the needle-through-needle technique was performed in the lumbar space (L2-L3) and 5mg of levobupivacaine (5mg/ml) and 0,002mg of sufentanil (0,005mg/ml) were administered intrathecally. After 2h30 of spinal block, 6ml of ropivacaine (3,75mg/ml) were administered via the epidural catheter. The surgery ended 1h15 after. There were no neurologically changes, such as prolonged motor block or other complications. The epidural catheter was removed 24h after surgery.
Discussion: In CIDP patients, the use of neuromuscular blocking drugs in general anesthesia may result in prolonged effect and there is no experience with sugammadex.[1] There are case reports of prolonged motor block after spinal anesthesia.[1] Regarding the epidural block, evidence concerning patients with acute demyelinating polyneuropathies (such as Guillain-Barré Syndrome) suggests the use of lower doses of local anesthetic.[3] There is also a possibility of worsening of symptoms after an immunological stimulus.[1,3] The combined spinal and epidural anesthesia allowed a careful titration of drugs, avoiding the management of a probably difficult airway and minimizing motor block, while providing optimal analgesia postoperatively. We did not find in literature previous reference to the use of this technique in CIDP patients.
References:
1. J Anesth. 2012;26(2):280-2.
2. Reg Anesth Pain Med. 2002;27(2):217-9.
3. Anesth Analg. 2004;98:825-7.
Learning Points: Successful combined spinal and epidural block in a CIDP patient. Importance of a previous neurological examination and low dose of local anesthetic.

3AP7-7

Thoracic interfascial wall block (SIFB) assessed by the analgesia nociception index (ANI). Two cases report

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Background: The thoracic interfascial wall block of the anterior and lateral cutaneous branches of the intercostal nerves (known as serratus intercostal plane block (SIFB) is a recent described technique that can be successfully used for breast surgery. The SIFB block is carried out using the ultrasound to locate the interfascial plane between the serratus anterior and the external intercostals muscles. The efficacy of this block during general anesthesia could be assessed using the analgesia nociception index (ANI), which is used to quantify the analgesic component analyzing the variations on the autonomic nervous system.
Case report: Two patients with gender identity disorder, aged 30 and 30 years old respectively, were scheduled for elective surgery for bilateral mastectomy, having only a previous history of hysterectomy and ooforectomy. SIFB bilateral blocks (4-5 intercostal levels with 20 ml of 0,25% l-bupivacaine on each side, transducer 10-15 MHz) were performed after general anesthesia (TIVA TCI propofol Schneider 2-2,5 mcg/ml e.s.c and remifentanyl Minto models 0,05-0,1 ng/ml e.s.c). ECG, HR, BP, SpO2, BIS and ANI were monitored. The ANI did not reach any value below 50 during the 150 minutes of surgery. Remifentanyl effect-site concentrations were not modified and it was stopped at the end of the intervention. Paracetamol and dexketoprofen were finally administered. No adverse events were observed.
Pain scores on a 0-10 scale were 2 and 0 at the end of anesthesia and at discharge from the PACU respectively with no needs of opioids.
Discussion: SIFB blocks could be performed under general anesthesia for mastectomy decreasing the discomfort and allowing to reach a good control of analgesia. The risk of pneumothorax and intravascular injection should be considered. ANI monitoring could be useful in these cases to assess the need of intra and postoperative analgesia and test the efficacy of this block during general anesthesia and it might also help to predict the need of postoperative analgesics.
References:
1. López-Matamala B, et al Med Intensiva. 2014Oct;38(7):463-5
2. Blanco R et al. Anaesthesia. 2013Nov;68(11):1107-13
3. Gruenewald M et al. Br J Anaesth. 2013Jun;110(6):1024-30
4. Migeon A. Paediatr Anaesth. 2013Dec;23(12):1160-5
Learning points: SIFB could be a good technique of regional anesthesia for mastectomy, and could be performed during general anesthesia. The ANI could be a good monitor to assess to efficacy of this block.

3AP7-8

Hunter syndrome: axial blockade might even be easy

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Background: Hunter syndrome (HS) or Mucopolysaccharidosis type II is an X-linked, rare, progressive disease caused by a deficiency of lisossomal enzyme iduronate-2-sulphatase, leading to multiorgan deposition of glycosaminoglycans (GAG). These patients, usually paediatric, need variable surgery for symptomatic relief, have a high incidence of difficult airway, and peri-operative mortality can be as high as 20%.[2]
We describe the case of a patient submitted to multiple surgeries in the course of several years, some under subarachnoid block (SAB) which was technically easy and successful.
Case report: MJH is a 17 years old male under enzyme replacement therapy for HS since he was 11 years old; he has minimal central nervous system (CNS) involvement (no cognitive impairment but narrowing of the cervical spinal canal without cord compression) along with other typical features. He was admitted for orthopedic surgery of left limb and has a known difficult airway. He was operated previously twice under SAB, described as easy, 3 and 1 years ago. We performed a spinal anaesthesia with a 27G needle by midline approach, with 10mg hyperbaric bupivacaine, which was technically easy, successful at first attempt by the 3rd year resident and obtaining the expected block. It was necessary to administer midazolam (total 6mg) for anxiolysis. Surgery underwent uneventfully.
Discussion: HS is a multiorgan disease associated to high perioperative morbidity. Little has been published about the success of neuraxial blockade in these patients. We found 2 reports of failed SAB[2] and one of failed epidural block, probably due to GAG deposition in the CNS. Literature about anaesthetic management of HS patients focuses mainly on difficult airway and omits successful neuraxial blockade. There are few reports of successful SAB in patients with other mucopolysaccharidosis but none of them refers to HS.
This patient was operated 3 times under SAB despite CNS involvement, suggesting that, contrary to the previously documented cases, it is a valid alternative for HS patients.
References:
1. ISRN Anesthesiology; vol 2913, article ID 791983
2. Rev Bras Anestesiol 2007; 57:6:658-664
Learning points: HS is a multiorgan disease associated to high perioperative morbidity and mortality and high incidence of difficult airway.
There are descriptions of failed neuraxial blockade in HS patients.
Neuraxial anaesthesia is a valid alternative for HS patients even when there is CNS involvement.

3AP7-9

Epidural narcotic overdose - a case report of respiratory depression

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Background: The use of epidural opioids in the control of post-operative pain has been largely recognized and routinely used.
We report an accidental administration of a large dose of epidural morphine that lead to respiratory arrest.
Case report: A 65 year-old-man underwent an uneventful radical prostatectomy under combined spinal-epidural anesthesia. The epidural catheter was tested after surgery with 3 mL of 2% lidocaine, followed by 5 mL bolus of an already prescribed 50 mL PCEA with 50 mg of ropivacaine and 1 mg of morphine (0,02 mg/mL of morphine). Accidentally, 50 mg of morphine instead of 1 mg were added to this PCEA syringe (1mg/mL concentration). The patient stayed at the PACU for 6 hours with a 5mL/h PCEA basal infusion of this dilution, having received 35 mg of epidural morphine in total. Six hours later, the emergency team was called for an episode of respiratory depression with peripheral and central cyanosis. The lungs were immediately ventilated with 100% oxygen using a face mask, orotracheal intubation with a 7,5 cuffed tube was performed, and 0.4 + 0,4 mg of naloxone was given intravenously with restoration of respiration and awareness. Blood pressure was 146/82 mm Hg with a heart rate of 110 beats/min, $SatO_2$98%.
During the next 20 hours, the patient was treated with a continuous intravenous infusion of naloxone of 0,4 mg/h. Rates were adjusted to respiratory rate (10-12 cpm), level of consciousness, and acid-base status. The patient remained pain free for 30 hours . Nausea, vomiting and pruritus were noted and treated.
Discussion: Mistakes in drug administration are still one of the greatest concerns in anesthesia. There are very few reports of such an amount of epidural morphine administration in an opioid-naive patient, and the ideal dose of naloxone infusion for reversal of respiratory depression, is still to be found. Some authors consider an effective dose of 0,1 - 0,4mg/h up to 0,8 mg/h adjusted to the response. A dosing nomogram was firstly discussed in 1986 by Goldfrank et al., who proposed an hourly continuous infusion of 2/3 of the initial bolus dose. In our patient the effective dose was lower (0,4 mg/h vs 0,53 mg/h), without affecting analgesia.
References:
Ann Emerg Med. 1986 May;15(5):566-70
Br J Anaesth 2002; 89: 925-7
Learning Points: Continuous infusion of naloxone, should be adjusted to patient's individual response. Correct preparation and labeling of syringes are essential to patient safety.

3AP7-10

Subdural hematoma following spinal anesthesia

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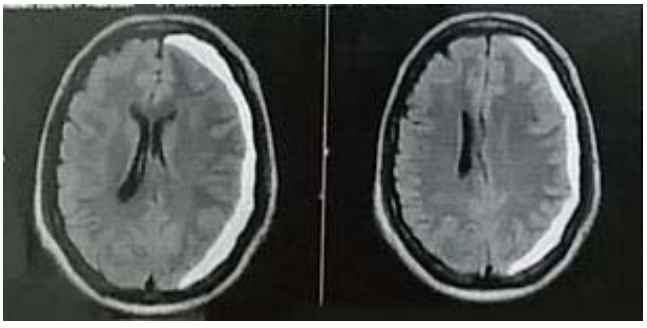
Background: Spinal anaesthesia is an easy and relatively safe procedure. Neurological complications are rare though potentially severe and of undetermined course.
We report a subdural hematoma following spinal anaesthesia.
Case report: A 54-year old male patient was submitted to spinal anaesthesia for arthroscopy of the knee. Anaesthesia was performed at L3-L4, using a Quincke needle 27G. After backflow of clear fluid, 20mg bupivacaine and 80 μg morphine were administered. After the intrathecal injection, the patient reported headache and 5mg midazolam was administered. Surgery lasted two hours. The patient was discharged 24 hours later but after 48 hours reported a holocranial headache which persisted even after decubitus and worsened when moving the head. As symptoms became more severe and diplopia and *tinnitus* developed, opioid analgesics were prescribed. On the 20th postoperative day, the patient experienced weakness in the right arm and paresthesia in the right leg. On MRI, an intracranial subdural hematoma was seen in the left frontoparietal region, causing compression of the left lateral ventricle and a slight deviation of the midline. The neurosurgical drainage of the hematoma was performed, resulting in complete resolution of the headache. The symptoms of diplopia and *tinnitus* resolved after two months.
Discussion: Post-dural puncture headache is a frontal and/or bilateral occipital pain, which worsens in orthostasis and is relieved in dorsal decubitus. Atypical headache patterns or physical changes should alert the medical team to the possibility of neurological complications. Bleeding is caused by traction and disruption of cerebral bridging veins secondary to cerebrospinal fluid loss. Early diagnosis and proper management are crucial for a favorable outcome.



[Subdural hematoma]

References: Bisinotto FMB, Dezena RA, Fabri DC, et al.Intracranial subdural hematoma: a rare complication following spinal anestesia: case report. Rev Bras Anestesiol, 2012;62(1): 89-95.
Learning points: Headache is the most frequent complication after spinal anesthesia, but we must be alert to atypical symptoms, to life-threatening complications can be diagnosed and properly conducted

3AP7-11

Our spinal anesthesia expeience in a patient with osteogenesis imperfecta

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Background: Osteogenesis imperfekta (OI), requires carefull anesthesia management because it is not only a rare disease but also has risks such as difficult airway and malignant hyperthermia. In this report, a case of OI in whom surgical intervention is planned for left inguinal hernia is presented.
Case report: In a 2 month old male patient at the weight of 3,2 kg diagnosed with osteogenesis imperfecta, inguinal hernia operation was planned. Routine monitorization was carried out. Spinal anesthesia administration was decided upon, taking short duration of operation, the probability of difficult intubation and the risk of mandibular bone fracture associated with intubation into account. Considering the risk of malignant hyperthermia, 2.5mg/kg. propofol was administered without sevoflurane induction and mask ventilation was carried out. The patient was positioned carefullly. 0.5mg/kg bupivacain was administed intrathecally at the level of L4-L5. Operation lasted for 45 minutes, and hemodynamically its course was stable. Patients was followed in recovery unit and was sent to clinic after motor block was discontinued.
Discussion: Osteogenes imperfecta (OI) is a rare autosomal recessive or dominant connective tissue disorder characterized by abnormal type I collagen production. In patients with OI, regional anesthesia is chosen rather than general anesthesia due to factors such as difficulty in ventilation and intubation, teeth and mandibula fractures, the risk of cervical trauma, diffiulty in positioning the patient, the risk of malignant or non malignant hyperthermia, and respiratory failure associated with kyphoscoliosis.
The problems in regional anesthesia administration are anatomic abnormalities in these patients and impairments in bleeding diathesis. In our patient, bleeding profile and platelet values were normal. Anatomic impairment was not severe enough to prevent spinal anesthesia probably due to young age of the patient and at second trial, intrathecal space was entered.
Patients with OI are challenging cases for anesthesists as they have complications that may influence the selection of both regional and general anesthesia. Since the complications of general anesthesia are more fatal, and considering the effect on post operative pain, it is our opinion that regional anesthesia technique should be the first choice.

Obstetric Anaesthesiology

4AP1-1

Rotem as point-of-care test during normal pregnancy: reference values

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Goal of Study: Rotational thromboelastometry (ROTEM) is a point-of-care (POC) bedside test that allows rapid evaluation of the overall coagulation system. POC coagulation testing might provide essential information for management of the high risk obstetric patient.
However reference values during pregnancy are still poorly defined. We measured ROTEM in normal at term pregnant women and compared these to values of non-pregnant female volunteers in order to assess how pregnancy alters these POC coagulation variables.
We hypothesized that with pregnancy POC coagulation variables would be indicative for a hypercoagulable state.

Methods: Blood samples were collected from 20 female non-pregnant volunteers and 12 at term pregnant women. ROTEM was performed according to the specific requirements together with hematocrit (Hct) and platelet count. Data between normal volunteers and pregnant women were compared using the Mann-Whitney U test.
Results and Discussion: In pregnant women the Hct was 32.9% (31.9-33.8), in non-pregnant volunteers 36.6% (35.6-37.5) ($P<0.01$). Platelet count was 154.000/μl (130.000-178.000) vs 222.000/μl (195.000-248.000), ($P<0.01$) respectively.
ROTEM showed that initiation of clotting, CT (clotting time), by tissue factor (EXTEM) is comparable between pregnant women and non-pregnant volunteers 62 s (52-71) vs 63 s (59-67) ($P>0.05$). Clot kinetics (time from 2 to 20 mm amplitude), as measured by CFT (clot formation time) is more rapid in pregnant women 70 s (57-83) vs 79 s (73-86) ($P=0.008$). Clot strengthening (α-angle 77° (75-79) vs 74° (73-76) ($P=0.032$)) and maximum clot firmness (MCF) 71 mm (69-73) vs 64 mm (62-66)($P< 0.001$) is increased during pregnancy. EXTEM MCF reflects the platelet interaction with fibrinogen. It takes longer to reach the maximum amplitude in pregnant patients 1687 s (1581-1794) vs 1378 s (1214-1543 ($P=0.008$). INTEM, FIBTEM and APTEM also reflect hypercoagulability.

Conclusion(s): This study provides reference values for Rotem parameters during normal pregnancy. Values are different from non-pregnant women and reflect the hypercoagulable state during pregnancy. These values can be used as reference when assessing coagulation status with POC coagulation testing in obstetric patients. Further study is needed to assess threshold values for haemostatic therapy in postpartum haemorrhage or decision making regarding to neuraxial anaesthesia in preeclampsia.

4AP1-2

A happy end after a cardiac arrest and haemorragic shock secondary to an amniotic embolism

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Background: Intra-hospital refractory cardiac arrest may benefit from Extracorporeal Life Support (ECLS). ECLS were already proposed in the treatment of Amniotic Embolism (AE).
Case report: A 38 year old woman, gravida 2, para 1, was hospitalized for elective caesarean section at 35 weeks of gestation for posterior placenta praevia with metrorrhagic episodes. Elective caesarean section led to the birth of a eutrophic child. Placenta accreta was highlighted as the source of postpartum haemorrhage. Hemodynamic instability and consciousness disorders motivated the use of general anesthesia in conjunction with the administration of uterotonics, an anti-fibrinolytic, a volume replacement, norepinephrine, and a transfusion support. After performing a haemostatic hysterectomy, a return to a stable hemodynamic situation was observed. At the end of the procedure, after a brief episode of bradycardia, the patient went into asystole. After 15 minutes of Cardio-Pulmonary Resuscitation (CPR), the Circulatory Support Mobile Unit (CSMU) was contacted. A veno-arterial ECLS was implemented after 55 minutes of low-flow. During CPR, the value of ET CO_2 was greater than 20 mmHg and waking movements were observed. Early surgeries for haemostatic control because of haemorragic shock were required twice. Between the two surgeries, factor seven activating protease was used and the bleeding was stopped during four hours. No thrombotic event occurred. ECLS was explanted after 12 hours. The patient was discharged of intensive care unit 4 days after without any neurological after-effect. The diagnosis of EA was confirmed by the presence of amniotic cells in bronchoalveolar lavage fluid.
Discussion: Our observations support the beneficial use of ECLS in the treatment of EA. It is believed there is a correlation between the use of ECLS when the implementation criteria in refractory cardiac arrest are met and a good neurological outcome: reversible cause of cardiac arrest, no no-flow, awakening signs per-CPR, and End-tidal $CO_2 \geq$ 10mmHg. While postponed for the arrival of the CSMU, prolonged CPR should be utilized when such criteria are present.
Learning points:
1. Maternity should improve their management for cardiac arrest by including ECLS in agreement with the CSMU concerned.
2. Factor seven activating protease can be a solution in major bleeding even if there are contraindications.

4AP1-3

Role of exogenous coagulation factors in realization of concept of restrictive replenishment of massive obstetric hemorrhage

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Background and Goal of Study: To establish the role of exogenous coagulation factors in the realization of the concept of restrictive replenishment of massive obstetric hemorrhage.
Materials and Methods: After approval of the design of the research by ethics committee there were examined 52 women in whom delivery or early postnatal period were complicated by acute severe blood loss with deficit of circulative blood volume 40-52%. Depending on the characteristics of intensive therapy patients were divided into 2 groups. In group 1 (n=30) there was performed standard intensive therapy of acute blood loss. In group 2 (n=22) treatment was added with the concentrate of prothrombin complex - (Octaplex, 1000-1500 IU). The groups were comparable on age, height, time of delivery, volume of blood loss (2793±668 ml). There were evaluated: the number of erythrocytes, hemoglobin, hematocrit, prothrombin index, INR, APTT, fibrinogen; water sector body (the total amount of liquid, the volume of the extracellular, intracellular and interstitial fluid) non-invasively - by integral impedance method at the time of delivery, in 12, 24, 72, 120 hours after it.
Results and Discussion: In case of using the concentrate of prothrombin complex there was shown a significant decrease by 24.5% of the total volume of infusion-transfusion environments; decrease by 22% of volume injected plasma and by 9.1% of the volume injected erythrocyte-contained environments. 12 hours after delivery in case of using the concentrate of prothrombin complex the total volume of fluid in the body was not significantly different from the volume of non-pregnant women; intracellular and extracellular volumes of fluid returned to the level in non-pregnant women. In this same group 24 hours after the delivery volume of the interstitial space was not significantly different from that parameter in non-pregnant women.
Conclusion(s): The inclusion of exogenous coagulation factors in the composition of infusion-transfusion therapy of acute obstetric hemorrhage provides the restrictive type of replenishment of deficit of circulative blood volume. The restrictive type of blood replenishment provides the reliable and fast (up to 1 day) normalization of water sectors of the body and reduces the probability of formation of the syndrome of multiple organ failure.

4AP1-4

Baseline fibrinogen level is significantly decreased in postpartum hemorrhage women

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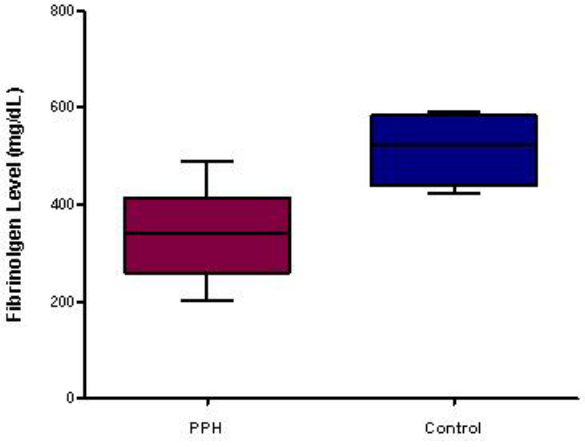
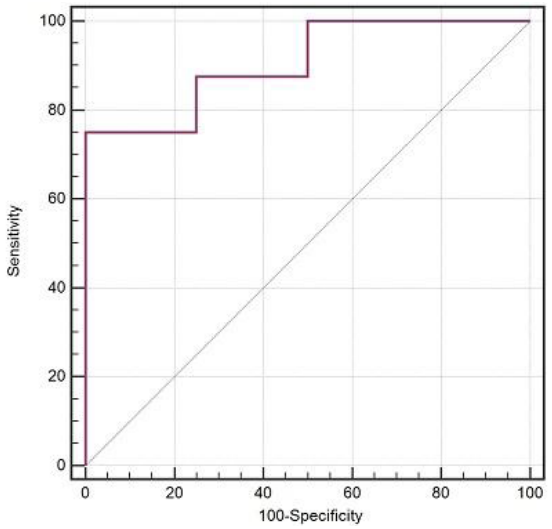
Background and Goal of Study: In the context of postpartum hemorrhage (PPH), fibrinogen concentration rapidly decreases to a critical level, which made fibrinogen replacement the first-line therapy in most transfusion algorithms.
1. In addition, preoperative low fibrinogen levels predicted postoperative bleeding in patients undergoing cardiac surgery.
2. This study assessed the relationship between pre-delivery fibrinogen levels and the incidence of PPH in full term women admitted for vaginal delivery.
Materials and Methods: We retrospectively reviewed data obtained from 26 consecutive parturients. Laboratory values obtained at admission were recorded, as well as the amount of blood loss measured during delivery. PPH was defined as a blood loss exceeding 800 mL during vaginal delivery or exceeding 1000 mL during caesarean section. A Receiving Operating Characteristic (ROC) curve was constructed with the aim to determine the relationship between preoperative fibrinogen level and the incidence of PPH.
Results and Discussion: From the 26 women included in our analysis, 11 developed PPH. Mean blood loss was 2100 ± 971 mL in women with PPH and 400 ± 154 mL in controls (p<0.001). PPH women had a significantly lower pre-delivery fibrinogen level compared to controls (p = 0.009).



[Figure 1]

Using ROC analysis, with area under the curve: 0.91 (95% CI: 0.60 to 0.99), p<0.0001), we determined that fibrinogen level ≤ 369 mg/dL predicted the development of PPH with a sensitivity of 75% and a specificity of 100%.



[Figure 2]

Conclusion(s): In this retrospective study, we first reported that decreased pre-delivery fibrinogen levels (≤ 369 mg/dL) are associated with an increased risk of PPH. Further large studies are needed to confirm these results.

References:

1. Abdul-Kadir R et al. Transfusion 2014,
2. Karlsson M et al. Transfusion 2008

4AP1-5

Comparison of point-of-care tests, Sonoclot and PFA to asses coagulation: healthy volunteers vs normal pregnant patients

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Background and Goal of Study: Classical laboratory tests evaluate individual components of coagulation and require 45-60 min for results to be available. SONOCLOT is a point-of-care (POC) bedside test that allows rapid evaluation of the overall coagulation system. POC coagulation testing might provide essential information for management of the high risk obstetric patient. However reference values during pregnancy are still poorly defined. We measured SONOCLOT and PFA (Platelet function analyser) variables in normal at term pregnant women and compared these to the values of non-pregnant female volunteers in order to assess how pregnancy alters POC coagulation variables.

Materials and Methods: Citrated blood samples (3.2%, 109 mM) were collected from 20 young female non-pregnant volunteers and 12 at term pregnant women. In addition to hematocrit (Hct), and platelet count, Sonoclot, and PFA tests were performed. Data between normal volunteers and pregnant women were compared using the Mann-Whitney U test.

Results and Discussion: Hct and platelet count were lower in pregnant women as compared to non-pregnant volunteers (32.9% (31.9-33.8) vs 36.6% (35.6-37.5); $p<0.001$ and 154.000/µl (130.000-178.000) vs 222.000/µl (195.000-248.000); $p=0.001$).

In pregnant women, Initiation of clotting as measured by gbACT+ (glass bead activated clotting time) was faster (145 s (142-148) vs 162 s (154-171); $p=0.013$), clot rate (CR) was higher (42 units/min (40-45) vs 28 units/min (26-30); $p<0.001$) and time to peak (TTP) was shorter (7.2 min (2.2-8.3) vs 9.9 min (8,5-11.3); $p=0.019$) than in non pregnant women. In contrast, Platelet function (PF) was decreased 2.3 (1.8-2.8) vs 3.1 (2.6-3.6); $p=0.024$) in pregnant women, while maximum amplitude (MA) did not differ between groups: 77 units (73-81) vs 73 units (69-77) ($p=0.209$).

PFA showed shorter closure times in pregnant women for collagen/epinephrine (106 s (98-114) vs 130 s (119-142); $p=0.009$) but not for collagen/ADP stimulated platelets (83 s (75-90) vs. 99 s (89-108); $p=0.133$).

Conclusion: This study provides reference values for Sonoclot and PFA parameters during normal pregnancy. Values are different from non-pregnant women and reflect the hypercoagulable state during pregnancy. These values can be used as reference values when assessing coagulation status with POC coagulation testing in patients with (pre)eclampsia requesting locoregional techniques for analgesia.

4AP1-6

Preoperative EXTEM and FIBTEM (A10-20) measured by ROTEM® for prediction of haemorrhage volume during Caesarean sections

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Background and Goal of Study: A major cause of maternal mortality is excessive postpartum haemorrhage (PPH). Approximately 1% of maternal haemorrhage amounts to >2 L[1]. The incidence of DIC with a total haemorrhage volume of >2 and >3 L is 7.3% and 23.2%, respectively[1]. Charbit et al. indicated that a simple fibrinogen measurement of < 2 g/L can anticipate the risk of PPH in 100% of cases [2]. However, >30 min is usually required to obtain the results of this measurement in our institute. ROTEM® can measure haemostasis markers immediately[3] (in as little as 10 min). Therefore, we hypothesised that perioperative ROTEM® can predict the amount of bleeding during caesarean section (C-section).

Material and methods: We enrolled 15 women scheduled for C-section. The women were divided into two groups according to the total perioperative bleeding volume: ≥2 L (High group) and < 2 L (Low group). Serial ROTEM® tests (EXTEM and FIBTEM) were performed at three time points:
(1) upon entrance into the operating room (OR),
(2) 10 min after delivery, and
(3) upon completion of the C-section. Statistical analysis was performed using Student's t-test.

Results and Discussion: There were six patients in the High group and nine in the Low group. Some ROTEM® values were lower in the High group than in the Low group, including EXTEM A10-20 and FIBTEM A10-20 upon entrance into the operating room and FIBTEM A10-20 and MCF at 10 min after delivery (Table). Therefore, some ROTEM® values can predict the possibility of a high volume of haemorrhage during C-section. In particular, A10 of EXTEM and FIBTEM can be obtained within 10 min, which is shorter than the time required to obtain fibrinogen values.

Conclusion: A10 of ROTEM® can be measured within 10 min and is a useful parameter with which to anticipate the risk of severe bleeding associated with C-section. This information will allow for the timely preparation of necessary blood products.

References:

1. Japanese Journal of postpartum and neonate 2008; 44: 992
2. J Thromb Haemost 2007; 5: 266

Time points		High group	Low group	*P*-VALUE
Immediately on entrance into the operating room	EXTEM A10	56±3	62±6	0.04*
	FIBTEM A10	13±3	19±5	0.02*
	EXTEM A20	63±3	68±5	0.04*
	FIBTEM A20	15±3	21±5	0.03*
	EXTEM MCF	64±3	69±5	0.06
	FIBTEM MCF	15±3	21±5	0.06
10min after delivery	EXTEM A10	55±6	61±4	0.11
	FIBTEM A10	11±4	17±3	0.008*
	EXTEM A20	64±5	66±4	0.39
	FIBTEM A20	12±4	19±3	0.005*
	EXTEM MCF	65±5	68±4	0.25
	FIBTEM MCF	11±4	19±3	0.002*
On completion of the C-section	EXTEM A10	53±7	59±4	0.13
	FIBTEM A10	11±4	17±4	0.06
	EXTEM A20	60±6	66±4	0.14
	FIBTEM A20	12±4	18±4	0.06
	EXTEM MCF	62±6	67±3	0.1
	FIBTEM MCF	12±4	19±4	0.06

*[Table: Values of ROTEM are presented as mean ± SD. *P<0.05]*

4AP1-7

Multidisciplinary protocol for massive obstetric hemorrhage in our hospital. Evaluation fom the beginning

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Background and Goal of Study: Postpartum hemorrhage (PPH) is a leading cause of maternal mortality worldwide. A clear multidisciplinary protocol for obstetric hemorrhage is recommended for improving rapid diagnosis and target theraphy of PHH-induced coagulapathy.[1]
In 2012 , we created a multidisciplinary protocol called " Red Code" in order to simplify the approach to the massive obstetric hemorrhage and improved the outcome. Our target was to evaluate the transfusion rate, the risk factors and the surgical or non invasive procedure for the management of the massive obstetric hemorrhage.
Materials and Methods: We analyzed 6483 hospital deliveries from 2012 to 2013 in our institution. Demographic data, fibrinogen concentrates, blood transfusion, hysterectomy, uterine artery embolisation data and the grade of "Red Code" protocol accomplishment were collected. Statistics: Data was given as a median and standard desviation. SPSS version 18 was used.
Results: Of the 3312 deliveries in 2012 in our hospital 3,1 per 1000 were complicated by massive obstetric hemorrhage. Of the total of 3171 deliveries in 2013 2,8 per 1000 were complicated by massive obstetric hemorrhage. The mean number of red blood cells (RBC) trasnfusion in massive obstetric hemorrhage was 7,27 ±4,9 units in 2012 and 5,75±1,9 units in 2013. The average of fibrinogen concentrates transfusion was 1,4 ± 1,64 gr in 2012 and 2±2,6gr in 2013. We performed in massive obstetric hemorrhages ,30% of hysterectomys and 30% of uterine artery embolisation in 2012 and 12,5% of hysterectomys and 50% of uterine artery embolisation in 2013.
Conclusion: The implantation of a multidisciplinary protocol for massive obstetric hemorrhage in our institution seen to allowed more conservative procedure and reduction in RBC transfusion.
References:
1: Ducloy-B A-S, Sunsen S, Wong CA, Butwick A, Vallet B, Lockhart E. Medical advances in the treatment of postpartum hemorrhage. Anesthesia Analgesia2014;119:140-7.

4AP1-8

Interventional radiological balloon catheter techniques for patients with morbidly adherent placenta: are we dealing with a special population?

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Background: There has been much debate over the role that prophylactic intra-arterial balloon catheter placement can play in modifying blood loss in patients with morbidly adherent placenta.[1-2]
We report a case that highlights the unpredictable hazards of such interventions in the obstetric population.
Case report: A 42-year old, ASA 2 female (BMI 45, hypothyroidism) presented with radiological evidence of placenta percreta with invasion of the majority of the cervical canal at 27 weeks gestation. A multidisciplinary plan was created for delivery at 33 weeks gestation. Bilateral internal iliac artery balloon catheters were inserted under combined spinal-epidural analgesia. Caesarean section was performed under general anaesthesia. Planned hysterectomy with placenta in-situ was complicated by massive haemorrhage approaching 22 litres. The main sources of bleeding included lateral pelvic wall venous plexuses and collateral vessels invading the cervix. Temporary balloon catheter deployment did not achieve haemostasis. The right lower limb was found to be acutely ischaemic with evidence of a lower leg compartment syndrome. Open femoral embolectomy and fasciotomies were performed. Postoperative morbidity included AKI with RRT, mechanical ventilation and left iliac artery pseudo aneurysm formation.
Discussion: Current RCOG guidance questions the role of catheters in placenta accreta.[3] Significant morbidity can be attributed to the insertion of intra-arterialcatheters in high risk parturients. These risks are above and beyond those secondary to the potential for massive haemorrhage and transfusion. Case series to date show a wide variation in complication rates from 3.3-15.8%.[1-2] Is the obstetric population a specific cohort with pro-thrombotic tendencies and as such, require a tailored risk assessment approach when considering endovascular interventions?
References:
1. Shrivastava et al. Case-control comparison of Cesarean hysterectomy with and without prophylactic placement of intravascular balloon catheters for placenta accreta. AJOG 2007 197 (4):402.e1-402.e5.
2. Ballas et al. Preoperative intravascular balloon catheters and surgical outcomes in pregnancies complicated by placenta accreta: a management paradox. 2012 207(3):216.e1-216.e5.
3. https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg27/
Learning points: Intra-arterial catheters are associated with significant morbidity. Adherent placenta require a multidisciplinary approach.

4AP1-9

Massive transfusion in obstetrics - a two year review in a dedicated obstetrics centre

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Background and Goal of Study: Massive blood transfusion is a life-saving practice on a minority of peripartum haemorrhages. Our goal is to characterize the population that was massively transfused over a 2 year period (October 2012 to October 2014) in order to assess our practice. The obstetrics unit is 15 minutes away from the blood bank and lab. 5018 births took place.
Materials and Methods: We conducted an observational retrospective study about massive transfusion in the obstetric setting. A listing of patients transfused over this period was requested from the bloodbank; those given 4 or more packed red blood cells (pRBC) in less than 4 hours were considered. Charts and files were sourced for data on demographics, obstetrics, comorbidities, haemoglobin (Hb) levels, blood products transfused. Data was analysed using descriptive methods and associations were ascertained using the Pearson correlation. A p value less than 0.05 was considered significant.
Results and Discussion: 2,9% (n=144) women were transfused. 10.4% (n=15) met the criteria for massive transfusion. Mean age was 36 (+/- 6) years old and gestational time 37 (+/- 3) weeks. 33% (n=5) had anaemia (Hb < 11.5 g/dL) prior to the event. No history of coagulopathy in any of the patients. Pre-eclampsy (n=3) and HELLP (n=2) were found. 2 foetuses had died in-uterus. 80% (n=12) were distocic deliveries (6 c-sections). 6 women had emergent hysterectomies and 2 B-Lynch sutures. The main causes for haemorrhage were uterine atony (n=5), c-section in leiomiomatous uterus (n=3) and birth canal trauma (n=3). The mean Hb that triggered transfusion was 6.5 (+/- 1.5) g/dL, and post-transfusion was 10.4 (+/- 1.5) g/dL. A reverse association between these two variables was found (Pearson -0.72). An average of 7 (+/- 2) units of pRBC were administered per patient; the number of pRBC transfused correlates with age (Pearson 0.64) and risk for hysterectomy (Pearson 0.62). 11 women received fresh frozen plasma (FFP), 13 fibrinogen, 6 platelets and 4 tranexamic acid. All women survived and there were no cases of TRALI or TRIM.
Conclusion(s): The small sample size precludes definitive conclusions. The transfusion practice varied from case to case and there is an apparent tendency to over-transfuse the most severe patients. The distance from the blood bank can shed an explanation for this defensive practice. To standardize massive transfusion management, institutional protocols should be discussed and implemented.

4AP1-10

A complete recovery case from amniotic fluid embolism followed by disseminated intravascular coagulation, atonic bleeding, and cardiac arrest

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Background: Amniotic fluid embolism (AFE) is one of the most serious complications during peripartum period. AFE occurs one case per 20,000-30,000 deliveries, and its mortality rate is 37 to 80%, which is quite high. We report a recovery case from cardiac arrest caused by AFE.
Case report: Written informed consent was obtained. A 32-year-old primigravida admitted to a general hospital with 39 weeks and 5 days gestation. After normal vaginal delivery, the patient developed disseminated intravascular coagulation and atonic bleeding. Administration of tocolytic agents and fluid resuscitation were performed, but cardiac arrest was occurred. After 7 minutes of cardiopulmonary resuscitation, spontaneous circulation was restored and an emergency hysterectomy was performed. At this point, the patient was clinically diagnosed as AFE. However, uncontrollable hemorrhage was continued (total blood loss was about 16,000g), then she was transferred to our hospital with blood pressure of 72/46 mmHg, heart rate of 142 bpm, and Glasgow coma scale of 3. APACHE II score was 36, and SOFA score was 15, respectively. Enhanced CT scan revealed intraabdominal hemorrhage and extravasation of contrast medium. Transcatheter arterial embolization was performed, but bleeding was still continued. An open abdominal surgery was then performed under intra-arterial balloon occlusion (6600g of blood loss). After 3 weeks of intensive care, she discharged from the ICU with a persistent consciousness disturbance. Physical and cerebral function rehabilitations were continued for 4 months, and she discharged without any complications. From serum sample, decreased complement C3, C4 and increased interleukin-8 was found. Amniotic components and anaphylactoid reaction were observed in the isolated uterus.
Discussion: AFE is diagnosed by clinical symptoms, and early diagnosis is critical to initiate prompt treatments. In the present case, cardiac arrest was not prevented, and hysterectomy was needed. However, prompt shock management and patient transfer were carried out by previous doctors. In our hospital, cooperation with many different departments resulted in saving this patient without any physical and neurological complications.
Learning Points: AFE is diagnosed by clinical symptoms and should be treated as soon as possible. Initial treatment for shock, including airway/breathing/circulation managements, is crucial. For definite diagnosis, blood and/or tissue samples are required.

4AP1-11

Efficacy of high dose fibrinogen concentrate in severe post partum hemorrhage (PPH) complicated with severe acquired hypofibrinogenaemia

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Background: The European Society for anesthesiology 2013 guidelines for severe perioperative bleeding reccomends use of fibrinogen concentrate for significant bleeding and known or suspected hypofibrinogenemia. However, there is a low level of evidence for its use in the obstetric setting.
Case report: A 45-year-old primigravida with an history of bilateral salpingectomy underwent in vitro fertilization with oocytes donated by her sister. A twin pregnancy ensued, and she underwent a cesarean section (C/S) at 36 weeks´gestation because of breech presentation.Three hours after C/S a blood loss of 1000 ml was noted and infusion of sulprostone was started but the bleeding didn´t stop and therefore an intrauterine tamponade balloon was placed by the gynecologist; Lab values showed Hb 9,2 g/dl, fibrinogen 2,1gr/l, D-dimerus 6254 ng/ml, PT, PTT and INR were normal. Six hours later a big haematoma over the ballon was noted at U/S check and lab values showed hb 5,7 g/dl, fibrinogen 1 gr/l and D-dimerus 20398 ng/dl while PT, PTT and INR were in the normal range;immediately isterectomy was performed by the gynecologists and 4 packed red blood cell units (PRBC) and 2 grams of tranexamic acid were administred by the anesthesiologist. At the end of surgery the patient was transferred in ICU hemodynamically stable but she was bleeding from the surgical laparotomic suture and from the drainage: lab values showed hb 6,7 g/dl, D-dimerus 3239 ng/dl PT 65%, PTT 32,8 sec, INR 1,32 and incredibly fibrinogen was too low that resulted undetectable with Clauss method: at this point the anesthesiologist decided to administer 4 grams of fibrinogen concentrate (haemocomplettan CSL behring) and other two PRBC units. One hour later the hemorrhage finally stopped, hb was 7 gr/dl, D-dimerus 699ng/dl and fibrinogen rose up to 1,94 gr/l. Two days later, the patient was discharged from ICU without sequaele and seven days after C/S she came back home with her twins.
Discussion: Fibrinogen concentrate substitution therapy for obstetric hemorrhage increases fibrinogen levels and appears to be effective in managing severe PPH complicated with acquired Hypofibrinogenaemia without serious adverse effects.
References: 1.Bell SF, Rayment R, Collins PW, Collis RE. The use of fibrinogen concentrate to correct hypofibrinogenaemia rapidly during obstetric haemorrhage. Int J ObstetAnesth. 2010 Apr;19(2):218-23.
Learning Points: Fibrinogen concentrate can correct hypofibrinogenaemia in women with severe PPH.

4AP1-12

Use of oxytocin to prevent hemorrhage at caesarean section - a survey of practice in Portugal

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Background and Goal of Study: Oxytocin (OT) remains the first-line agent in the prevention and management of postpartum hemorrhage (PPH). Debate continues over OT optimum dose and regimens of administration. Our aim was to survey current OT regimens used by anesthetists in Portugal.
Materials and Methods: The survey consisted of a covering email explaining the survey and a questionnaire with 11 questions asking for OT dose and method of administration in caesarean section (CS) for non-labouring (NL) and in labouring (IL) women, indications for OT infusion and perceived side effects of OT. The email was sent to 48 Portuguese public hospitals. Head of departments would forward the email to the anesthetists, including residents. Data was collected from May to October 2014. During this period, reminders were sent, following the initial request to complete the online survey.
Results and Discussion: Possible sample of 1474 anesthetics, 112 responses (7,5%). In 12 cases it didn't apply to their clinical practice, leaving 100 completed questionnaires.
OT bolus of 5IU is used by 46% of clinicians (46% NL/45% IL), followed by additional bolus if necessary in 25% (22% NL/27% IL); 10IU by 12% and less than 5IU by 5%. No bolus in 29% NL/38% IL. OT infusions are used routinely by 56% of clinicians with selective use for particular clinical circumstances by 30% and 52% to a request by the obstetrician. Most clinicians use either 10IU (61%) or 20IU (23%) diluted on crystalloid solution (43% on 500ml 54% on 1000ml) over 1hour (21%) to 4hours (14%) with multiple different regimens. 29% administer at an undetermined rate. Perceived adverse effects were reported more frequently for bolus administration than for infusions. Flushing, hypotension, tachycardia and nausea were the most common.
Current guidelines (RCOG and NICE) recommend a prophylactic dose of 5IU of OT by slow injection at CS. Smaller loading doses have been determined to be sufficient in clinical trials. ED90 of oxytocin was found to be as low as 0.35IU in NL and 2.99IU IL women. This survey reports great variation in OT administration, with high doses still being used, revealing a lack of national and local consensus.
Conclusion(s): Although OT is used routinely, there appears to be variation in its use. Side effects depend on dose and speed of administration. Education and guidance by national practice guidelines and local protocols are necessary.

4AP2-1

Anaesthetic and obstetric outcome in obese parturients

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Background: Obesity is a growing risk factor worldwide, which also affects obviously the pregnant population. This means more incidences of antepartum medical diseases, increased risk for cesarean delivery, high failure rate of epidural catheter, difficult or failed intubation and a higher rate in large-for-gestational age fetuses and fetal macrosomia.
Goal of the Study: Our observational retrospective study includes all women with body Mass Index (BMI) over 30 Kg/m2 during 2013. We have collected around 200 obese parturients. We have compared those patients with a control group with BMI under 30 Kg/m2.
Material and methods: We have analysed database of the obese women with BMI over 30 kg/m2 and control group under 30 kg/m2. The parameters compared are antepartum medical diseases as diabetes, hypertension, preeclampsia, venous thromboembolism, gestational age, labour induction, cesarean delivery, epidural catheter placement, extra boluses required in epidural analgesia, intrathecal anaesthesia for cesarean section, general anaesthesia for cesarean section for failed epidural anaesthesia or other raisons, complications and birth weight >4000g.
Results and Discussion: By the moment we have preliminary results comparing 50 obese patients with 50 non-obese patients. The results show a higher incidence of gestational diabetes in the obese group with statistically significant results.
Induction of labor is also higher in the group of obese pregnant ($p < 0.05$).
Gestational age also is longer in the group of obese pregnant ($p < 0.05$).
Conclusion(s): Obese parturient presents a major challenge to the anaesthesiologist. Anticipating complications is critical in reducing maternal and perinatal morbidity and mortality.
The early placement of an epidural catheter can avoid general anaesthesia in a group with a higher risk for difficult or failed intubation.
References:
- Obstetric anaesthesia for the obese and morbidly obese patient: an ounce of prevention is worth more than a pound of treatment. Acta Anaesthesiol Scand 2008.
- Anaesthetic and Obstetric Outcome in Morbidly Obese Parturients. Anaesthesiology 1993.
- Anesthesia complications during scheduled cesarean delivery for morbidly obese women. American Journal of Obstetrics & Gynecology 2010.

4AP2-2

Does epidural analgesia versus combined spinal-epidural analgesia has difference?

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Background and Goal of Study: Combined spinal-epidural analgesia (CSEa) offers the advantages of both epidural and spinal techniques[1]. The aim of this study was to compare the incidence of complications between CSEa and epidural analgesia (Ea) and the mode of delivery.
Materials and Methods: After study approval by the institutional ethics committee, a prospective study was conducted in women´s who request labor analgesia during 5 months. Patients were randomly assigned to receive CSEa (ropivacaine 4 mg with sufentanil 2.5 μg was injected intrathecally) or Ea (ropivacaine 0.15% with sufentanil 0.5 μg/ml was administered through the epidural catheter). Data collected: demographic characteristics, labor data, verbal numeric pain score (VNPS) before and after the technique and complications. Descriptive analyses of variables were used to summarize data, Chi-square test and non-parametric tests were performed for comparisons. A $p \leq 0.05$ was considered significantly different.
Results and Discussion: 349 patients were studied (Ea group: 231; CSEa group: 118). Cervical dilatation at epidural request was 3.3±0.6 in the Ea group and 3.4±0.9 ($p=0.035$). VNPS before technique was highest in the CSEa group (8.7±1.2 vs 8.5±1.5, $p=0.279$) and highest in the Ea group after the technique (1.9±1.5 vs 0.7±1.2, $p=0.000$). Accidental dural puncture (ADP) and post-puncture headache (PPH) was report only in the Ea group (0.9%, $p=0.311$; 2.6%, $p=0.077$). The majority of the techniques in both groups were performed by a specialist ($p=0.003$). No significant differences were found when ineffective analgesia requiring an attitude was considered.
Conclusion(s): Quality of pain relief after techniques was improved in CSEa group. Regarding ADP and PPH no statistical differences was found between the groups.
References: 1. Simmons SW, Taghizadeh N, Dennis AT, Hughes D, Cyna AM, Cochrane Database Syst Rev 2012 Oct 17;10.

4AP2-4

Efficiency and satisfaction of labor pain therapy with parenteral pethidine or meptazinol and neuraxial analgesia. A comparative observational study

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Background and Goal of Study: Sufficient and satisfying labor pain therapy is still a challenge for anesthetists and obstetricians. The aims of this study were
1. to compare two established analgesic therapies in obstetrics (opioids and neuraxial) regarding efficiency and women's satisfaction with therapy and birth experience,
2. to evaluate secondary neuraxial analgesia rate after opioid use, and
3. to compare efficiency and satisfaction of primary or secondary neuraxial analgesia.
Materials and Methods: After receiving permission by the local ethic committee and written informed consent by each patient, we performed an observational study for 12 months. Whenever pethidine, meptazinol or neuraxial analgesia had been used, the woman's pain score was recorded by a numerical rating scale. Mother-, child- and birth-related data was collected from patients' records. Satisfaction was enquired by a postpartum questionnaire. Data was analyzed using T-, Chi^2-, Wilcoxon- and Mann-Whitney-U-test as well as logistical regression.
Results and Discussion: The study includes data from 449 vaginal deliveries. 157 patients were given pethidine, 162 meptazinol and 130 neuraxial analgesia only. There were no differences between the opioids regarding pain relief, satisfaction, duration of labor, side effects or additional drug use. Last intervention time to birth was shorter for meptazinol ($p<0.001$) as it had been given more often intravenously and repeatedly than pethidine ($p<0.001$ respectively).
Neuraxial analgesia led to a stronger pain relief than opioids ($p<0.001$). It had been used earlier in birth process and caused a longer duration of labor (7.6h ± 2.5h vs. 5.7h ± 2.5h, $p<0.001$). Women's satisfaction with pain therapy was higher with neuraxial analgesia ($p<0.001$); however, satisfaction with birth experience wasn't increased. Primary neuraxial analgesia was more satisfying for the patients than secondary ($p<0.01$), whereas efficiency was comparable. Secondary neuraxial analgesia rate was higher after pethidine use ($p<0.05$).
Conclusion: Neuraxial analgesia is an effective pain relief therapy in labor, which not necessarily leads to a higher satisfaction with birth experience. Primary use is more satisfying for the patients than secondary use.
The opioids pethidine and meptazinol are largely comparable. However, in daily setting meptazinol can be better adapted to labor process leading to a shorter intervention time to birth and less need of secondary neuraxial analgesia.

4AP2-5

Pregnant in labor, epidural analgesia contraindicated: what now?

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Background: Pregnancy is a hypercoagulable state. Pregnant women with thrombophilia are at increased risk for thrombosis with adverse maternal and fetal complications. Heparin is the most common anticoagulant used in pregnancy as it does not cross the placenta and lacks teratogenicity. Although a central block technique is daily used in labor analgesia, there are medical conditions that contraindicate it. Coagulation disorders (either caused by the disease itself or a consequence of the treatment) is one of them, increasing the risk of epidural hematoma. Remifentanil is a ultra-short acting opioid. I

has a rapid and predictable offset of action and its short half-life remains constant even after repeated doses or a constant infusion. It crosses the placenta, but is rapidly metabolized by the neonate. Remifentanil Patient Controlled Analgesia (PCA) device may be an alternative to epidural analgesia in labor as we in this case.
Case report: A 40 years old pregnant, 66Kgs, with trombophilic disease, and medical history of abortion, under Tinzaparine sodium therapy, in a higher than recommended dose, because of patient mistake. She was admitted to labor at 37 weeks' gestation with painful contractions. ASA standard monitorization was ensued and intravenous cannulation was performed. Labor analgesia was achieved with PCA remifentanil: background infusion 80mcg/h, bolus doses 20mcg, lockout time 3minutes. The infant was born an hour later with an Apgar score of 6, 9, 10.
Discussion: The recommended dose of tinzaparine sodium is 175 UI per Kg. Overdose is associated with hemorrhagic adverse effects. The risk of epidural hematoma, in neuroaxial technique in patient with coagulation disorders, is not absolutely determined and it should be weighted case-by-case. According to ASA recommendation neuroaxial anesthesia can be performed within 24 hours after therapeutic heparin dose administration. Nevertheless, there is a lack of scientific evidence in addressing central block analgesia in patient under overdose heparin, despite its suspension in an adequate time. So we decided to provide analgesia by PCA.
References: Blair JM, et al Patient-controlled analgesia for labour using remifentanil: a feasibility study. Br. J. Anaesth. (2001) 87 (3):415-420.
Learning points: Guidelines may not answer all the problems to critical decision and medical judgment assumes an important role. Patient education is also extremely important to successful management of anticoagulant therapy.

4AP2-6

Programmed intermittent epidural bolus versus continuous epidural infusion for labor analgesia in a routine clinical practice setting

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Background and Goal of the Study: Programmed intermittent epidural anesthetic bolus (PIEB) technique has been reported to result in a lower incidence of maternal motor block, compared to continuous epidural infusion (CEI) in nulliparous women using a pump controlled by the patient for additional boluses. In this study, we compared PIEB to CEI for maintenance of labor analgesia in a clinical practice setting using manual boluses not controlled by the patient for additional analgesia requirement. We evaluated analgesic efficacy and maternal motor block rate.
Materials and Methods: Thirty-five term pregnant, with spontaneous labor and cervical dilation < 6 cm undergoing epidural analgesia were eligible for evaluation. Epidural analgesia was initiated and maintained with a solution of bupivacaine 0.1 % with fentanyl 1.5 μg/mL at an infusion rate of 10 mL per hour (plus a correction of 0.2 mL/cm from 150 cm height). Sixteen women were on PIEB and nineteen on CEI (Nulliparous 94% and 74%, respectively). Boluses of 4mL of the same perfusion were used to treat breakthrough pain. The degree of motor block was assessed in both lower extremities using the modified Bromage score and the degree of pain with the verbal analog scale (VAS) at regular intervals throughout labor. We also analyzed total analgesic solution consumption, incidence of instrumental delivery and patient satisfaction (evaluated by a 5-item/score survey). All statistical analyses were performed using SPSS version 20.0 and GraphPad version 5.0.
Results: Motor block was reported in 12.5% in the PEIB group and in 50% in the CEI group at 2 hours of labor ($P<0.05$). We also observed a similar trend at full cervical dilation ($P=0.10$). There was no difference for the incidence of instrumental delivery (26.3% for the CEI group vs. 25% for the PIEB group; $P>0.05$). Total bupivacaine consumption, the number of patients requiring additional boluses and mean number of boluses were not statistically different between groups. No differences in pain and satisfaction scores were observed.
Conclusions: Taken together, our results suggest that the epidural analgesia with PIEB compared to CEI resulted in a lower incidence of maternal motor block in routine clinical practice, with no statistical difference in pain and satisfaction scores, incidence of instrumental delivery or requirement of additional boluses. We consider that PIEB could allow a quick recovery and an early mobility of the patient.

4AP2-7

Quality of labour neuraxial analgesia and maternal satisfaction at a Portuguese central hospital

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Background and Goal of Study: Maternal satisfaction during labour and delivery is influenced by many factors. Sense of security and perceived control, level of pain, personal support, earlier experiences, given information and involvement in decision-making, all contribute to the childbirth experience. A negative experience increases risks of maternal postpartum depression and may negatively affect mother´s attitudes to future pregnancies, choice of delivery method and type of analgesia. Our purpose was to evaluate maternal satisfaction with the neuraxial labour analgesia regimen provided at a central Portuguese hospital.
Materials and Methods: A questionnaire was created focusing on pain during the first and second stages of delivery, perceived side effects and overall experience. It included 26 items evaluated on a 5 point Likert scale and 19 questions regarding demographic data, actual and past experiences. All women with a viable pregnancy who requested neuraxial analgesia for labour during October 2014 were approached. Patients were managed as per departmental routine based (0,1% ropivacaine+sufentanil 0,25ug/ml by continuous perfusion or PCEA). Patients completed an anonymous satisfaction questionnaire in the first 24hours after delivery.
Results and Discussion: 182 deliveries occurred, 120 were approached and 79 completed the questionnaire. Most women 67 (84,8%) were pleased with anesthesiologist attention. All women received epidural analgesia and 58 (73,4%) considered its placement not painful. A large number reported not to be confortable during the first or second stages of labour (12,7%/12,7% disagree and 6,3%/5,7% strongly disagree respectively). There was high overall satisfaction with pain management (72,7%) and 68 (86,1%) would request again epidural analgesia for delivery. 53 (67,1%) said childbirth occurred like they had expected. 35,4% assisted to anesthesiologist educational sessions on labour analgesia. The overall experience was considered to be highly positive in the majority of women (79,7%).
Conclusion(s): Despite the high incidence of insufficient analgesia, most women were satisfied with their pain management and childbirth experience at our hospital. Assessment of effectiveness of neuraxial analgesia involving the entire process of labour and delivery, including all domains of maternal satisfaction, may unveil problems and identify opportunities to improve clinical practice.

4AP2-8

Safety and efficacy of intravenous remifentanil patient-controlled analgesia used in a stepwise approach for labour: an observational study

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Background: Epidural analgesia is the preferred analgesic method for women in labour and is considered effective and well tolerated. Systemic opioids are useful when regional techniques are contraindicated, unavailable or impossible to perform. Remifentanil demonstrated a suitable pharmacological profile in labor analgesia. We aimed to assess the efficacy and the safety of intravenous patient-controlled analgesia (IV-PCA) with remifentanil during the first and the second stages of labour.
Materials and Methods: In an observational study, parturients with normal singleton pregnancies at term and no contraindications to remifentanil were recruited. Remifentanil was available in an increasing stepwise manner with 4 levels (L).
Bolus doses (b) ranged between 0.25-0.5μg/kg with or without a background infusion (I) of 0.05μg/kg/min (L1: b=0.25μg/kg, I=0; L2: b=0.5μg/kg, I=0; L3: b=0.25μg/kg, I=0.05 μg/kg/min; L4: b=0.5μg/kg, I=0.05 μg/kg/min). A lockout time of 2min was used. A verbal numeric scale (0-10) was used to assess maternal pain scores and satisfaction. Hemodynamic parameters, respiratory rate, oxygen saturation, maternal sedation (Ramsay score) and foetal heart rate trace were continuously monitored. Remifentanil requirement and maternal side-effects were recorded every 15min. Neonatal effects included Apgar scores, need for resuscitation and umbilical cord blood analysis. Parametric data were analysed by repeated measures ANOVA and simple summary sta-

tistics and non-parametric scores were analysed by Friedman non-parametric repeated measures test.
Results: Thirty parturients were enrolled. Pain scores were significantly reduced during the first 150min of IV-PCA use when compared to baseline ($p < 0.05$). Maximal pain reduction was 70% ($p < 0.001$). Twenty-nine parturients used only a bolus dose of 0.25μg/kg. There was no evidence of cardiovascular instability or respiratory depression. All parturients were co-operative. Eight women experienced nausea and no-one experienced itching. All women continued using IV-PCA remifentanil until delivery. There were no cardiotocographic abnormalities needing any interventions. Apgar scores and cord blood gas analyses remained within normal limits.
Conclusion: We conclude that an IV-PCA remifentanil provides adequate pain relief and high satisfaction during the first and second stages of labour. An acceptable level of maternal side-effects and minimal effects on the neonate may occur. Careful monitoring is mandatory.

4AP2-9

Remifentanil - a safe alternative to labor pain relief?

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Background: Neuroaxial analgesia is the standard for labor analgesia. However, it can be contraindicated or even declined by parturient. Remifentanil is an ultra-short acting opioid, with a rapid onset of action and predictable offset of action. Its short half- life remains constant even after repeated doses or a constant infusion. It crosses the placenta, but is rapidly metabolized by the neonate. We report 3 cases of obstetric analgesia wherein epidural was contraindicated and patient controlled analgesia (PCA) using remifentanil i.v. was used.
Case report: A 28-years-old primigravida, admitted to labor at 38 weeks gestation, with previous thoracic- lumbar surgery. Baby's Apgar score was 8, 10, 10. PCA was used for 4 hours. A 34 - years-old, multiparous, admitted, with active labor, at 39 weeks gestation with platelet count of 85.000/uL. PCA was used for 2 hours. Baby's Apgar score was 7, 10, 10.
A 24- years-old, primigravida admitted to labor at 40 weeks gestation, with a large tattoo in lumbar region. PCA was used for 4 hours. Baby's Apgar score was 9, 10, 10.
All 3 were pleased with analgesia, although all mentioned it didn't alleviate all pain, especially on the second phase of labor, or was not as good as in first labor with epidural.
In all 3 patients ASA standard monitorization and continuous monitoring of fetus were ensued and intravenous cannulation was performed. Remifentanil was diluted in a concentration of 20mcg/mL. PCA was set to deliver a bolus dose of 20mcg, without background infusion, and with lockout time of 3minutes. Full instructions were given to patients and an attending midwife and an anesthetist were available all time. No neonatal resuscitation was required. The patients experienced no pruritus, nausea, vomiting or drowsiness.
Discussion: The use of remifentanil i.v. in labor analgesia has been growing. In our hospital it was not a common practice until recently. The complications associated with its use are known and require a constant vigilance. No complications were registered.
References: Blair J.M. et al. Patient-controlled analgesia for labour using remifentanil: a feasibility study, Br. J. Anaesth. (2001) 87 (3):415-420.
Learning points: Remifentanil proved to be a safe alternative to epidural analgesia, although the last one continues to be preferred, even by parturient. Pregnant women in whom epidural analgesia may not be performed safely, should have a pre anesthetic evaluation to improve anesthetic care.

4AP2-10

Timing of epidural analgesia for labour pain in nulliparous women - a retrospective study

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Background and Goal of Study: The optimal time for epidural analgesia during labour is controversial. The aim of this study was to evaluate the timing of the epidural analgesia and labour outcomes in nulliparous women.
Materials and Methods: We performed a retrospective study in parturients who underwent epidural analgesia for labour pain in our institution from January 2011 to December 2012. Exclusion criteria: multiparous women, preterm pregnancies, induced labour, nonvertex presentation, multiple pregnancy, elective caesarean. We retrieved each patient's demographic characteristics, timings of labour epidural analgesia and obstetric outcomes from their medical chart. Descriptive analysis was used to summarize data. Ordinal and continuous data were tested for normal distribution, based on the Kolmogorov-Smirnov test. Categorical data was analysed using Chi-square test. Normally distributed variables were compared using student t test and the remaining with Mann-Whitney test. Data is summarized as median [IQ25-75] or mean±SD.
Results and Discussion: A total of 633 parturients met the inclusion criteria. The age was 29 [25-32] years old and body mass index (BMI) 27.9 [25.1-30.9] kg/m^2, mostly ASA physical status I (78.2%). The median cervical dilatation for epidural analgesia was 4 [3-4] cm. Mode of delivery was mostly eutocic (42.9%) with 38.1% of instrumental vaginal deliveries and 19% caesarean deliveries. We divided the parturients into two groups according to the timing of epidural analgesia: cervical dilatation ≤3cm and >3cm. The groups were comparable regarding age, BMI, ASA physical status and newborn weight. There was no difference in the rate of caesarean delivery, but there was a higher rate of instrumental vaginal delivery ($p=0.027$). Instrumental vaginal deliveries had a longer period of labour than eutocic delivery (6h vs. 5h, $p < 0.001$) and a higher rate of episiotomy (87.5% vs. 72.5%, $p < 0.001$). Caesarian delivery was associated with higher BMI (29.2[26.8-31.6]Kg/m^2 vs. 27.4[24.8-30.8]Kg/m^2, $p<0.001$) and heavier newborns (3324±417g vs. 3208±358g, $p=0.005$).
Conclusion(s): Earlier epidural analgesia was associated with instrumental vaginal delivery, but not with caesarean.

4AP2-11

Which technique use for maintenance of labor analgesia after combined spinal-epidural? Comparison of programmed intermittent epidural bolus dose regimens

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Background and Goal of Study: Programmed intermittent epidural bolus (PIEB) consists in an improvement in labor analgesia and may lead to a more favorable effect on the obstetric outcomes[1]. The aim of this study was to compare the mode of delivery and neonatal outcomes in women who received 2 different PIEB dose regimens for maintenance of labor analgesia.
Materials and Methods: After study approval by the institutional ethics committee, a prospective study was conducted in women´s who requested labor analgesia during 5 months. Combined spinal-epidural (CSE) analgesia was performed and a dose of ropivacaine 4 mg with 2,5 μg, was injected intrathecally. After, patients were randomly assigned to receive one of two regimens: PIEB 0.1% (ropivacaine 0.1% plus sufentanil 0.2 μg/ml - 10 ml/h) or PIEB 0.0625% (ropivacaine 0.0625% plus sufentanil 0.2 μg/ml - 10 ml/h). Rescue bolus of 5 ml was allowed in both groups with the infusion pump. Data collected included demographic characteristics, labor data, mode of delivery and Apgar score at 1st and 5th minutes. Descriptive analyses of variables were used to summarize data and parametric and non-parametric tests were performed for comparisons. A $p < 0.05$ was considered significantly different.
Results and Discussion: 118 patients were studied (PIEB 0.1%=84; PIEB 0.0625%=34). Cesarean section was reported in 18.1% in the PIEB 0.1% group and in 23.5% in the PIEB 0.0625% group. In the PIEB 0.1% group vaginal instrumental delivery was reported in 30.1%. Regarding mode of delivery no statistical differences were found between the two regimens. Apgar mean scores at 1st minute in PIEB 0.1% group was 9.1±0.5 vs 8.8±1.0 ($p=0.116$) in

PIEB 0.0625% and at 5th minute 9.9±0.2 vs 9.7±0.6 (p=0.095), respectively. No significant differences were found when cervical dilatation at epidural request and the use of oxytocin was considered.
Conclusion(s): Although cesarean section rate was highest in PIEB 0.0625% and vaginal instrumental delivery rate highest in PIEB 0.1% group, no significant differences were found between the two regimens. Apgar mean scores at 1st and 5th minutes was similar in both groups.
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4AP2-12

Willingness to pay for labor epidural analgesia

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Background and Goal of Study: Although epidural analgesia (EA) relieves labor pain effectively, discrepancy between parturients' perceived utility and actual payment of labor EA are never investigated in countries where labor EA is provided on a private basis.
We applied willingness to pay (WTP) methodology to quantify such discrepancy and explore its related determinants.
Materials and Methods: We reanalyzed data collected in the previous questionnaire survey with the new measurement of WTP using the payment card technique. Two regression approaches were used in combination to identify factors significantly associated with WTP for labor EA. Linear regression analysis was performed to evaluate the relationships between WTP and potential determinants, and to predict WTP value. Ordinal logistic regression analysis was also conducted to validate the associations between WTP and other factors.
Results and Discussion: Of the 205 parturients, 155 of them responded to the question of WTP and 78.7% of the respondents had WTP below the actual payment of labor EA. Only female newborns, planning to receive EA in prelabor and more positive attitude toward labor EA were significantly associated with higher WTP in univariate and multivariate analyses. Both linear and ordinal logistic regression analyses yielded similar findings.
Conclusion(s): By using the WTP methodology, we demonstrated that most parturients in Taiwan were not willing to make the actual payment for labor EA and parturients' perceived utility of labor EA was still low under most conditions.
Acknowledgements: This study was funded by the Taipei Veterans General Hospital, grant no. V100B-026, and by the Anesthesiology Research and Development Foundation, Taipei, Taiwan, grant no. ARDF10003.

4AP3-1

Continuous wound infusion with 0.2% ropivacaine vs. intrathecal morphine for post-cesarean analgesia: a prospective randomized controlled double-blind study

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Background and Goal of Study: Adequate pain control after cesarean section allows for fast rehabilitation and could prevent persistent pain and postpartum depression (1).
The aim of this prospective randomized controlled double-blind study was to assess the quality of analgesia provided with either intrathecal morphine or ropivacaine continuous wound infusion compared to routine care in patients undergoing elective cesarean section.
Materials and Methods: After IEC approval, 192 full-term parturients who gave written informed consent were randomly allocated into 3 groups. Each patient underwent cesarean section under spinal anaesthesia (hyperbaric marcaine 10 mg + sufentanil 5 μg) and was equipped with a wound multiholed catheter. In the placebo group (GR1) patients received 0.1 ml of isotonic saline intrathecally and a 10ml/h isotonic saline infusion in the wound catheter for 30 hours. In the intrathecal morphine group (GR2) patients received 100 μg (0.1 ml) of morphine intrathecally and the same infusion in the wound catheter. In the wound infusion group (GR3) patients received 0.1 ml of isotonic saline intrathecally and a 10 ml/h 0.2% ropivacaine infusion in the wound catheter for 30 hours.
Primary objectives of the study were duration of effective analgesia and postoperative PCA IV morphine consumption during the first 30 postoperative hours. Secondary objectives were incidence of adverse effects. Statistical analyses included Kruskall-Wallis and Chi² tests. A p< 0.05 was considered statistically significant.
Results and Discussion: Demographic and intraoperative characteristics were not different between groups.

	GR1 (N=58)	GR2 (N=61)	GR3 (N=63)	p
Duration of analgesia (min)	247 [182-338]	380 [215-1527]	351 [227-594]	<0.01
Morphine consumption (mg)	20.5 [9.5-31.0]	4.0 [1.0-10.0]	8.0 [4.0-20.0]	<0.001
Hypotension (%)	52	38	35	0.138
Nausea and vomiting (%)	16	30	16	0.195
Pruritus (%)	36	57	49	0.108

[Table 1]

Duration of analgesia was not different between GR2 and GR3. However 30 hours-morphine consumption was significantly lower in GR2 than in GR3 (p<0.05).
Conclusion(s): In the conditions of our study, 100 μg of morphine added to spinal anaesthesia provide better analgesia than 0.2% ropivacaine wound infusion with comparable incidence of side effects.
References:
1. Pain 2008;140:87-94.

4AP3-2

Comparison of epidural oxycodone and epidural morphine for post Caesarean section analgesia: a randomised controlled trial

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Background and Goal of Study: Epidural morphine after Caesarean section may cause moderate to severe pruritus in women. Epidural oxycodone has been shown in non-obstetric trials to reduce pruritus when compared to morphine. We hypothesised that epidural oxycodone may reduce pruritus after Caesarean section.
Materials and Methods: A randomised controlled trial was conducted in term women who underwent Caesarean section with combined spinal-epidural technique initiated with intrathecal fentanyl 15mcg. Women received either epidural morphine 3mg or epidural oxycodone 3mg via the epidural catheter after delivery. The primary outcome was the incidence of pruritus at 24 hours after Caesarean section. The secondary outcomes were the pruritus scores, treatment for postoperative nausea and vomiting (PONV), pain scores and maternal satisfaction.
Results and Discussion: One hundred women were randomised (group oxycodone O=50, morphine M=50). There was no difference between group O and M in incidence of pruritus (n(%) 28(56%) vs 31 (62%), p=0.68) and the worst pruritus scores (mean(SD) 2.6(2.8) vs 3.3(3.1), p=0.23), respectively. Both groups had similar pain scores at rest (2.7(2.3) vs 2.0(2.7), p=0.16) and sitting up (5.0(2.3) vs 4.6(2.4), p=0.38) at 24 hours. Pruritus scores were lower at 4-8, 8-12 and 12-24 hours with oxycodone, but pain scores were higher during the same period. Both groups had similar need for treatment of PONV and maternal satisfaction with analgesia.
Conclusion(s): There was no difference in incidence of pruritus at 24 hours between epidural oxycodone and morphine. However, pruritus scores were lower with oxycodone between 4 to 24 hours after surgery with higher pain scores in the same period.
References:
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2. Backlund et al. J Clin Anesth 1997;9(1):30-5.

4AP3-3

Combined spinal-epidural and general anesthesia for cesarean section in pregnant with placenta percreta

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Background: Placenta percreta (PP) is a rare condition consisting of an abnormal implantation of the placenta in the uterine wall with invasion of pelvic structures comprising an increased risk of bleeding and consequent increase of maternal and fetal mortality. We describe a case of a pregnant woman with a previous diagnosis of PP, submitted to a combined spinal-epidural (CSE) and general anestesia (GA) for cesarean section with hysterectomy (CSH).
Case report: 40 years, ASA 2; 38th gestational week; 3th pregnancy (2 deliveries). Nuclear magnetic resonance at 35 weeks revealed placental invasion of the cervix and areas of the bladder suggesting PP. It was decided a CSH and placement of balloon catheters (BC) in the common iliac arteries in order to minimize uterine perfusion during the hysterectomy and prophylatic ureteral catheters (UC). In the day of surgery and after ASA standard and invasive blood pressure monitorization, an epidural catheter (EC) and a subarachnoid anesthetic (10 mg levobupivacaine 0.5% and 0.002 mg sufentanil) were placed by CSE technique (needle through needle) for placement of both bilateral UC by cystoscopy and BC in the common iliac arteries by femoral approach. After this procedure (1h30 min), GA was induced (150 mg propofol; 65 mg succinilcholine) and a right subclavian vein catheter was placed. Six min after incision, a female newborn, 2940g; APGAR 8/10 was delivered. After hysterorrhaphy and before the union of utero-ovarian arteries, there was abundant hemorrhage (3600 mL) requiring inflation of the BC (25 min of clamping) and transfusion of red blood cells (8 units) and fresh frozen plasma (6 units). Norepinephrine was initiated for a brief period. BC were removed after closure of surgical wounds. The patency of the pedioses and posterior tibial arteries was assessed .Admitted in an Intensive Care Unit 8 h after surgery where she stayed stable for 3 days.
Discussion: CSE provided anesthesia for placement of the UC and arterial BC allowing these procedures to be performed without exposing the fetus to prolonged GA. The EC was used for postoperative analgesia. Conversion to GA was necessary by expected complexity of the surgery, possibility of abundant blood loss and consequent hemodynamic instability.
References: AANA Journal; October 2012;Vol. 80, No. 5
Learning points: Anesthetic approach of patients with PP may be challenging and a multidisciplinary approach is required.

4AP3-4

Natural caesarean section: risks and benefits of a natural cesarean section - a retrospective cohort study

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Background and Goal of Study: The natural cesarean section (NCS) technique was first described in 2008.[1] However, this technique is not widely practiced. In NCS parental participation, slow delivery and direct skin-to-skin contact is essential. The neonate is handed over to the mother and easier mother-child bonding and breastfeeding are some of the suggested benefits. Data on the risks and benefits of this new technique is sparse. This retrospective study presents the preliminary results of NCS compared to the conventional cesarean section (CCS).
Materials and Methods: Ethical approval was obtained. From august 2011 until august 2012 conventional CS (CCS) and from January 2013 until December 2013 NSC were retrieved from the hospital data system. Exclusion criteria consisted of CS performed prematurely (< 37 wks.), fetal distress, which was defined as suspicion for fetal distress at start CS and 5 min Apgar score < 7.0 or umbilical artery pH < 7.0. Operating and recovery time, blood loss, maternal and fetal outcome were recorded.
Results and Discussion: In total 810 CS were performed during the study period, 96 (12%) CS were excluded. Of the remaining, 403 (56%) patients were analyzed in the CCS-group and 311 (44%) in the NCS-group. Operation time was 4m42s longer in the NCS-group (95% Confidence interval (CI) 2m54s to 6m36s). Recovery time was 13m42s shorter (95%CI 3m6s to 24m). Maternal infection was seen in 21 (5.2%) in the CCS-group vs 13 (4.2%) in the NCS-group (RR 1.2, 95% CI 0.63 to 2.5). Prolonged maternal hospital admission, > 4 days, was needed for 121 (30%) women (CCS) and 55 (18%) women (NSC), respectively, RR 1.7 (95%CI 1.3 to 2.3). Neonates born after a NCS were less frequently admitted to the pediatric ward compared to neonates born after CCS (19% vs 9.9%, RR 1.9 (95%CI 1.7 to 2.7)). Treatment for (suspected) neonatal infection was less frequent after NCS (8.8% vs 2.5%; RR 3.5 (95%CI 3.1 to 9.5). No differences were seen in other maternal or neonatal outcomes.
Conclusion(s): Patients undergoing NCS showed a slightly longer operation time, but a shorter recovery time, less maternal infection and a decreased risk of prolonged hospital stay. Neonates in the NCS group showed less neonatal infections and less frequent admittance to the neonatal ward.
References: 1. Smith J, Plaat F, Fisk NM. The natural caesarean: a woman-centered technique. BJOG 2008;115:1037-42

4AP3-5

Sustained released oxycodone/naloxone for postoperative pain therapy after caesarean section

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Background and Goal of Study: Postoperative pain management after Caesarean Section (CS) is still insufficient and the unfavourable outcome is mainly associated with low opioid administration after CS (1). Since sustained released (SR) oxycodone/naloxone is recommended for postoperative pain therapy after abdominal surgery (2) , we evaluated a postoperative pain therapy concept based on this drug combination after CS.
Materials and Methods: After IRB approval we compared the prior established postoperative pain therapy scheme of our institution after CS with a new scheme based on sustained released oxycodone/naloxone in an observational study. In the “prior established” group all patients received ibuprofen (2x800 mg, SR) for 3 day after CS and further analgesics on demand. In the oxycodone group patients received additionally Targin® 20/10 (20 mg oxycodone/10 mg naloxone, SR) immediately after CS and Targin® 10/5 12h later and 10 mg oxycodone on demand.
All patients completed questionnaires 24h and 48h after CS containing questions about the intensity of pain (min, max, rest and incident pain), the interference of pain with mobilization and coughing, wish for more analgesics, other symptoms related to pain (sleep quality, mood, fatigue, PONV) and the overall satisfaction with the pain therapy.
Results and Discussion: In each group 70 patients completed the questionnaires after CS in regional anaesthesia. In the “prior established” group 68/70 patients received ibuprofen 1600mg), 42 additionally paracetamol (2-4g), 13 patients piritramid (7.5-15 mg, comparable to 5-12.5 mg morphine) and 2 patients diclofenac (75 mg) in the first 24h. In the oxycodone group all patients received 30 mg Targin® and 1600 mg ibuprofen, 21 patients additionally oxycodone (10-20 mg) and 26 patients paracetamol (1g) in the first 24h. We found no differences in any of the parameters of pain intensity or other collected parameters neither 24h nor 48 h postoperative. The medians for rest pain and incident pain were >3 and >6 in both groups, the median interference of pain with mobilisation and coughing was “high” in both groups 24h postoperative.
Conclusion: In this setting sustained released oxycodone did not influence the postoperative pain intensity after CS compared to a nearly opioid-free postoperative pain therapy. In both groups the postoperative pain therapy was insufficient.
References:
1. Marcus, Eur J Pain, 2014 ahead of print.
2. Englbrecht, Schmerz, 2014, 28: 265-81.

4AP3-6

Tragic outcome of a late perimortem caesarean delivery: some lessons to learn

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Background: A systematic review of case reports describing the management of cardiac arrest during pregnancy significantly enhanced our understanding of cardiopulmonary resuscitation (CPR) in pregnant women. Here we describe the circumstances leading to a tragic outcome despite the immediate availability of CPR to a full-term pregnant woman who suffered a witnessed out-of-hospital cardiac arrest.
Case report: A two member team of emergency medical technicians (EMTs) attended a full term pregnant women who suddenly collapsed and then suffered from cardiac arrest at her home. She received immediate CPR as she lost her pulse in front of the EMTs, who were present to attend her "collapse". She was transported to the operating room of a hospital in 20-minutes time with CPR in place. A multidisciplinary team took over her further management in the hospital. A perimortem caesarean delivery (PCD) was performed in 10-minutes time. A severely hypoxic but alive foetus was delivered who died few days later. The spontaneous circulation of the woman returned immediately after the delivery. The peripheral arterial oxygen saturation and end-tidal carbon dioxide monitoring indicated adequate cardiac output. Post cardiac arrest care was instituted but she died 16-hours later.
Discussion: The applications of effective left lateral uterine displacement and incorporating the 4-minute rule to perform PCD during a CPR have saved the lives of many foetuses and mothers in hospital settings[1]. Out-of-hospital cardiac arrest during advanced pregnancy poses special challenges to CPR because the "gold-standard" treatment of early PCD currently is not possible in an out-of-hospital setting.
Our recent insight from a series of out-of-hospital CPR cases revealed that the outcome could be improved by educating the family members and friends of cardiac arrest victims in the techniques of basic life support[2] but even this strategy will not be successful in pregnant women because here success depends upon an early PCD.
This report emphasis that a new direction is required to meet the challenges associated with out-of-hospital CPR in pregnant women[3].
References:
1. Gynecol 2005; 192: 1916-21.
2. World J Clin Cases 2014; 2: 72-4.
3. Obstet Gynecol 2010; 203:179 e1-5.
Learning points: Use of the effective left lateral uterine displacement and 4-minute-rule to perform PCD, is essential for a meaningful CPR in pregnant women. A new direction is required to meet this challenge in pre-hospital settings.

4AP3-7

Natural Cesarean section: family centered multidisciplinary standard procedure for all term cesarean sections

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Background and Goal of Study: The natural cesarean section (NCS) technique was first described in 2008.[1] describing parental participation, slow delivery and direct skin to skin contact during cesarean section (CS). However, this technique is not widely practiced. One of the reasons the implementation may fail is reluctance to staff to change roles and give up rituals. The anesthesia team is important in the organizational approach in theatre. This abstract describes briefly the key points of the NSC protocol.
Materials and Methods: Our hospital services over 2000 deliveries annually with a cesarean section (CS) rate of 23%. In order to introduce this new technique in our hospital a team of a gynaecologist, an anesthesiologist and a paediatrician was formed in order to develop a multidisciplinary NCS protocol as standard procedure for all term CS's (>37 weeks gestation) elective/non-elective, irrespective of indication or fetal position, for neonates born without fetal distress not needing a paediatrician immediately after birth.
Results and Discussion: The protocol consists of the following main steps. Antenatally parents are counseled on the procedure (including informed consent) In theatre ECG leads are placed on the maternal back by the anaesthesiologist. Theatre temperature is 20-22°C. Spinal anesthesia is performed. The gynaecologist starts the procedure with double sterile gloves and arm sleeves. The paediatrician is available in the neonatal resuscitation room and will treat the neonate if neonatal distress occurs. After the drape is lowered by the anesthesiologist the neonate is born slowly, facing towards parents and is handed from gynaecologist to mother's chest with help of an obstetric nurse wearing sterile gloves. After drying the neonate a warming blanket (38°C) is placed over the neonate preventing hypothermia. The anesthesiologist and obstetric nurse are responsible for the neonate when lying on mother's chest. After birth the gynaecologist removes one pair of gloves and sleeves and resumes surgery. Within an hour the neonate is checked by the paediatrician on the recovery ward.
Conclusion(s): Developing a NCS protocol requires a multidisciplinary effort with commitment from all participating disciplines. The procedure was standardized to evaluate maternal and fetal outcomes which are presented in a separate abstract.
References: 1. Smith J, Plaat F, Fisk NM. The natural caesarean: a woman-centered technique. BJOG 2008;115:1037-42

4AP3-8

Preoperative gabapentin alone or in combination with dexamethasone for postoperative pain relief after abdominal hystrectomies

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Background and Objectives: To investigate the role of combining preoperative gabapentin with dexamethasone in the management of post-operative pain following abdominal hystrectomy.
Material and methods: This prospective randomized blind study included 60 females scheduled for abdominal hysterectomy under general anesthesia. They were randomized into three equal groups [20 patients each]; group C [Control]: received oral placebo and intravenous 2 cc normal saline 0.9%, group G [Gabapentin]: received oral 800 mg gabapentin orally and intravenous 2 cc normal saline 0.9% and group GD [Gabapentin/Dexamethasone]: received oral 800 mg gabapentin orally and intravenous 8 mg/2 cc dexamethasone. Intraoperative fentanyl requirement, postoperative pain, sedation and nausea and vomiting were assessed at 2, 6, 12 and 24 hours postoperative. Time of the first request for analgesia and total postoperative meperidine dose over 24 h were calculated.
Results and Discussion: Intraoperative fentanyl requirement, time of the first analgesic request, total 24 hours meperidine consumption and VAS score at 2 and 6 hours postoperatively showed highly statistically significant difference between group (GD) [added dexamethasone to gabapentin] and gabapentin (G) alone or control (C), meanwhile they were statistically significant between (G) and (C) groups. VAS score was statistically significant lower among the three studied group when assessed at 12 hours postoperatively. There were no statistically significant differences among the three groups as regards the postoperative sedation scale. PONV was highly statistically significant less observed in groups (GD) and (G) at 2hours and statistically significant less observed at 6 hours postoperatively when compared to the control group (C).
Conclusion: Gabapentin alone reduced the intraoperative and postoperative opioid requirement as well as postoperative pain and PONV which was significant in comparison to the placebo effect in the control. Obviously these effects were more prominent and highly significant when dexamethasone was added to gabapentin.

4AP3-9

Failed continous spinal anaesthesia for labor in a morbid obese patient with previous corrected scoliosis

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Background: Continuous spinal analgesia and anaesthesia (CSA) has a quicker onset and a better satisfaction than labour epidural analgesia (LEA). It is a good option for patients with operated column, morbid obesity, and difficult epidural puncture or airway.
Case report: We present a case of a 27-year old obese (BMI = 55) parturient admitted to our hospital at 39 weeks of gestation. She had been operated of idiopathic scoliosis at T2-L4 and L5 -S2 levels. A CSA technique was chosen and a catheter was placed 2 cm intrathecally, using an over-the-needle technique, in the only intervertebral space free of instrumentation (L4-L5). The correct position of the catheter was confirmed with an aspirative test, and 1 ml of 0,25% hyperbaric bupivacaine plus 20 mcg fentanyl was injected. A T12 level of left sensory block was reached, but the block remained patchy on the right side despite topup doses. After 1 hour, she complained of bilateral pain. A new aspiration test diagnosed the migration of the tip of the catheter. A few minutes after, an emergency c-section was indicated due to a Feto-pelvic disproportion. Given the low level of emergency and the high risk of a general anaesthesia, a combined spinal-epidural at L5-S1 level with an intrathecal dose of 11 mg of 0,5% hyperbaric bupivacaine +20 mcg of fentanyl allowed to achieve a T4 homogeneous blockade. The patient remained stable and didn't present any complications.
Discussion: Results of LEA in parturients with previous spinal surgery is uncertain, especially in case of associated obesity. CSA was described as a good alternative in this case. However, scoliosis and obesity could also be considered two risk factors for failed block with a spinal catheter, due to the risk of migration of the catheter outwards (influenced by the depth of subcutaneous tissue), and to the anatomy changes after the spinal surgery, altering the spread of local anesthetic in the intrathecal space.
Learning Points: Although a CSA failure for labour hadn't been described so far, risks factors for failure should be contemplated especially in difficult airway or high risk patient for proposing an adequate alternative, since general anesthesia should not be not an option in this type of patients.
1. Palmer CM. Anesth Analg. 2010 Dec;111(6):1476-9
2. Alonso E et al. Int J Obstet Anesth. 2009 Apr;18(2):137-41
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4AP3-10

Where do our "epidurals" go?

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Background: It is generally accepted that epidural analgesia provides the most consistently effective form of pain-relief during labor.
Although initial confirmation of the correct placement of the epidural catheter is particularly important, the possibility of later catheter migration should not be forgotten.
Subdural block is thought to occur in up to 1% of "epidurals". It may occur when the epidural catheter erodes into the potential space between the dura mater and the arachnoid, probably after the needle has torn the dura. The block is characteristically slow (20-30 minutes) in onset and spreads cranially much higher then expected, often involving the lower cervical dermatomes. Extensive motor block is, however, uncommon, and hypotension is usually mild.
Case report: We hereby describe the case of a 32-year-old pregnant woman in whom an epidural catheter for labor analgesia was placed.
Dose test uneventful, obtaining pain relief after administration of the whole epidural bolus.
Within 15 minutes after the second administration of analgesia through epidural catheter, bilateral sensory-motor blockade until T4 with paresthesia in the upper limbs was found.
Verbal instructions not to use the catheter without the presence of an anesthetist were given and recorded in the patient's clinical file.
Clinical and hemodynamic surveillance of mother and fetus was maintained and the mother reassured.
Upon reversal of the sensory-motor block, first stage of labor was complete and instrumental delivery programmed. As the mother complained of pain, the obstetrician ordered the midwife to give another bolus through the epidural catheter. Sensory-motor block settled again with the same characteristics as before.
Two hours after administration, the sensory motor block was completely reversed and both the mother and the baby were discharged to the obstetric ward.
Discussion: Though rare, anesthetists must be alert to the possibility of catheter migration. One must keep in mind that subdural unintentional block do not cause neither immediate sensory-motor block nor marked hemodynamic changes.
References: S. Yentis and S. Malhotra: Analgesia, Anaesthesia and Pregnancy: Cambridge, 3rd edition 2013
Learning points: Beware: your epidurals don´t always stay where you want them to.

4AP3-11

Excellent satisfaction despite strong pain after caesarean section - an audit within the quality management system for postoperative pain

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Background and Goal of Study: The quality management system (QMS), based on procedure-specific, multimodal analgesic protocols, decreases the levels of postoperative pain (POP) and increases the life quality of surgical patients (1). The aim was to investigate whether the POP management of patients after caesarean section (CS) is also improved within the QMS.
Materials and Methods: Retrospective analysis of data from annual audits in patients after CS in comparison with the patients, who underwent other surgical procedures (OS group) from the orthopaedic, gynaecological, visceral and trauma surgery departments of the university hospital was performed. Standardised questionnaire, including pain intensity on the Verbal Rating Scale (VRS-11); incidence of analgesia-related side effects; incidence of pain interference with the items of life quality and patients' satisfaction with the treatment of POP was used.
Results and Discussion: Although the anticipated intensity of POP was higher in OS group, 67 patients after CS reported more pain on movement than the patients after OS: mean 6.1 vs. 4.3 (VRS-11; $p < 0.0001$). The satisfaction with POP treatment and the quality of life were similar among the patients from both groups. The patients after CS reported less nausea and vomiting than the patients after OS ($p < 0.0001$).
Conclusion(s): The disparity between the high level of pain and excellent satisfaction with POP treatment (2), raise the ethical and bio-medical considerations of restrictive pharmacological therapy of post-CS pain.
References:
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2. Lanser P, Gesell S. Pain management: the fifth vital sign. *Healthc Benchmarks* 2001;**8**:68-70

4AP3-12

Management of labour analgesia in a parturient with suspected intrathecal epidural catheter migration with bolus doses of Local Anesthetic Mixture (LAM)

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Background: Intrathecal insertion of catheter during placement of an epidural or migration of the catheter during labour is known and previously reported. If not detected or suspected early, catastrophic consequences can occur. We report a case of management of suspected intrathecal catheter migration following normal needle placement and negative test dose.
Case report: 34 year old, G2P1, no significant past medical history, requested an epidural for labour analgesia. An epidural was inserted using a 16G Tuohy needle and loss of resistance to saline. There was clear meniscus fall and negative aspiration. Test and loading doses were given without any

sensory effect. Afterwards, detecting no abnormalities, the EPCA pump was started. 1-hour review showed full bilateral dense motor block of lower limbs and sensory block to T10 with stable haemodynamics. Intrathecal migration of the catheter was suspected and infusion stopped. The patient complained of pain and the motor block resolved 3 hours later, so further analgesia was managed with 3ml bolus doses of LAM three times. The patient was pain free without further motor block, throughout labour and delivery, which was uneventful. The patient was carefully followed up for any signs of epidural analgesia or cord compression. 4 days post-delivery the patient developed Post Dural Puncture Headache (PDPH) that required an epidural blood patch after 24 hours of conservative management. Effective pain management with small doses of anaesthetic coupled with the PDPH would seem to be clinical confirmation of suspected intrathecal migration.

Discussion: Migration of EC into the intravascular, subdural or subarachnoid spaces is a common clinical occurrence with incidence showing variation between 21%-43% [1]. Numerous catheter fixation techniques can be found in literature; including suturing, tunnelling, adhesive devices and the Lockit epidural catheter clamp[2].Bilateral dense motor block can be attributed to many causes including subarachnoid injection, cord hematoma etc.

References:

1. Poulton B, Young P. A novel method for catheter fixation. Anaesthesia 2000; 55: 1141 - 2.

2. Coupé M, Al-Shaikh B. Evaluation of a new epidural fixation device. Anaesthesia 1999; 54: 98 - 9

Learning points: Bilateral dense motor blockade in both limbs following epidural analgesia is a serious physiologic effect which needs appropriate monitoring, investigation and adjustment to further management of labour analgesia.

4AP4-1

Body mass index and post-dural puncture headache: is there any link?

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Background and Goal of Study: Post-dural puncture headache (PDPH) followed accidental dural puncture (ADP) is one of the most common and debilitating complications of neuraxial blockade in parturients. In obese women, epidural technique is often more difficult to perform and has both a higher failure rate and a higher risk of ADP. The aim of our analyses was to evaluate the relationship between body mass index (BMI) and the risk of PDPH.

Materials and Methods: We conducted a retrospective analysis in our tertiary obstetric referral center. Between January 2007 and October 2014, 18497 neuraxial blocks were performed: 276 spinal, 15110 epidural and 3111 combined spinal-epidural (CSE). We reviewed our record sheets of all patients who experienced either ADP or PDPH. Parturients were classified into two groups: non-obese (BMI < 30 kg/m^2, G$<$ 30) or obese (BMI ≥ 30 kg/m^2, G$\geq$30). Descriptive analyses of variables were used to summarize data and chi-square or Fisher exact tests were performed ($p< 0.05$).

Results and Discussion: There were 58 ADPs (0.3%) and 45 (77.6%) women developed PDPH. Comparing the G$<$ 30 (n=35) and the G$\geq$30 (n=23), the incidence of PDPH was similar (80.0% vs 73.9%, $p>0.05$). Severe PDPH occurred in 4 (11.4%) women in the G$<$ 30 and did not occurred in G$\geq$30 ($p>0.05$). Conservative management (bed rest, adequate hydration, caffeine, analgesics) was performed in all patients. An epidural blood patch (EBP) was performed in 15 (42.9%) parturients in the G$<$ 30 and 4 (17.4%) in G$\geq$30 ($p=0.043$, OR 3.563 95% CI 1.00 to 12.67). Confining analysis to those with a detected ADP (n=42), there was no difference in incidence and intensity of PDPH, nor the need of an EBP, in G$<$ 30 and G$\geq$30. Similarly results were obtained when redefining the two groups in women with a BMI < 40 kg/m^2 and BMI ≥ 40 kg/m^2.

Conclusion: Low- level evidence suggests that the risk of PDPH declines as body mass index increases. In our series, the incidence and the characteristics of PDPH were similar in obese and non-obese parturients. EBP was only performed as the conservative measures failed. However, women with a higher BMI are less likely to need an EBP, suggesting that higher BMI may be protective.

4AP4-2

Accidental dural puncture and post-dural puncture headache: eight years of experience

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Background and Goal of Study: Accidental dural puncture (ADP) is an important complication of regional anesthesia and post-dural puncture headache (PDPH) remains a disabling outcome in obstetric population. The aim of our analyses was to calculate the incidence of ADP and PDPH and evaluate its management among obstetric anesthesiologists.

Materials and Methods: We conducted a retrospective audit in our tertiary obstetric referral center. Between January 2007 and October 2014, 18497 neuraxial blocks were performed: 276 spinal, 15110 epidural and 3111 combined spinal-epidural (CSE). We reviewed our record sheets of all patients who experienced either ADP or PDPH. Descriptive analyses of variables were used to summarize data and chi-square test was performed ($p< 0.05$).

Results and Discussion: There were 58 ADPs (0.3%), 42 (72.4%) observed and 16 (27.6%) in which PDPH followed unrecognized/suspected ADP. ADP occurred during epidural in 52 (89.7%) patients and CSE in 6 (10.3%), and an 18-gauge needle was used in both. After detected ADP, 21 (50.0%) women had epidural catheters re-sited at a different lumbar interspace, 9 (21.4%) at the same lumbar interspace, 9 (21.4%) had intrathecal catheters (ITC) for a maximum of 24h and regional technique was abandoned in 3 (7.2%). Forty-five (77.6%) women developed PDPH. Onset was mainly within 48h after ADP (67.3%). Incidence of PDPH was similar after epidural and CSE (75% vs 100%, $p>0.05$) and not related to position in which technique was performed (lateral 77.5% vs sitting position 77.8%, $p>0.005$) or to whether the catheter was placed in spinal or epidural space (55.6% vs 82.2%, $p>0.05$). There was no association between PDPH and type of labor (73.7% vaginal vs 85.0% cesarean section, $p>0.05$). Conservative management (bed rest, adequate hydration, caffeine, analgesics) was performed in all patients. Epidural blood patch (EBP) was performed in 23.8% of women after known ADP and 56.3% of unrecognized ADP. Repeated EBP was needed in 3 (15.8%).

Conclusion: Incidence of ADP, PDPH and EBP was similar to the literature. Incidence of PDPH is not related to the choice of regional technique. Insertion of ITC did not prevent PDPH, but the catheter was not left for 24h. Vaginal delivery was not related to PDPH. Reattempting an epidural remains the preferred action followed ADP. In our series, the EBP was only performed as the conservative measures failed.

4AP4-3

Knowledge and attitudes of anaesthetists on management of HIV positive parturients - a survey across 2 hospital sites

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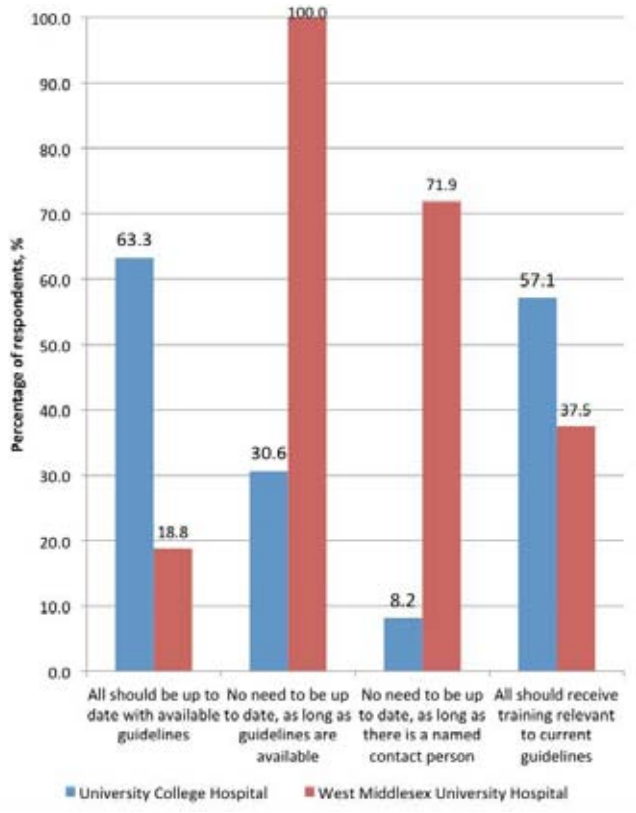
Background and Goal of Study: The prevalence of HIV in women giving birth in the UK has been increasing, stabilising at 2.2 per 1000 in 2011.[1] Correct management during the peri-partum period lowers risk of mother to child transmission, and involves all carers, including anaesthetists. Based on national guidelines, we investigated the opinions and awareness of anaesthetists in the management of the HIV positive parturient.

Materials and Methods: We prospectively handed out a questionnaire to anaesthetists (excluding those who never work in labour ward) to fill in immediately, to assess knowledge of evidence-based management and attitudes towards available guidelines. The survey was conducted across two sites in Oct 2014: University College Hospital (UCH), a teaching hospital and West Middlesex University Hospital (WMUH), a district general hospital, both in London.

Results and Discussion: There were 49 respondents from UCH, 31 consultants and 15 trainees; WMUH had 32, 17 and 2 respectively. At UCH, 55% of respondents have obstetric lists at least every half year, while that was the case for 25% at WMUH. The key findings are shown in the table and graph. Fisher's exact test showed no significant difference between the findings (Table 1) whatever the hospital grade, previous experience, or frequency of obstetric lists.

	University College Hospital, n (% of respondents)	West Middlesex University Hospital, n (% of respondents)	Total, n (% of all respondents)
Has managed an HIV positive parturient before	24 (49%)	17 (53%)	41 (51%)
Should all HIV positive parturients have an elective caesarean section? (correct answer as per guidelines: No[1])			
No	32 (65%)	13 (41%)	45 (56%)
Don´t know	10 (20%)	17 (53%)	27 (33%)
Management of an HIV positive parturient during caesarean section may include: (correct answer as per guidelines: Zidovudine only[1])			
Zidovudine only	15 (31%)	6 (19%)	21 (26%)
Don´t know	29 (59%)	17 (53%)	46 (57%)

[Table 1: Key survey findings]



[Figure 1: Attitudes of Anaesthetists Concerning Guidelines]

Conclusions: Regardless of background or experience, most anaesthetists in our survey were not up to date with guidelines on the management of HIV positive parturients. Most were interested in gaining this knowledge but opinions on dissemination of guidelines differed. Our survey shows that addressing this need has to be tailored to suit local preference and practice.

References:

1. de Ruiter A et al, HIV Medicine 15(suppl 4):1-77, 2014

4AP4-4

Post-dural puncture headache and prophylactic measures: eight years of experience

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Background and Goal of Study: Mechanism by which persistent reduction in cerebral spinal fluid (CSF) volume creates post-dural puncture headache (PDPH) after accidental dural puncture (ADP) is not clear. Several measures have been studied to prevent this disabling complication.
The aim of our analysis was to calculate the incidence of ADP and PDPH and evaluate the efficacy in establishing prophylactic measures (PM) to prevent PDPH.

Materials and Methods: Retrospective analysis in our tertiary obstetric referral center. Between January 2007 and October 2014, 18497 neuraxial blocks were performed: 276 spinal, 15110 epidural and 3111combined spinal-epidural (CSE). We reviewed our record sheets of all patients who experienced either ADP or PDPH. Parturients were divided in 2 groups: those who initiated PM (Group PM) and those who did not (Group non-PM). Descriptive analyses of variables were used to summarize data and Chi-square test was performed ($p<0.05$).
Results and Discussion: There were 58 ADPs (0.3%), 42 (72.4%) observed, 12 (20.7%) in which PDPH followed unrecognized ADP and 4 (6.9%) in which PDPH followed suspected ADP. ADP occurred during epidural in 52 (89.7%) patients and during CSE in 6 (10.3%), and an 18-gauge needle was used in both.
After detected or suspected ADP (n=46), 35 (76.1%) women initiated PM, including bed rest, adequate hydration, caffeine drinks, analgesics and/or non-steroidal anti-inflammatory. Nine (19.6%) of those women had intrathecal catheters (ITC) placed, but all initiated PM.
The overall incidence of PDPH was 77.6% (n=45). Comparing the Group PM (n=35) and non-PM (n=11), the incidence of PDPH was similar (71.4% vs 72.7%; $p>0.05$). There was no association between PM and the intensity of PDPH, 22 (62.9%) women in the group PM and 7 (63.6%) in the group non-PM had moderate to intense PDPH ($p>0.05$). Once all women with ITC initiated PM, a correlation between ITC and incidence of PDPH cannot be establish as PM act as a confounding factor.
Conclusion(s): Incidence of ADP and PDPH was similar to the literature. Institution of PM is not consensual, although they are still a very common practice. In our analyses, there was no association between the establishment of PM and prevention of PDPH. The initiation of PM and the intensity of PDPH were not related. All women who had ITC initiated PM, so we cannot establish if ITC alone was prophylactic in preventing PDPH. Our results are similar to the recent literature.

4AP4-5

A case report of anaphylaxis after preoperative antibiotic prophylaxis for cesarean section

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Background: Anaphylaxis is a rare event during pregnancy, however it has the potential to lead to serious maternal and fetal morbidity.[1] We present a case of anaphylaxis developed on a pregnant women after preoperative administration of cefazolin.
Case report: A healthy 31-year-old woman at 40 weeks gestation was proposed for nonelective cesarean delivery. She had previously been submitted to 2 cesareans without complications. There was no prior allergic history. At operating room, intravenous (IV) cefazolin (2 g) was given before anaesthetic induction. Immediately following administration of antibiotic, patient's blood pressure (BP) dropped to 90/60 mm Hg with a heart rate of 127/min and 80% saturation of peripheral O_2 (SpO_2). She was intubated and ventilated, 0,03 mg phenylephrine and fluidtherapy were given. Surgery started under general anesthesia. Patient remained hypotense and hypoxic. Respiratory failure due to acute pulmonary edema (APE) was recognized and anaphylaxis was suspected. BP and SpO_2 finally recovered after IV epinephrine 0,01 mg, ranitidine 50 mg, hydrocortisone 200 mg and furosemide 80 mg. Immediately after birth, the newborn was reanimated and mechanically ventilated during the first 3 hours of life. The patient was admitted in the intensive care unit, clinical status started to improve and extubation was performed 6 hours later. Both mother and newborn were discharged home in good condition, without neurological deficits.
Discussion: During delivery, anaphylaxis is mainly caused by antibiotics (mostly B-lactamic) and latex.[1] We suspected of anaphylaxis because there was a direct temporal relation between cardiovascular and respiratory failures and cefazolin´s administration. High index of suspicion, prompt and adequate treatment are important in attenuating mortality and morbidity. Prophylactic antibiotics reduce the incidence of infection from caesarean section, but the most effective timing of administration steal controversial. Compared with administration after cord clamping, preoperative antibiotics significantly reduce the rate of endometritis.
However, there are concerns about unnecessary neonatal exposure, fetal infection masking, neonatal septic work-up increases and emergence of resistant strains.[2]

References: [1] American Journal Of Perinatology Reports; 2011; 1 (1): 15-19.
[2]Arch Surg; 2011;146 (12): 1404-9.

Learning points: Decision of antibiotic prophylaxis before cord clamping for cesarean section should be well pondered.

4AP4-6

Epidural blood patch, positive pressure epidural space

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Background: Post-dural puncture headache (PDPH) is a troublesome complication of spinal anesthesia, especially for obstetric population. Its exact mechanism is unclear, although the most plausible explanation is the cerebrospinal fluid (CSF) leak through the dural hole and subsequent intracranial pressure changes. Epidural blood patch (EBP) is an adopted method for the treatment of especially severe PDPHs. We present a case of PDPH, in which CSF was detected in the epidural space during EBP.
Case report: A 26 year-old, multiparous woman at 38 weeks of gestation presented for elective, cesarean delivery. The spinal block was performed with a 26-G atraumatic spinal needle at the lumbar 4-5 interspaces in the sitting position at first attempt. There were no complications intraoperatively. On the third postoperative day she developed fronto-occipital headache worsening with mobilization. She had medical treatment in the hospital with the diagnosis of PDPH and discharged after. At the ninth postoperative day she readmitted to the hospital with severe headache. EBP was planned. At the first insertion of the 18-G epidural needle CSF leak was observed, the needle was retracted. At the second attempt, despite the CSF leakage, 15 mL of autologous blood was injected to epidural space. The headache was disappeared immediately after the procedure. No neurological complications were observed, and the patient was discharged after 4 hours follow-up.
Discussion: In some PDPH cases CSF leakage may occur due to fistula formation between the subarachnoid and epidural spaces. Cerebrospinal fluid appearance can also be observed in epidural space located needle. Magnetic resonance imaging, radionuclide cysternography, computurized tomography myelography or epiduroscopy can be used for exact diagnosis.[1,2] Ultrasound guidance can be used during the EBP procedure for proper detection of the epidural space.[3]
References:
1. Ho KY, Gan TJ Management of persistent post-dural puncture headache after repeated epidural blood patch. Acta Anaesthesiol Scand. 2007 May;51(5):633-6.
2. Hayek SM, Fattouh M, Dews T et al. Successful treatment of spontaneous cerebrospinal fluid leak headache with fluoroscopically guided epidural blood patch: a report of four cases. Pain Med. 2003 Dec;4(4):373-8.
3. Khayata I, Lance Lichtor J, Amelin P. Ultrasound-guided epidural blood patch Anesthesiology. 2011 Jun;114(6):1453.
Learning points: CSF can be detected in epidural space during EBP.

4AP4-7

The skin disinfection before regional anaesthetic techniques in obstetric practice: a double blind controlled study

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Aim: Count the amount of colony forming units (CFUs) from the skin of partuents, obtained after using two applications of 70% alcoholic Chlorhexidine 0.5% solution (Group C), compared to three applications of alcoholic 10% Povidone Iodine solution and one application of 70% alcoholic Chlorhexidine 0.5% solution (Group P).
Method: The study involved the application of sterile soya agar jelly contact plates to the back skin of a hundred and one partuents on labour suite, before and after disinfection. Sixty four were undergoing elective caesarean section. Thirty seven were having an epidural inserted for labour pain. They were randomised to group C (chlorhexidine only) and group P (Iodine and chlorhexidine).
In both groups Plate 1 was applied before skin disinfection. In the group C the skin was disinfected with Chlorhexidine, allowed to dry and a sterile Plate 2 was applied. A second application of Chlorhexidine was applied, allowed to dry and then Plate 3 was applied. In group P, skin disinfection with three washes of iodine and one wash of Chlorhexidine were performed. This was allowed to dry and sterile Plate 2 was applied to the skin. A third unused but opened Plate 3 was used as a surrogate for blinding. The plates were sent to the laboratory, incubated and CFUs counted at 24 hours by blinded microbiologist.
Results: There was no statistical significant difference in the number of plates that grew CFUs before disinfection. No plates grew CFUs after disinfection with two washes of 70% alcoholic Chlorhexidine 0.5% (Group C) or after 3 applications of alcoholic 10% Povidone Iodine solution and one application of 70% alcoholic Chlorhexidine 0.5% (Group P). However in group C growth of less than 50 CFUs occurred in one plate after a single wash with 70% alcoholic Chlorhexidine 0.5%.
Conclusion: We have demonstrated that in partuents, the application of two washes of 70% alcoholic Chlorhexidine 0.5% is as effective as three washes of 10% Povidone Iodine and 1 wash of 70% alcoholic Chlorhexidine 0.5%. The application of two washes rather than four washes translates into less time consumption, especially in urgent cases, thus allowing more time for drying up of solutions.
References: Malhotra *et al*: One vs two applications of chlorhexidine/ethanol for disinfecting the skin: implications for regional anaesthesia. Anaesthesia. 2011 Jul;66(7):574-8.

Group	No of CFUs	0	<50	50-100	>100
C	Before Skin Disinfection	0	7	16	14
	After 1st C wash	36	1	0	0
	After 2nd C wash	37	0	0	0
P	Before Skin Disinfection	0	12	16	9
	After 3 x P + 1 C	37	0	0	0
	To Air	37	0	0	0

[Spinals]

Group	No of CFUs	0	<50	50-100	>100
C	Before Skin Disinfection	0	7	4	4
	After 1st C wash	15	0	0	0
	After 2nd C wash	15	0	0	0
P	Before Skin Disinfection	0	8	0	4
	After 3 X P + 1 C	12	0	0	0
	To Air	12	0	0	0

[Epidurals]

4AP4-8

Euglycemic non diabetic ketoacidosis in septic parturients. A case series

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Background: Having obtained written permission, we would like to report a series of septic parturients presenting with euglycemic, non-diabetic ketoacidosis in the third trimester of pregnancy.
Case series:
Patient 1: A 17 yr. old primipara presented at 39wks. gestation with a 4 day h/o vomiting due to gastroenteritis and uro-sepsis. Glucose was 4.8 mmol/L and ketones 4+. Venous gas showed: pH 7.37, base deficit 5.6, HCO_3 18 and Lactate 2.2 mmol/L. Despite obstetric management, she continued to have poor nutrition with worsening acidosis and euglycemia. On day 4 her pH was 7.32, CO_2 3.5, Base deficit 11.2 and HCO_3 13. She had a grade-2 caesarean section under general anaesthesia after failed induction of labour. Her ketoacidosis only improved after variable rate insulin dextrose infusion on ITU.
Patient 2: A 34 yr. old G2P0 mother presented at 35wks. gestation with 4 day h/o vomiting, breathlessness and flank pain with ketones 3+, glucose 7.5mmol/L, pH 7.43, CO_2 3.7kPa, Base deficit 5.6, HCO_3 22 and lactate 2.7mmol/L. Despite management of oro-pharyngeal candidiasis and pyelonephritis, her acidosis worsened. On day 4, her pH was 7.20, CO_2 2.8kPa, base deficit 18 and HCO_3 8.1mmol/L with an anion gap of 20. She had emergency cesarean section for foetal distress and was treated on ITU with a fixed rate insulin-dextrose infusion until ketone negative (DKA protocol). Baby needed neonatal support.
Patient 3: A 28 yr. old primipara presented at 28 wks. gestation with a 5 day history of nausea, vomiting, abdominal pain and lower respiratory tract infec-

tion. Glucose was 5.8 mmol/L with 3+ urinary ketones. On Day 2, her ketoacidosis worsened with 4+ of ketones, pH of 7.26 and base deficit of 11.7. After resuscitation, she was started on variable insulin and dextrose with potassium on the obstetric HDU. She improved with pH of 7.33, base deficit of 6.3 and 2+ ketones.
Discussion: A triad of starvation (hyperemesis), stress (sepsis) and pregnancy (third trimester) predisposes to development of ketoacidosis causing maternal and foetal morbidity[1]. Sepsis confounds diagnosis and delays management. Insulin, dextrose and recommencing nutrition halts keto-genesis.
Reference: 1. Rizzo T. et al. *Correlation Between Antepartum Maternal Metabolism and Intelligence of Offspring.* New England Journal Of Medicine. 325:911-16. 1991.
Learning points: In gestational euglycemic ketoacidosis, early level 2 care focused on prevention of keto-genesis optimises maternal and foetal outcomes.

4AP4-10

Skin testing and incremental challenge to evaluate adverse reactions to local anaesthetics in the third trimester of pregnancy is a valuable and safe process

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Background: True allergy to local anaesthetics (LAs) is rare (<1%). In the obstetric population, a history of adverse reactions can limit analgesic and anaesthetic options in labour and delivery.
Case report: A 30 year old primiparous female was referred to the anaesthesia clinic at 30 weeks gestation. She reported experiencing sudden onset abdominal pain and drowsiness for a prolonged period after dental extraction performed under LA. Her medical history was otherwise unremarkable. In collaboration with the immunology and obstetric teams, the patient was admitted to the labour ward at 36 weeks gestation. IV access was established alongside maternal (BP, HR, SpO2) and foetal (intermittent FHR) monitoring. The obstetric team were on standby to assist in the vent of maternal instability. Protocolized skin testing and incremental challenge testing of amide LAs was performed uneventfully with no adverse reactions.[1] The patient was discharged successfully 4 hours after testing was completed. The patient presented in labour at 40 weeks, successfully received epidural analgesia and proceeded to emergency Caesarean section under epidural anaesthesia for delivery her baby. She reported high levels of satisfaction with the peripartum multidisciplinary care.
Discussion: Many patients are incorrectly labelled as having allergies to LAs. Pregnancy may be considered the wrong time to consider formal allergy testing, for fear of harm to the mother, foetus or both. Allergy testing in pregnancy has been demonstrated safely previously[2]. The incremental challenge technique in the third trimester of pregnancy minimises the risks of harm to parturient and foetus and can lead to to a greater variety of options for her in labour and delivery. Formal testing requires a comprehensive multidisciplinary approach to achieve maximum benefit for the patient.
References:
1. Schatz M. Skin testing and incremental challenge in the evaluation of adverse reactions to local anesthetics. J Allergy Clin Immunology 1984 74 (2):606-616.
2. Palmer CM et al. Management of the parturient with a history of local anesthetic allergy. Anesth Analg. 1993 (77):625-628.
Learning points: LA allergy is rare. Formal allergy testing in the third trimester using the incremental challenge approach is safe.

Step*	Route	Volume	Dilution
1	Puncture	---	1 : 100
2	Puncture	---	Undiluted
3	Intradermal	0.02 ml	1 : 100

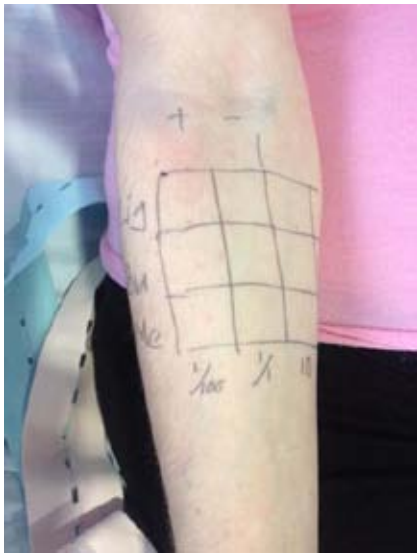
*Administer at 20-minute intervals

[Table 1. Skin testing protocol for patients with histories of prior reactions to LAs]

Step*	Volume (ml)	Dilution
1	0.1	1 : 100
2	0.1	1 : 10
3	0.1	Undiluted
4	0.5	Undiluted
5	1.0	Undiluted

*Administer at 20- to 30-minute intervals

[Table 2. Protocol for subcutaneous incremental challenge in patients with histories of prior reactions to LAs]



[Incremental challenge testing for LA senstiivity]

4AP4-11

Implantation and evaluation of a reporting/action protocol/monitoring system for accidental dural perforation incidence. Series of 26747 epidural patients between 2008 and 2013

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Background: Accidental dural perforation (DT) is a potential complication of obstetric regional anaesthesia. Incidence in patients varies between 0.1 and 0.6% according to our series (from 1 to 2.5% in teaching institutions)[1].
Methods: With the support of our scientific committee, we developed a DT identification/response/monitoring system based on patients' digital clinical files. Data were prospectively gathered and analysed on all patients receiving obstetric anaesthesia, including all cases of DT, between 2008 and 2013.
Results: During the study period, 26,747 patients received obstetric anaesthesia. Accidental DT occurred in 65 cases (DT-rate of 0.25%) - the annual incidence rate is reflected in the table. In 13 cases the damaged was caused by the needle used. Epidural catheter was maintained for 24 hours in 52 patients. Persistent headache was reported in 8 patients, who required blood patching. In 4 of these patients the epidural catheter was left for longer than 24 hours. Other patients experienced mild headache, and there was no increase in mean hospital admission time. Two patients were readmitted for headache. Both had had catheters inserted at least 24 hours and 1 of them required blood patching.
Discussion: The incidence of DT tended to rise early on, balancing out in later years to levels reported in other series. We believe that the improvement is due to better understanding of and commitment to DT identification and monitoring by professionals.
Our series shows a reduced incidence of PDPH when catheters are left in for at least 24 hours. This has in turn led to reduced demand for blood patches in patients[2].
We consider the practice to be a safe one with a very low incidence of complications and low mean hospital admission time, although wider series would be needed to confirm our findings.

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1. Moral M, Rodríguez S, Sahagún S, Yuste JA. Tratamiento de la cefalea post-punción dural con hidrocortisona intravenosa. Rev. Esp. Anestesiol. Reanim. 2002; 49: 101-104.
2. Int J ObstetAnesth. 2008 Oct;17(4):329-35. doi: 10.1016/j.ijoa.2007.04.009. Epub 2008 Aug 8.
Ten years of experience with accidental dural puncture and post-dural puncture headache in a tertiary obstetric anaesthesia department.
Van de Velde M1, Schepers R, Berends N, Vandermeersch E, De Buck F.

4AP4-12

Methylergometrine and oxytocin induced acute myocardial infarction under spinal anesthesia after caesarian section

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Background: Methylergometrine are frequently used during cesarean section, induced abortion, post partum hemorrhage to promote uterine contractions may also induce coronary vasospasm.
Case report: We report the case of 22-old women without previous risks factors of ischemic heart disease, after typically caesarian section under spinal anesthesia with Methylergometrine and oxytocin administrated intravenous. In early postoperative period she complained on chest pain and tachycardia. We find supraventricular tachycardia without hemodynamic changes and gives amiodarone intravenous with immediately positive effect. Later in first 6 hours we find the ECG-changes - the lost of R wave amplitude in V1-V3 and coronary T wave in V2-V6. Echocardiography: injection fraction 38%, akinesis of four myocardial segments; high level of blood creatine kinase-MB (110 E/l), aspartate transaminase (243 E/l) and troponin T (4,2 ng/ml).The treatment of acute myocardial infarction include aspirin, oxygen, opioids, nitroglycerin, low molecular weight heparin.In dynamics (10 days) we observe the normalization of ECG, echocardiography: injection fraction 59%, no akinesis segments; blood creatine kinase-MB (10 E/l), aspartate transaminase (24 E/l) and troponin T (0,05 ng/ml).
Discussion: The risk of development of acute coronary syndrome or acute myocardial infarction in routine obstetrics practice is very rare and most often been described after intravenous use [1][2]. The mechanism probably is coronary vasospasm.
References:
1. Bateman BT(1), Huybrechts KF, Hernandez-Diaz S, Liu J, Ecker JL, Avorn J. Methylergonovine maleate and the risk of myocardial ischemia and infarction. Am J Obstet Gynecol. 2013 Nov;209(5):459.e1-459.e13.
2. de Labriolle A(1), Genée O, Heggs LM, Fauchier L. Acute myocardial infarction following oral methyl-ergometrine intake. Cardiovasc Toxicol. 2009 Mar;9(1):46-8.
Learning points: Our case suggest that combination of methylergometrine and oxytocin under spinal anesthesia increase the risk of acute myocardial infarction during early postoperative period, the mechanism probably is coronary vasospasm.

4AP5-1

Cardiac output and microcirculation in preeclampsia: a non-invasive comparative prospective study

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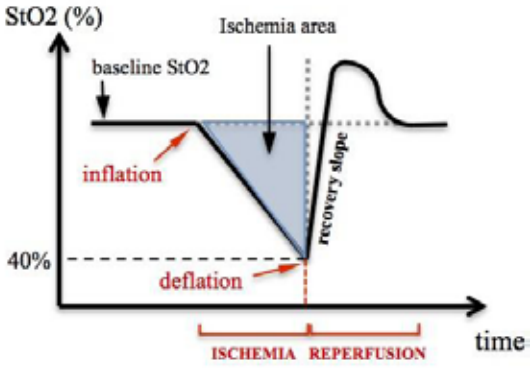
Background and Goal of Study: Endothelial dysfunction observed during preeclampsia could have an impact on cardiac output (CO) and microcirculation. Only few comparative data with normal pregnancy are available. The aim of this study was to determine if preeclamptic patients have CO or microcirculatory impairment.
Materials and Methods: Prospective monocentric observational comparative study between preeclamptic (PE) and control pregnant patients. Non-invasive CO was measured using Nexfin® monitor (Edwards Lifesciences®). Dynamic thenar eminence microcirculatory oxygenation during a brachial vascular occlusion test (VOT) was assessed by InSpectra® StO2 near-infrared spectroscopy monitor (Hutchinson Technology®). Measurements were made during prepartum and postpartum period (at day 3-4) and a specific pre/postpartum comparison was made for preeclamptic patients.
Results and Discussion: 27 PE and 27 controls during prepartum, and 12 PE and 12 controls during postpartum were included (pre and postpartum measurements were made for 10 PE patients). There was no statistical difference in CO between PE and controls (respectively 7,97 vs 8,15L/min (p=0,75) in prepartum, and 6,92 vs 7,37L/min (p=0,54) in postpartum). There was no statistical difference in StO2 reperfusion slope during VOT between PE and controls (respectively +5,38 vs +4,77 units/sec (p=0,21) in prepartum, and +4,86 vs +4,75 units/sec (p=0,89) in postpartum). Baseline StO2 was significantly higher in PE in prepartum (85,5 vs 80,72%, p=0,005) and significantly decreased between pre and postpartum (respectively 87,7 and 81,6%, p=0,02). Ischemia area during VOT was significantly higher in PE in prepartum (-109,2 vs -67,1 units.min, p=0,005), and significantly decreased between pre and postpartum (respectively -153 and -87,9 units.min, p=0,02).
Conclusion(s): Preeclamptic patients show both preserved CO and microvascular reactivity during pre and postpartum. Increased baseline StO2 and ischemia area during prepartum suggest an impairment in microcirculatory flow and tissular O2 extraction, and these abnormalities seem to improve in postpartum. Further inclusions could confirm these observations.



[Typical StO2 changes during VOT]

4AP5-2

Minimally invasive hemodynamic monitoring in fetoscopic surgery of myelomeningocele

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Background: Myelomeningocele is the most frequent form of congenital anomalies of the central nervous system.The use of minimally invasive monitoring of these patients may be used as a therapeutic guide during anesthesia for fetoscopic surgery repair.
Case report: We present 4 pregnant women between 19 and 26 weeks of gestation undergoing fetoscopic repair of myelomengocele. Before the general anesthesia a peridural catheter was placed. Intramuscular fetal anesthesia was administered and balanced maternal and fetal anesthesia was maintained with sevoflurane 1,5% MAC and continuous infusion of remifentanyl. Besides the usual monitoring a radial artery was placed and minimally invasive uncalibrated cardiac output monitor was connected to the patient. Hemodynamic parameters were recorded and phenylephrine infusion was maintained to ensure stability of the patient.

	Case I	Case II	Case III	Case IV
Weeks of Gestation	24	19+2	26+1	22+4
Fetal anesthesia	Yes	Yes	Yes	Yes
Combined maternal anesthesia	Yes	Yes	Yes	Yes
Phenylephrine infusion(µg/min)	15-34	16-51	25-41	19-38
HR(beats/min)	68-96	72-97	59-84	64-92
MAP(mmHg)	69-110	55-75	67-77	59-85
CI(L/min/m²)	2.3-2.7	4.8-5.6	4.1-5.2	3.8-4.7
SVI(mL/beat/m²)	23-47	48-70	50-71	45-68
SVR(dyne-s-m²/cm⁵)	1400-1800	880-1200	950-1245	1095-1525

[Table 1]

Figure shows maximum and minimum values of the analyzed parameters. All cases were uneventful.

Discussion: With the growing trend to minimally invasive fetal surgery the anesthesiologists need to be less aggressive but rigorous with the maternal hemodynamic monitoring to ensure fetal well-being. Although throughout the surgery the fetal heart rate is observed by ultrasound we need to ensure both maternal and fetal hemodynamic stability. For this reason it has become necessary to use minimally invasive monitoring to determine cardiac output as it has been the most accurate parameter to detect changes in uterine-placental blood flow and let us to adjust treatment according to the hemodynamic parameters.
Learning points: Fetoscopia repair of myelomeningocele is growing due to the less invasiveness compared with open surgery. It is a challenge for the anesthesiologist to maintain a good hemodynamic stability which ensures maternal and fetal well-being. For this reason non invasive monitoring is an important tool for an early prevention and treatment of any complication with the minimum maternal aggression.

4AP5-3

Hemodynamic profile and perioperative complications of aged women undergoing elective cesarean delivery

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Background: The number of aged women submitted to cesarean delivery (CD) is extremely increasing. It is already known that this implies more complications, especially in terms of increased bleeding and uterine atony[1]. Nevertheless, less is known about the hemodynamics of these parturients.
Methods: We reviewed perioperative data of women undergoing elective CD with spinal anesthesia, where hemodynamic monitoring was employed (Nexfin, Bmeye-Edwards). The population was divided in accord to the age at the moment of intervention (more than forty years vs. forty years or less) and the analysis involved hemodynamic profile (basal and intraoperative) together with intra- and postoperative complications.
Results: 181 histories were reviewed. No patient presented with previous hypertension. The number of aged patients amounted to 23 (12.7%). There was no remarkable difference in terms of basal cardiac index (CI) and blood pressure (BP), although systemic vascular resistances appeared higher in aged patients (2091 vs. 1962 dyne.sec(2).cm(-5).m(2)). Intraoperatively, aged women tended to present more episodes of hypotension (36% vs. 21% for BP less than 90 mmHg) and more episodes of low CI (41% vs. 24% for CI less than 3 L/min/m2); however we did not record differences regarding drugs and fluids for hypotension's treatment. Aged women presented more postoperative complications: augmented needs for antihypertensive treatment (22,7% vs. 9,5%), fluid challenge (23% vs. 4,4%) and diuretics (36% vs. 11,4%). Proteinuria as well showed frequently in aged women (24% vs. 12%). We finally observed that intraoperative blood loss in aged woman increased (877 vs. 658 mL) and the need for uterotonics, both intra- and postoperatively, augmented.
Conclusions: Accordingly to this review, aged parturients submitted to elective CD present compromised hemodynamics: they tend to more instability during the interventions and suffer from more postoperative complications, especially in terms of hypertension and oliguria. This data should orient about intraoperative hydration and use of vasopressors when facing this type of patient, and meticulous care should be paid to promptly unmask subclinical preeclampsia. We also confirmed that aged woman are disposed to uterine atony.
References:
1 CMACE. Saving mothers' lives: reviewing maternal deaths to make motherhood safer: 2006-2008. BJOG 2011;118(Suppl. 1):1-203.

4AP5-4

ST-analysis and epidural analgesia

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Background and Goal of Study: Combined method of direct fetal ECG and CTG can potentially reduce the rates of neonatal metabolic acidosis and obstetric interventions. The aim of the study was to assess safety and efficacy of a new fetal surveillance method - direct ECG combined with CTG.
Materials and Methods: 215 patients with a singleton pregnancy at term were examined during labor. Fetal monitoring was performed by simultaneous registration cardiotopography (CTG) and direct electrocardiogram (ECG). ECG analysis was performed by calculating of the T/QRS ratio and analyzing of the ST-events presence. The umbilical venous blood was collected to assess Acid-base Balance, pH, lactate concentration. With the use of STAN, the FHR pattern was classified according to the FIGO guidelines. All patients were divided into 3 groups- with normal(I) (n=133), suspicious(II) (n=42) and pathological(II) (n=40) cardiotocogram. The frequency of usage of epidural analgesia (EA) was the same in all groups.
Results and Discussion: Episodic ST were observed in the 24.8% in group I. Average newborn Apgar score was 7.8±0,4, umbilical artery blood pH 7.31 (7.24-7.36), lactate - 5.2 (3.8-5.7). In 5.4% (7 cases) of the I group the C-section was carried out and 1.5% (2 cases) were delivered by vacuum extraction. The indication was acute fetal distress. In this subgroup an average pH was 7.27, lactate - 5.12 mmol/L, with no influence of EA on continuous fetal surveillance. In the II group ST events (1-8) were noted in 16.6%. 40 women delivered spontaneously, 2 by vacuum extraction. ST events were not registered. Apgar score was 7,6±0,7, the acid-base parameters within normal values. No effects of EA were noted on CTG/direct ECG during labor. In the III group a high incidence of C-section(2%) and vacuum-extraction(17,5%) were registered. ST events were in 35%(14) women. There was no a rise in T/QRS ratio nor baseline of the direct fetal ECG curve, and no monotonous rhythm or decelerations in CTG curve. Pathological CTG was registered several hours after EA. Sometimes there were biphasic ST-events, with no specific impact of epidural analgesia on the presence of abnormal fetal ECG. The average Apgar score: 6,8±0,5 , pH: 7,08 (6,95-7,14) and lactate: 8,2 mmol/l, thus confirmed an acute fetal distress.
Conclusion(s): A CTG/direct ECG method of intrapartum fetal assessment has high reliability and confirmed the absence of a direct side effect on the state of the healthy fetus.

4AP5-5

Drip, drip, drip.....more fluid please!!

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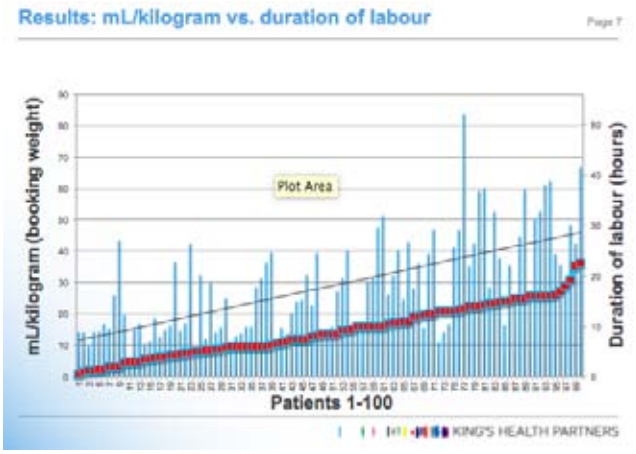
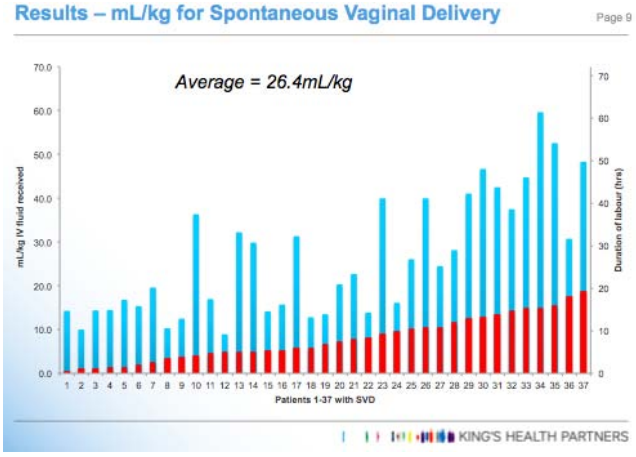
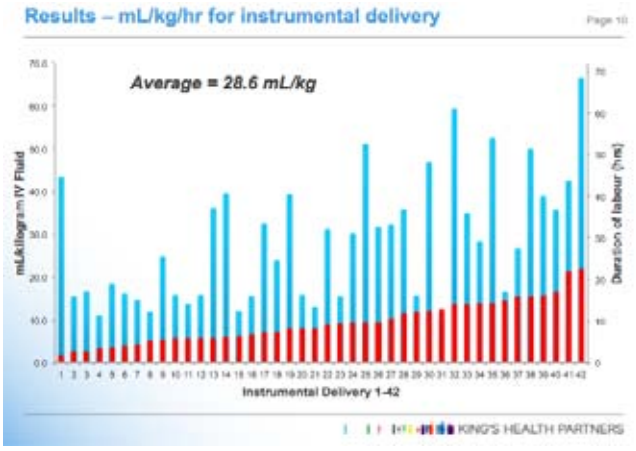
Background and Goal of Study: Modern low-dose epidural local anaesthetic concentrations have led to formal guidance stating that intravenous fluid is no longer mandatory with epidural analgesia in labour.[1] Differing fluid prescribing practices exist amongst anaesthetists, obstetricians and midwives in labouring women.
This study aimed to determine if fluids were given with epidural analgesia, how much fluid was given in labour prior to delivery and the rationale for fluid prescribing, especially if patients are maintaining oral fluid intake.
Materials and Methods: Using patient notes and electronic prescribing records, a retrospective audit was performed on 100 women receiving epidural analgesia in labour. The amount of fluid given, reasons for IV fluid, if oral intake was maintained and mode of delivery were noted. Fluid administered in theatre and amount of oral fluid taken was not included.
Results and Discussion: 67 women had 1L Hartmann's (not prescribed by an anaesthetist) commenced by a midwife in preparation for insertion of an epidural. 33 women had fluid prescribed by obstetricians for abnormal CTGs or maternal pyrexia/tachycardia. 98 women maintained an oral fluid intake in addition to IV fluids. Total fluid given pre-delivery ranged from 1-6 litres Hartmann's over a labour duration of 1-22 hours respectively. A longer duration of labour corresponded with a greater mL/kg (booking weight) IV fluid administration, peaking at approximately 83mL/kg. 37 spontaneous deliveries, averaging 26.4mL/kg crystalloid, 42 instrumental deliveries, averaging 28.6mL/kg crystalloid and 21 Caesarean sections, averaging 33.7mL/kg crystalloid. There were no cases of pulmonary oedema. There was no formal documentation of fluid balance intrapartum and the electronic prescribing system was not in continuity with bedside activity.
Conclusion(s): Traditional practice of intravenous fluid therapy with epidural analgesia in labour is still practiced in our labour ward. Intrapartum fluid administration can reach potentially harmful levels, especially when not documented clearly. Poor understanding of the rationale for IV fluids is a major contributing factor amongst all practitioners in obstetrics. There is scope for significant quality improvement in education of healthcare professionals and fluid balance documentation for labouring women.
References: 1. Care of healthy women and their babies during childbirth. NICE https://www.nice.org.uk/guidance/cg55.



[Total IV fluid mL/kg vs. duration labour]



[SVD mL/kg total IV fluid]



[Instrumental delivery mL/kg total IV fluid]

4AP5-6

Heart rate as surrogate of the cardiac output in the hemodynamic management of the Cesarean delivery

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Background and Goal of Study: Hypotension after spinal anesthesia for Caesarean Delivery (CD) presents an incidence of up to 71%[1]. Phenylephrine is considered as the vasopressor of choice for the treatment of spinal hypotension[2] but ephedrine may be preferable for hypotension with decreased Heart Rate (HR). The aim of this observational study was to report pharmacologic treatment, incidence of hypotension and other common outcomes when Cardiac Index (CI), instead of HR, guided vasopressor choice.
Materials and Methods: Hypotension was defined as systolic pressure <100 mmHg. In HR group, hypotension was treated with phenylephrine infusion when heart rate exceeded 60 b/min, with 5 mg bolus of ephedrine when not. When CI values were provided, the switch from phenylephrine to ephedrine was performed for CI under 3 L/min/m^2.
Results and Discussion: Forty-eight procedures were reviewed, equally distributed into groups HR and CI. Groups were homogenous with regards to the demographic profile and the basal hemodynamic assessment. Episodes of hypotension presented frequently; patients presenting at least one episode were equally distributed between groups, 19 (79%) in HR and 17 (70%) in CI, with a mean of two episodes per patient in both groups. Patients presented dizziness or transient nausea in only 8 case (33%) in HR and 11 (45%) in CI. CDs were uneventful and newborns admitted to ward without any complication. Postoperative maternal recuperation presented uneventfully in every case. Data about pharmacologic treatment are showed in Table 1; differences were not statistically significant. Anticholinergic or vasodilator drugs were not needed.
Conclusion(s): We have not found differences with regards to the main outcomes. We can conclude that HR and CI are equally effective in guiding vasopressor management for hypotension treatment during CD.

	GRUPO HR	GRUPO CI	p
Phenylephrine (mg)	2,5	2	0,27
Ephedrine (patients/%-mg)	7/29 - 12,1	8/33 - 11,8	1
Coloids (patients/%-ml)	4/17 - 400	2/8 - 300	0,66
Crystalloids (ml)	818	814	0,95

[Table 1]

References:
1. Klohr S, Roth R, Hofmann T, Rossaint R, Heesen M. Definitions of hypotension after spinal anaesthesia for caesarean section: literature search and application to parturients. Acta Anaesthesiol Scand 2010; 54: 909-21
2. Loubert C. Fluid and vasopressor management for Cesarean delivery under spinal anesthesia: continuing professional development. Can J Anaesth 2012; 59: 604-19

4AP5-7

Ultrasound assessment of gastric content in peripartum patients

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Background and Goal of Study: Obstetrical patients are usually known to have a high aspiration risk, however less than 10% of french anesthesiologists actually perform a rapid sequence induction for procedures during labour and in the immediate postpartum. The aim of this prospective study was to assess the gastric content using gastric ultrasonography in the laboring woman and in the immediate postpartum period, in order to establish the diagnosis of full-stomach and assess the risk of aspiration.
Materials and Methods: In this prospective observational study, two ultrasonographic examinations were performed in each patient, at the onset of epidural analgesia and immediately after childbirth. Antral cross-sectional area (CSA) was measured, difficulty of performance was assessed with a numerical scale, and factors which could influence gastric content were collected. The cut-off value for the diagnosis of full-stomach was taken as 340 mm^2 [1].
Results and Discussion: One hundred women were enrolled in the study. Median antral CSA was 469 mm^2 [421 - 511] at epidural insertion and 427 mm^2 [357 - 475] after delivery. Antral CSA was ≥340 mm^2 in 71% of women at epidural insertion versus 65% after delivery. Gastric ultrasonography was significantly more difficult to perform in pregnant women than immediately after delivery (mean difficulty score 4.7±2.9 vs 2.6±1.9, p<0.0001), ten measures where impossible to obtain during labour.
We often noted the presence of an antral compression by the gravid uterus during labour. The intensity of pain at the time of inclusion was significantly associated with a full stomach (p= 0.0127) in a multivariate analysis. Gastric ultrasonography may be at risk of under estimating gastric content during labour because of the compression of gastric antrum by the gravid uterus. This compression distorts the stomach and may lead to an unreliable antral cross-sectional area.

However, in the immediate postpartum period, when gastric compression no longer exists, it is a useful tool for gastric volume assessment.
Conclusion(s): This procedure may be useful in estimating the risk of aspiration in patients needing general anesthesia or sedation in this context.
Reference: 1. Anesthesiology 2011; 114:1086-92

4AP5-8

Our experience with temporal measurement of changes in cardiac output using a non-invasive cardiac output measurement device during epidural analgesia during labor in a pregnant woman with congenital heart disease: a case report

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Background: Painless delivery by epidural analgesia is a useful technique for pregnant women with heart disease during labor. ICON® (Osypka Medical, Germany) is a noninvasive cardiac output (CO) measurement monitor. We used it to continuously monitor CO during labor in a pregnant woman with congenital heart disease.
Case report: The subject was a 27-year-old primigravida with a ventricular septal defect for whom delivery using epidural analgesia was planned. ICON® electrodes were attached following onset of regular uterine contractions. Regarding epidural analgesia, a catheter was inserted between the third and fourth lumbar vertebrae. The baseline values prior were as follows: blood pressure (BP), 110 mm Hg; heart rate (HR), 60/min; CO, 10.6 L/min. As the initial dose, 5 mL of 0.1% ropivacaine with 25μg fentanyl added was injected. Subsequently, 0.1% ropivacaine with 1 μg/mL fentanyl added was provided as patient-controlled analgesia (PCA).
Following the initial dose, although no changes were observed in BP or HR, decrease was noted in CO. The maximum CO further decreased by 35% relative to baseline, and gradually returned to baseline levels. Vaginal delivery was successfully achieved. Oxytocin and others were administered due to uterine atony, and the estimated blood loss was 463 ml. CO rapidly increased following delivery, but decreased to baseline levels within 15 minutes.
Discussion: Although CO increased following delivery due to increases in circulating blood volume resulting from uterine contractions, it was thought to have decreased due to bleeding immediately thereafter. CO was expected to have again increased due to uterine contractions following hemostasis.
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1. Armstrong S, et al : Minimally- and non-invasive assessment of maternal cardiac output: go with the flow! Int J Obstet Anesth. 2011 Oct;20(4):330-40
2. James CF et al: Cardiac output in women undergoing cesarean section with epidural or general anesthesia. Am J Obstet Gynecol. 1989 May;160(5 Pt 1):1178-84
3. G. Lorello, et.al :Peripartum cardiomyopathy: postpartum decompensation and use of non-invasive cardiac output monitoring. Int J Obstet Anesth. 2014 Feb;23(1):66-70.
Learning points: Continuous monitoring of CO using ICON® is a simple procedure and a noninvasive technique. ICON® provides an effective monitoring procedure during labor for pregnant women with heart disease.

4AP5-9

Characteristics of women needing ephedrine for hypotension treatment during elective cesarean delivery under spinal anesthesia

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Background: Hypotension during Caesarean Delivery (CD) under spinal anesthesia presents an incidence of up to 71%[1]. Phenylephrine is today considered as the vasopressor of choice for this situation, although ephedrine may be preferable when Heart Rate (HR) and Cardiac Index (CI) descend. Up to now, there is a lack in our knowledge about the profile of women needing ephedrine for hypotension treatment.
Methods: We reviewed perioperative data of women undergoing spinal anesthesia for elective CD, where hemodynamic monitoring was employed (Nexfin, Bmeye-Edwards). We searched for cases where ephedrine was employed as rescue vasopressor for hypotensions refractory to phenylephrine. Medical histories as well as hemodynamic profiles were examined for characteristics that might have influenced the need for ephedrine.
Results: We reviewed 229 histories. In all cases phenylephrine was employed as prophylactic treatment, but in 79 women (34.5%) ephedrine was needed to treat persistent hypotension. With a subgroup of 83 patients, we observed that ephedrine was required especially before fetal delivery, with only 7 patients (8.4%) treated after that. Women receiving ephedrine were older (36 vs. 34 years) and they tended to obesity (weight 83 vs. 76 kg; body mass index 33.5 vs. 28.5 kg/m^2). Moreover, women with multiple gestations were more inclined to require ephedrine (20% vs. 10% in single gestations). Basal hemodynamic profile revealed substantial differences: where ephedrine was required, basal CI was lower (3.9 vs. 4.4 L/min/m^2) and systemic vascular resistances increased (2049 vs. 1940 dyne.sec^2.cm^{-5}.m^2). Women treated with ephedrine had large blood loss (841 vs. 608 mL) and required more uterotonics (7.5 vs. 6.8 IU of oxytocin; 25.3% vs. 5.3% of women requiring methylergometrin as second-line uterotonic).
Conclusions: In accord to this analysis, ephedrine might be considered as first-line drug for hypotension's treatment when facing aged and obese pregnant women, especially with multiple gestations. This could be due to reduced cardiac performance, hypovolemia or augmented obstacle to venous return. The interpretation about uterotonics is harder, because obesity and multiple gestation are also risk factors for uterine atony.
Reference:
1. Klohr S, Roth R, Hofmann T, Rossaint R, Heesen M. Definitions of hypotension after spinal anaesthesia for caesarean section: literature search and application to parturients. Acta Anaesthesiol Scand 2010; 54: 909-21

4AP5-10

Maternal hypotension prevention after crystalloid versus colloid load following epidural analgesia for labor

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Background: Prevention of hypotension after epidural analgesia for labor remains a challenge for anesthesiologists.[1] The purpose of this study was to evaluate the effect of colloid and crystalloid preload upon maternal arterial pressure and its fetal repercussion after epidural analgesia for labor.
Material and methods: One hundred and eighty-eight healthy laboring women with a singleton cephalic fetus and requesting epidural analgesia were included in this cohort study. Epidural analgesia was achieved with 7-13 milliliters of 0.25% bupivacaine and 50 mg fentanyl. The patients were allocated in two groups: In the crystalloid group, 750 ml of lactated Ringer's solution (LR) was infused in 10 min before the epidural test dose and 250 ml of 6% hydroxyethyl starch 130/0.4 (HES) in the colloid group. Hypotension was defined as 20% drop in systolic blood pressure (SBP) from baseline or a SBP less than 100 mmHg and was treated with 250 ml of 6% HES or 250 ml of LR in the HES group and the LR group, respectively. If necessary, intravenous vasopressors were given. On arrival in the delivery room, maternal blood pressure, maternal heart rate (HR) and fetal HR were taken before and after fluid preload. Those parameters were also recorded at 1, 3, 10, 20 min after initial dosing of epidural analgesia and every 30 min until delivery. Nausea and vomiting were also recorded. Neonatal outcome was evaluated by APGAR scale and we obtained venous umbilical cord blood gases of the newborn.
Results and Discussion: After epidural analgesia, the incidence of maternal hypotension was 2,1% in HES group and 12,8% in LR group. Vasopressor requirement was lower in HES group than in LR group. The incidence of nausea or vomiting was similar in both groups. Maternal SBP and mean BP remained significantly higher after preload and 20 min after epidural analgesia in HES group than in LR group. Neonatal outcome was similar in both groups, but umbilical vein pO2 and hemoglobin were higher in HES group than in LR group. Recent studies showed that an optimal prophylactic volume loading and the maintenance of plasmatic colloid oncotic pressure are basic to prevent maternal hypotension after neuraxial anesthesia.[1,2]
Conclusion: HES preload, compared to LR preload, reduced the incidence of maternal hypotension following epidural analgesia for labor. Neonatal umbilical vein pO_2 and hemoglobin were higher in HES group than in LR group, suggesting a better oxygen delivery to the fetus.

4AP5-11

Impact of ephedrine and phenilephrine on maternal and fetal outcome during management of hypotension after spinal anesthesia for cesarean delivery

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Background and Goal of Study: Phenylephrine and ephedrine are both used to control maternal arterial blood pressure during spinal anesthesia for cesarean delivery. We designed a prospective study to compare the efficacy and safety of phenylephrine and ephedrine on mother and baby, during the management of hypotension on spinal anesthesia for cesarean delivery.
Materials and Methods: In this prospective study, we enrolled 101 healthy pregnant women ASA I (randomly divided in two groups), during the 2 years 2013-2014, undergoing elective caesarian delivery under spinal anaesthesia. Exclusion criteria were: active labor, chronic hypertension and preeclampsia. Assessed outcome variables were: **maternal** hypotension, nausea, vomiting, decreased consciousness level, bradycardia, as well as the **neonatal** umbilical cord blood pH values and Apgar scores minute 1 and 5. Hydration was applied with 1500ml of Ringer's lactate before spinal anaesthesia. Spinal anaesthesia was performed in the sitting position at L3-L4 interspace using G26 needle. We used 15mg hyperbaric bupivacaine with 0.2mg morphine and 10μg fentanyl. Hypotension was treated with (Gr. 1 = nr 51 patients): ephedrine 5mg bolus, followed by 1mg/min infusion, or (Gr. 2 =nr 50 patients) phenilephrine 100μg bolus, followed by 16μg/min. Maternal Systolic Arterial Pressure (SAP) was measured at baseline before anaesthesia and every minute after spinal anaesthesia until delivery, heart rate continuously. Data were analyzed using the SPSS 15.0. $P<0.05$ was considered significant.
Results and Discussion: Maternal outcome measures: **maternal** *hypotension,* there was no difference in treatement of hypotension between ephedrine and phenilephrine groups ($p=0.42$), *bradicardia* was present more in phenileprine group, but without significance ($p=0.6$). There was no difference between two groups on maternal *nausea* ($P=0.57$), vomiting ($P=0.25$) and *decreased consciousness level* ($p=0.06$). **Neonatal** outcomes: there was no difference between two groups on *Apgar score* at min 1 ($p=0.61$) and min 5 ($p=0.20$). Neonates of mothers who received phenylephrine had higher umbilical arterial *pH values* than those with ephedrine ($p=0.01$), but the risk of true fetal acidosis (pH u. arterial <7.2) was similar in both groups ($p=0.06$).
Conclusion: Our data suggested no difference on maternal and fetal outcome, between ephedrine and phenylephrine on efficacy for management of hypotension after spinal anesthesia for cesarean delivery.

4AP5-12

HES 130/0.4 versus Ringer´s lactate solution for volume preloading during spinal anaesthesia with ropivacaine for elective caesarean section

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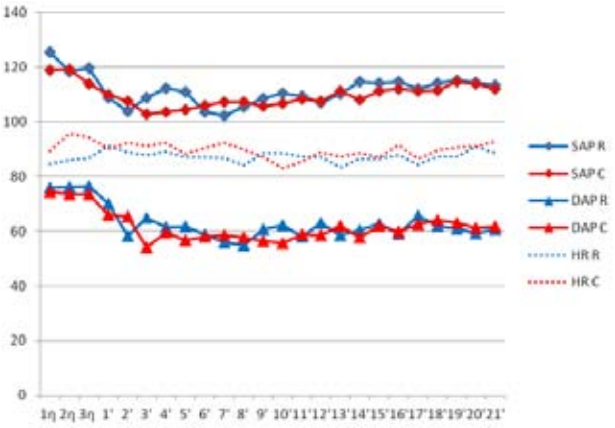
Background and Goal of Study: All epidural or spinal techniques using local anaesthetics cause peripheral vasodilation and hypotension posing a major clinical problem during elective caesarean section. Although various fluid preloading regimens together with vasopressors have been used to reduce its incidence, very few studies have been conducted using ropivacaine as the local anaesthetic of choice. The purpose of this randomized double blinded study was to investigate the efficacy of volume preloading with either hydroxyethylstarch (HES) or Ringer's Lactate (RL) solution on maternal hemodynamic stability and neonatal outcomes during spinal anaesthesia with ropivacaine 0.75%.
Materials and Methods: 60 healthy term women scheduled for caesarean delivery were randomly assigned to receive either 15 ml/kg RL (Group R) or 7ml/kg HES 130/0.4 preload (Group C) within 15 minutes just prior to combined spinal epidural (CSE) anaesthesia in the L3-L4 interspace. Baseline heart rate, systolic (SBP) and diastolic (DBP) blood pressure were recorded in the left lateral tilt position. Spinal anaesthesia was induced with ropivacaine 12 mg (1.6 ml 0.75%) and fentanyl 15 μg. Maternal hypotension defined as a 20% reduction in SBP from the baseline, and severe hypotension (SBP<80 mmHg) were treated with 5 and 10 mg ephedrine boluses, respectively. All recordings were continued every minute for 20 minutes. The incidence of hypotension, ephedrine use, umbilical cord blood gases and Apgar scores at 1 and 5 minutes after delivery were recorded.
Results and Discussion: Patient demographics in both groups were comparable. The incidence of hypotension, mean ephedrine dose (13 mg Group R vs 10.8 mg Group C) and maternal nausea or vomiting was similar in both groups. There were no differences among the two groups in neonatal outcomes.
Conclusion(s): In healthy patients with full-term pregnancy, volume preloading with HES compared to RL did not significantly improve the prevention of hypotension and the need for ephedrine during CSE anaesthesia for elective caesarean section. Perhaps these preload regimens did not compensate reductions in arterial blood pressure after CSE anaesthesia due to the use of ropivacaine as compared to hyperbaric bupivacaine therefore necessitating the combined use of vasopressors.



[Graph 1]

4AP6-1

Emergency EXIT

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Background: Ex-utero intrapartum treatment (EXIT) is performed to allow airway management in a fetus with complex airway disease. We describe a case of a large neck tumour extending into the fetal chest causing lung compression and mediastinal shift that required emergency treatment.
Case report: 30yr old healthy multiparous had the fetal abnormality diagnosed at routine 20week scan and then confirmed by MRI. A category 3 LSCS and EXIT was undertaken at 37 weeks, a day prior to elective procedure, due to persistent abnormal CTG. In theatre, two large bore intravenous cannulas and a radial arterial line inserted. RSI was performed with 375mg thiopentone, 60mg rocuronium and a size 7.0 COETT. Anaesthesia was maintained with oxygen, nitrous oxide, sevoflurane to MAC 1 and remifentanil infusion. Terbutaline infusion at 100mcg/hr was commenced immediately after induction and doubled following start of surgery. Uterine incision was made 24min later and the head was delivered 1min later and the liquor was replaced by instilling warmed hartmanns solution. The neonate's trachea was intubated by the ENT and neonatal team using a Glideoscope. Terbutaline was stopped immediately after cord clamping. Total time for terbutaline infusion was 29 minutes. Aggressive third stage management included all routine uterotonics and a Bakri balloon. Total blood loss was 1000ml with no haemodynamic instability.
Discussion: The major concern in the EXIT procedure is placental separation with partial fetal delivery and potential for massive haemorrhage with exaggerated uterine atony. Traditional techniques to provide uterine relaxation including high concentration volatiles, nitroglycerin infusion, subcutaneous terbutaline and magnesium are reported [1]. The use of a terbutaline infusion has not been described. We found terbutaline infusion provided optimal surgical conditions. Uterine atony was managed actively, which resulted in less than anticipated blood loss compared to local previous experience with subcutaneous terbutaline.
Learning Points: Our multidisciplinary team preparation, planning and learning from previous cases enabled us to deal with this complex procedure in an emergency with good outcomes. Secondly, we feel that terbutaline infusion can be used safely and effectively if the third stage is managed meticulously.

4AP6-2

Successful liver transplantation due to fulminant hepatic failure and salvage delivery in an 8-week pregnant woman: a case report

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Background: Fulminant liver failure during pregnancy is an unusual but dramatic event as there are two lives involved. In most of the cases reported up to date, liver transplantation in pregnant women shows satisfactory maternal outcomes while fetal survival is poor.
Case report: A 26 year-old Asiatic woman (8 weeks of gestation) with a background of a previous HBV infection resolved and an adult Still disease whose treatment was discontinued on admission, was referred to our hospital due to an acute hepatitis. She had fever and jaundice without any abdominal pain. Laboratory tests revealed elevated liver enzymes, high bilirubin, coagulopathy, persistent hypoglycemia and elevated ferritin levels. Over the following days, the patient´s hepatic function progressively declined and she gradually developed stage III encephalopathy. Emergency orthotopic split liver transplantation from a brain-death donor was performed 5 days later. Fetal heartbeat was confirmed during the perioperative period. The graft function recovered over the next 5 days. Viral, metabolic and vascular etiologies were excluded and final diagnose, via a non-specific biopsy, was autoimmune versus cryptogenic hepatitis. Despite of the poor prognosis she carried on with pregnancy. At 34 weeks gestation, she underwent instrumental delivery as labour was started after premature rupture of membranes. She gave birth to a premature baby with respiratory distress, non-isoimmune jaundice and germinal matrix haemorrhage, resolved in the first month of live. After 2 months, both mother and child maintained a good general condition.
Discussion: This case is full of interest as it´s one of the few cases reported in the literature with successful liver transplantation during first trimester of pregnancy with no consequences in the newborn. Also, it presents an etiological interest: considering an autoimmune origin of the acute hepatitis, Still´s disease is very unusual to produce an hepatic fulminant failure, even more during pregnancy.
References:
1. Vinaya C.Maddukuri, Courtney D. Stephenson et al. Liver Transplantation for Acute Liver Failure at 11-Week Gestation with Successful Maternal and Fetal Outcome. Case Rep Transplant, vol 12, Article ID 484080.
2. Özgür Harmanci, Taylan Kav et al. Successful Management of severe acute liver disease related with adult-onset Stil´s disease in a pregnant patient. TJG 2013; 24(1):61-64.
Learning points: Anaesthesic management for liver transplantation in pregnancy women

4AP6-3

Obstetric spinal anesthesia performed by residents: what is the role of obesity?

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Background and Goal of Study: Maternal obesity is a challenging factor for obstetric anesthesia and may increase the time required for succesful block induction. Our primary aim was to compare time required for subarachnoid puncture during single shot spinal block performed by residents in obese and non-obese parturients undergoing cesarean section. Our secondary aims were to compare puncture characteristics, complications and success of spinal anesthesia.
Materials and Methods: Following ethical committe approval (2013/1749) and informed consent of participants, 344 parturients undergoing cesarean section between December 2013-November 2014 were enrolled in this prospective, observational study. Residents palpated spinous process, iliac crests (good, poor, none) and evaluated back flexion (convex, straight, concave) after which they attempted spinal puncture using 25G needle via introducer. Time required for cerebrospinal fluid puncture (T), needle reinsertion and redirection, puncture depth, presence of traumatic puncture or paresthesia, need for help of staff anesthesiologist and success of spinal anesthesia (no need for analgesics or conversion to general or epidural anesthesia) were documented. Patients were categorized according to BMI [obese (BMI≥40 kg/m^2) (n=43) and non-obese (BMI< 40 kg/m^2)(n=301)]. Data are given median [25th-75th percentiles], mean±SD, number (%). Categorical data were compared with chi-square. Student t and Mann Whitney U tests were utilized according to data distrubution.
Results and Discussion: T was longer in obese (2 [1.45-7]) compared to non-obese patients (1.5 [1-3] min)(p=0.001). Puncture depth was increased in obese (75.9±13.1mm) patients compared to non-obese (52.7±7.2mm) (p<0.001). Reinsertion and redirection attempts were increased in obese (1[1-2], 3[1-6]]) compared to non-obese (1[1-1], 2[1-3];p<0.001). Traumatic puncture, paresthesia incidence and need for help were increased in obese patients. Spinous processes were nonpalpable in 7.3% of non-obese and 44.2% of obese patients (p<0.001). Iliac crests were nonpalpable in 6.6% of non-obese and 34.9% of obese patients (p<0.001). Data for back flexion were similar between the groups.Success was similar between obese and non-obese patients (35 (81.4%) and 265 (88%) respectively).
Conclusion(s): Although obesity doesnot influence success of spinal anesthesia, it results in more difficult punctures for residents and increases time required for CSF puncture.

4AP6-4

Diagnosis of HELLP syndrome. Where are we?

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Background and Goal of Study: HELLP syndrome is a severe and rapidly progressing condition which requires distinct diagnostic considerations. The goal of the study was to evaluate the means of diagnostic criteria applied for HELLP syndrome diagnosis and assess their impact on the maternal and neonatal outcomes.
Materials and Methods: A retrospective observational cohort study was carried out using medical records of tertiary perinatology center with the diagnosis of HELLP syndrome from the period of time between 2005 and 2013. The patients who fit the HELLP syndrome diagnosis were grouped by Mississippi-Triple Class system. Means of diagnosis and treatment outcomes were analyzed within those groups.
Results and Discussion: Among the 45 patients with HELLP syndrome included in the study, 58% (n=26) fit the HELLP syndrome criteria and 42% (n=19) had partial HELLP syndrome. Within the HELLP syndrome group 30,8% of patients fitted Class 1, 53,8% and 15,4% had Class 2 and Class 3 HELLP syndrome respectively. During the hospital stay in 34,6% (n=9) of cases the patients' condition worsened. In our study severe preeclampsia was present in 96,2% (n=25) of cases of HELLP syndrome and 100% (n=19) of cases of partial HELLP syndrome. However the level of blood pressure did not correlate with the severity of patients' condition (p=0,656, X^2=18,835). The clinical presentation varied within all classes and the only objective mean of diagnosis and evaluation of progression of the syndrome were laboratory tests. The treatment was based on the Mississippi protocol:
(1) magnesium sulfate,
(2) blood pressure control and
(3) intravenous dexamethasone.
Delivery of the fetus is the only etiological treatment. Mean time from admission to delivery was 27,5 (±27,5) hours in the group with HELLP syndrome and 38,6 (±65) hours in the partial HELLP syndrome group. Due to active multidisciplinary management complications developed only in 2 cases (1-cerebral hemorrhage; 2-renal and hepatic failure) of all of the patients. There were four (15,38%) cases of perinatal death in the HELLP group.
Conclusion(s): HELLP syndrome is a multiorganic disorder of pregnancy whose diagnosis should be based on biochemical laboratory evidence. Vigilance in suspicion and recognition of HELLP syndrome and appropriate treatment are essential to ensure better maternal and neonatal outcome.

4AP6-5

The effect of intra-abdominal pressure in the development of hypertension in a pregnant patient

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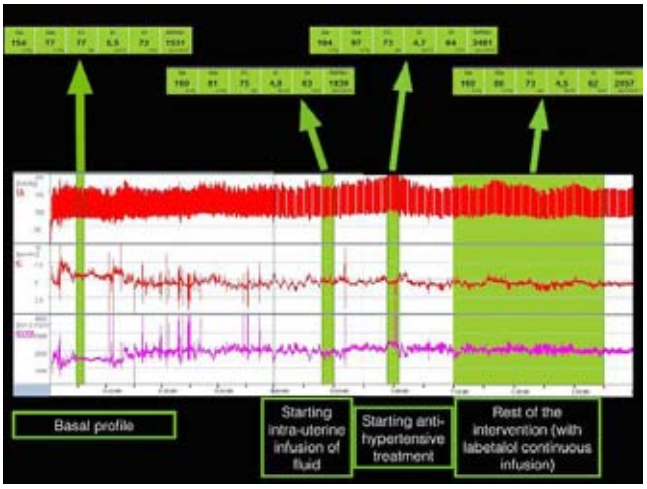
Background: Gestational hypertension/preeclampsia (PE) is a frequent condition during pregnancy. Intraabdominal hypertension (IHT) has been proposed as a possible mechanism*(1)*. Despite the definition and graduation of IHT in recent guidelines*(2)*, "physiologic" IHT during pregnancy was not covered.
Case report: Women 36 y.o. with multiple pregnancy (triple bicorial-triamniotic) was diagnosed with umbilical artery intermittent diminished end-diastolic flow with cerebral vasodilation leading to selective intrauterine growth restriction of the second twin. Percutaneous ecography-guided cordon occlusion was programmed.
Epidural anaesthesia with Lidocaine 1% (10 ml) + Levobupivacaine 0.25% (4 ml) and sedation (TCI Propofol+Remifentanyl) was used. Non-invasive hemodynamic monitoring was performed using Nexfin®. After 200 cc saline uterine infusion, she developed difficult to treat arterial hypertension (AHT) (BP: 194/97, HR:73; SVR:2481).
Urapidil (20 mg) + Labetalol (31 mg infusion) were used. Labetalol was required in postoperative care.



[Nexfin® Graphic]

Discussion: AHT in preeclampsia is assumed to be mediated by a uterus-placental ischemic mechanism owing to vascular abnormality in maternal spiral arteries, due to impaired decidual implantation*(3)* ("inside-outside" mechanism). We present a case of difficult-to-treat AHT after a rapid intraabdominal volume infusion. We hypothesize that this increased uterine arterial pressure ("outside-inside" mechanism), which can support that increased intraabdominal pressure is involved in the genesis of preeclampsia.
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Learning Points: *IHT as possible cause of PE*

4AP6-6

Successful peri-operative management of pregnancy with aplastic anemia undergoing elective lower uterine ceserean section

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Background: Pregnancy in a case of Aplastic Anemia is an extremely rare and difficult to manage due to the life threatening episodes of bleeding and infection. Only a handful of cases have been reported with majority of them terminating into unsuccessful pregnancies.
Case report: 24 yrs old primigravida refered from Bhutan at 32 weeks of gestation had presented with hematuria, gum bleeding and mild breathlessness on mild exertion (NYHA - III). Her initial routine blood investigations revealed Pancytopenia (Hemoglobin - 3gm%, TLCount:- 940cells/mcL, DLC (%):- N18 L79 M02, Platelet count:- 0.60 lac/mcL), Bone marrow biopsy confirmed Aplastic anemia. She received strict barrier nursing, IV Cyclosporin -A, IV Filgrastim (G-CSF)and she was transfused with Platelets, Packed Red Blood Cell (PRBC) & Fresh Frozen Plasma (FFP) along with IV Ertapenem & IV Posaconazole. Daily foetal monitoring was done by USG & CTG. At 34th week of gestation she was posted for elective LSCS which had to be rescheduled due to Low platelet count (0.04 lac/mcL) and complaints of melena. She was optimised with platelet transfusion and reposted for elective LSCS after 7 days with (Hb - 8.3gm%, TLC - 1470 cells/mcL, Platelet Count - 0.55 lac/mcL) GA was administered with Rapid Sequence Induction and maintained with O2, sevoflurane and Fentanyl. Intraoperative she eventually recieved 5units of Platelets, 2units FFP and 1500ml of Ringer lactate. She delivered a live male child weighing 1970gms with APGAR score of 6, 8, 9 at 1min 5min & 10min respectively. The baby had shallow breathing and weak cry and required Bag Mask Ventilation for 30sec. The child was found to have syndactyly of 4th & 5th digit of the Rt.foot. Post-operatively the patient complained of Blurring of vision and had raised Blood Pressure and an episode of seizure which was managed with IV Magnesium sulphate. She furthered required more Platelet (23units) and PRBC (3units) transfusion and was discharged with her baby 45 days following admission.
Discussion: Pregnancy associated with aplastic anemia is a rare and potentially life threatening disease which if managed adequately has a relatively good prognosis for both mother and child.
References:
1. Stibbe et al. JOMCR 2011, 5:66
2. K.W.Leong et al.*Postgrad Med J* 1995 71: 625-627
Learning points: Barrier Nursing and Transfusion of blood products being the backbone of treatment, followed by Immunosuppressant, newer G-CSF drugs and Antibiotics which play a major role in the management.

4AP6-7

Acute fatty liver of pregnancy: a critical case of hepatic failure

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Background: Acute fatty liver of pregnancy (AFLP) is a rare and potentially life-threatening complication which tends to manifest in the third trimester of pregnancy. It's incidence is rare (1/16,000 pregnancies) but if untreated, AFLP can lead to coagulopathy, fulminant hepatic failure, multiple organ dysfunction and death.
Case report: 28-year-old insulin-dependent diabetic hypothyroid patient primigravida at 38-week of gestation admitted for scheduled delivery. 2 weeks before she had a total bilirubin 1.3 mg/ml, GOT-91 U/L, GPT-63 U/L without associated abdominal pain nor coagulopathy. Vitals were stable and epidural catheter was put in place. During labour induction foetal developed a distress and required an emergency caesarean. Patient suffered a massive bleeding which required multiple blood, plasma, platelets and fibrinogen transfusions, vasoactive drugs and several uterotonics. Hysterectomy was needed to control bleeding. Blood test results: APTT 116s, INR 2,61, glucose 40 mg/dl, Platelets 40,000mm, total bilirubin 5mg/dl, metabolic acidosis with acid lactic 10 mmol/L. Patient was shifted to ICU under sedation, mechanical ventilation and vasoactive drugs. 3h later anuria and hypotension appeared and ecofast showed haemoperitoneum so urgent surgery was performed without any bleeding point detected. Blood products, recombinant factor VII and

tranexamic acid were administered. Lactic acidosis, severe coagulopathy, hypothermia and hypoglycaemia continued alongside hemodynamic support, HFVVC, polytransfusion and glucose infusion during the next 2 days so liver failure was suspected. Finally she was moved to a hospital with liver transplantation possibility. 12h later a total body TC showed bilateral intraparenchimal haematomas with herniation signs. She died 24h later.
Discussion: AFLP is not usually considered because it's rare and its atypical presentation with abrupt evolution of several complications resulting in multiple organ failure. For this reason, according to recent publications, it needs early diagnosis and prompt termination of pregnancy, resulting in better maternal and foetal outcomes*. If suspected, supportive medical management with platelets, plasma transfusions and cryoprecipitate are needed in order to correct DIC.* When medical treatment fails liver transplantation can be considered but few cases are described.
Learning points: *This report could help us to consider AFLP and implant early interventions which can improve outcomes*.

4AP6-8

Direct implications for obstetric anesthesia in cord blood donations

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Background: Umbilical cord blood (UCB) donation is a source of hematopoietic progenitors that has spread in the population very quickly and with a large contribution of maternal education by primary care midwives and delivery unit.
Most of UCB units are not donated due to ignorance and in some cases because pregnant women did not kept regular checks during pregnancy.
Objetive: Influence of obstetric anesthesia chosen by the mother as a determining factor when UCB unit is donated.
Material and Methods: We analyzed a full day delivery unit emphasizing the desire of pregnant women towards donating UCB, how the termination of labor developed and how it influenced the analgesic on these aspects.
We performed a descriptive study in 21 pregnants who gave birth on that day. All patients were asked if they wanted to donate UCB before anesthetic intervention and dubious patients were explained about the importance of this donation.
In all cases we let them choose obstetric analgesia they wanted.
Continuous epidural infusion of bupivacaine (0,125%) - fentanyl (1mcg/ml) was used in our patients.
We analyzed the completion of delivery, the effectiveness of epidural anesthesia and if there was a donation or change of opinion about it.
Results: 15 patients of 21 donated. 4 of them wanted donation irrefutably, 3 rejected the donation, and 14 initially doubted.
The 4 who wanted to donate: cesarean section was performed under spinal anesthesia on 2 patients, and the other 2 had a normal delivery under epidural analgesia.
The 14 who initially doubted: we found that 12 of them wanted epidural analgesia.
Of these, instrument-assisted vaginal delivery was performed in 3 cases, cesarean section in 2 cases, and eutocic delivery in 9 cases. UCB was donated in all cases. The other 2 pregnants who doubted, they rejected the epidural and did not donated. Cesarean section was performed under general anesthesia on 1case, and eutocic delivery on 1case.
Conclusion:

- Epidural or spinal analgesia with success and satisfaction becomes a highly influential factor in donating UCB.
- The greater tendency to eutocic or instrumental delivery under epidural anesthesia makes the good work anesthetic influence in the donation and this act is a multidisciplinary and multicentric work to get open road to donate UCB for transplantation parents and/or regenerative therapies development.
- This work is focused on further studies with larger sample sizes and possible anesthetic interaction with the quality obtained in cord blood.

4AP6-9

Emergency cesarean section in a patient with delayed diagnosis of hemolytic uremic syndrome: a case report

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Background: Microangiopathic disorders in pregnancy present a challenge for both the Obstetrician and the Anesthesiology, concerning diagnosis and therapeutics. We report a case where the patient presented to an emergency cesarean section, and in the intensive care unit, we confirmed the diagnosis of HUS.
Case report: A twenty-one year-old-primigravid (37 weeks) came to our emergency ward complaining of non-productive cough, throat pain, intense myalgia, shivering, dysuria and fatigue. She had also a progressive dyspnea, vomiting and diarrhea. The symptoms started two days earlier. Clinical exam showed regular general state and 20 breaths per minute; she was hydrated, anicteric and afebrile
(36.7 °C, axillary measure). Oxygen saturation was 88% in the room air, increased to 93% with supplementary oxygen, through a nasal catheter. As the cardiotocography evidenced non-reassuring fetal status, with late deceleration, the obstetricians indicated an emergency cesarean section.
Discussion: We had three hypotheses when the cesarean was indicated. First, severe urinary tract infection resulting in hemodynamic profile of septic shock (previous renal lithiasis, dysuria, shivering, urinalysis). Second, HELLP syndrome without hypertension (nauseas, vomiting, myalgia, malaise). Finally, the possibility of HUS (vomiting, previous diarrhea, fatigue). We decided for general anesthesia for two reasons: we could not guarantee the coagulation status, and the hemodynamic profile seemed to be unstable. Physicians confirmed the diagnosis of HUS, in the ICU, with severe thrombocytopenia. Our approach of the case included brief preoperative assessment, good intravenous line, fluid expansion, rapid sequence of intubation, inhalational-relaxant technique with sevoflurane and cisatracurium, and postoperative recovery in ICU.
References:
1. Hemolytic uremic syndrome. Springer Berlin Heidelberg; 2014 Mar 25;:1-22.
2. Microangiopathic Disorders in Pregnancy. Elsevier Ltd; 2011 Apr 1;25(2):311-22.
Learning points: Anesthesiologists must be aware of these uncommon, but life-threatening diseases when they treat patients with little information in an emergency setting.

4AP6-10

Maternal and peripartum complications in twin pregnancy

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Background and Goal of Study: Twin pregnancy represents a multidisciplinary challenge. The incidence of maternal complications (gestational hypertension, preeclampsia, gestational diabetes) is increased; the probably of peripartum complications is also higher.[1][2] The epidural should be preferred for analgesia/anaesthesia.[3]
The aim of this study is to determine the incidence of the most common maternal disturbances during twin pregnancy and during peripartum period in a tertiary centre.
Materials and Methods: Retrospective longitudinal descriptive study of women with twin pregnancy whose birth occurred between January 2012 - December 2013. Demographic data, ASA, delivery, analgesia/anaesthesia and maternal morbidity were the studied variables. Descriptive analysis in Excel®.
Results and Discussion: Within the time interval there were 5118 births, 190 (3.7%) from multiple pregnancy. The mean maternal age was 32.7 y.o. (19-45). Forty women (42.6%) were ASA I, 48 (51.1%) ASA II and 6 (6.4%) ASA III.
There were 47 (50%) vaginal deliveries and 47 (50%) caesareans section; there were no cases of both vaginal and abdominal delivery.
The analgesia/anaesthesia option was epidural in 62 cases(66%), followed by combined spinal-epidural in 9 cases (9,6%).
The incidence of pregnancy related diseases were 18.1%: 3 cases of gestational hypertension, 11 of preeclampsia and 8 of gestational diabetes. Five women (5.3%) had both hypertensive disease and gestational diabetes.
Intrapartum haemorrhage occurred in 3 cases and we had 3 cases of post-

partum haemorrhage due to atony, corresponding to an incidence of hemorrhagic complications of 6.38%.
Conclusion(s): Multiple pregnancies corresponded to 3,7% of total births. There was a significant incidence of pathology of pregnancy and bleeding complications among this particular group of pregnant women. The epidural was the most frequent option for analgesia/anaesthesia.
References:
1. Chasen ST, Chervenak FA. Twin pregnancy: Labor and delivery. In: UpToDate, TW (Ed), UpToDate, Waltham, MA, 2014
2. Chasen ST, Chervenak FA. Twin pregnancy: Prenatal issues. In: UpToDate, TW (Ed), UpToDate, Waltham, MA, 2014
3. Barrett JF. Best Pract Res Clin Obstet Gynaecol. 2014 Feb;28(2):327-38.

4AP6-11

Acute fatty liver of pregnancy: the art of taking timely decisions by a multidisciplinary team

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Background: We present a case of Acute Fatty Liver of Pregnancy (AFLP), its anaesthetic management, with a multidisciplinary approach to reach a positive goal.
Case report: A previously healthy 50 kg, 34 years old, G2 P1 female at 34 weeks´ gestation complained of epigastric pain, nauseas and vomiting. On the day of admission she was normotensive. Her hemoglobin was 10,9 g/dl and platelet counts was normal. The prothrombin time was 32,9 s, the partial thromboplastin time was 37,5 s with an INR of 2,2. Her blood urea nitrogen and creatinine were normal. The serum glucose was 80 mg/dl, the aspartatate aminotransferase was 180 U/L, the alanine aminotransferase was 99 U/L and the total billirrubin level was 2,0 mg/dl. The abdominal sonographic examination demonstrated neither gallstones nor dilatation of the biliary ducts. A presumptive diagnosis of AFLP was made. An emergency cesarean section was performed under general anesthesia. Intraoperatively she received crystalloids and four units of FFP. At the end of the operation she was extubated after reversal. Six hours later the patient became hemodynamically unstable with decreased of hemoglobin and hematocrit and worsening of INR at 2,8. Abdominal ultrasound revealed moderate amount of free fluid in the peritoneal cavity. An emergency laparotomy was performed and 1000 ml of non-clotted blood was evacuated from peritoneal cavity, few vessels not well hemostatized were detected and sutured. She was extubated and transferred to intensive care unit for further monitoring. She remained stable with improvement of laboratory tests.
Discussion: AFLP is a rare, severe and potentially fatal condition. Early diagnosis and prompt delivery significantly reduces its complications (1). In this case was quickly assumed the diagnosis of AFPL, in this situation several specialties were called to work initially. The decision to perform c- section was timely and complications were addressed quickly.
References: 1-Differentiation of Acute Fatty Liver of pregnancy from HELLP syndrome. Minakami H, Morikawa M, Yamada T, Akaishi R, Nishida R. J.Obstet. Res Vol 40, No.3 641-649, March 2014
Learning Points: Sometimes the anaesthetist lie to the challenge of dealing with not so common diseases, and should be prepared for this challenge. Is important to know the resources we have to account and make timely decisions. In our case a multidisciplinary team participated in taking decisions, without jeopardizing the life of the patient.

4AP6-12

The effects of the stress status on the mother and newborn on emergency and elective caesarean surgery made with general anaesthesia

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Background: This study aimed to examine the relationship between the staittrait anxiety scale and mother's level of education, number of pregnancies, being followed-up and satsfaction status and the effects of the stress status of the mother and the newborn on postoperative pain in elective or emergency caesarean operations made under general anaesthesia.
Materials and Methods: After approval of local ethics committee and patient consent, 60 prospective patients, ASA I-II, aged >18yrs, at37-40weeks gestation were divided into 2 groups of Emergency (group E) and Elective (group El)C/S. Data were recorded, including educational level, previous births and type of anaesthesia, antenatal follow-up, weight gain. Preoperative anxiety was calculated with Spielberger status [STAI1] and Continuous Anxiety Inventory [STAI2]. No premedication was applied, routine anaesthesia protocol with standard monitorisation of haemodynamic measurements. Postoperative complications and VAS scores were recorded 3 times in the first 24 hours. Analgesia was applied at VAS ≥4. Apgar values of the newborns at 1-5 mins, presence of transient tachypnea of the newborn (TTN) and patient satisfaction at 24 hours were evaluated.
Results and Discussion: In the Group E, the STAI1 points ($p < 0.01$), frequency of analgesia ($p < 0.01$), amount of analgesia($p < 0.05$) and increase in anxiety (difference in STAI1 and STAI2, $p < 0.05$) were significantly greater than those of the Group El and time of first analgesia ($p < 0.01$) was significantly shorter.STAI1 points of followed-up pregnancies were significantly lower than those of the non-follow-up ($p < 0.05$). A negative correlation was determined between time of first analgesia and STAI1 points ($r=0.612$) and a positive correlation between frequency and amount of analgesia, and STAI1 points ($r=0.643, r=0.626$). TTN was observed in 3 Group E and 2 Group El. Patient satisfaction levels were poor/moderate in the Group E and good/excellent in the Group El ($p < 0.01$).In all patients, there was a negative correlation between patient satisfaction and STAI1 points ($r=0.672$).In cases with postoperative throat pain, STAI1 points were significantly high($p < 0.05$).
Conclusion: According to this data;stress was not related to education level and was lower in follow-up pregnancies, weight gain in elective cases created stress, increases in stress were greater in emergency cases, inadequate pain control in emergency cases with high levels of preoperative anxiety had a negative effect on patient satisfaction.

4AP7-1

Anesthesia for a Cesarean delivery in a patient who underwent Fontan reconstructive surgery in childhood

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Background: Due to the high long-term survival of patients who underwent Fontan reconstructive surgery, nowadays is not uncommon encounter in our practice these patients for noncardiac surgery. We review the anesthetic management for cesarean delivery in a patient who had undergone a Fontan operation in childhood.
Case report: A 30y woman, who was born with a congenital tricuspid atresia with transposition of the great arteries and pulmonary stenosis that underwent Fontain repair at age of 9 years was scheduled for elective C-section for obstetrical causes.
An epidural catheter was placed at L3-L4 vertebral interspace, and besides the usual monitoring a radial artery and central venous catheter were placed and cardiac output and vascular resistence were monitored.
To prevent hypotension slow titration of epidural boluses of 0,5% bupivacaine and 2% lidocaine were administered with a total dose of 20 ml (T4 level was achieved) and pneumatic compression stockings were used.
Glucosaline infusing at rate of 83 ml/h 8 hours before the scheduled surgery was stablished to mantain euvolemia and during the procedure 1000ml of crystalloid and 500 ml of colloids were given.
The patient remained hemodynamically stable throughout surgery without vasopressors.
After surgery, the patient was transferred to the Intensive Cardiac Care Unit for 24h. Analgesia was administered by epidural catheter and the patient was discharged home in six days.
Discussion: Fontan circulation is described as passive blood flow to the lungs which is possible because surgical anastomoses were created from the systemic venous return to the pulmonary artery bypassing the right heart. Therefore cardiac output is dependent on preload and pulmonary resistance. Epidural anesthesia has been the best choice because it reduces the risk of myocardial depression, tracheal intubation and the need to ventilate with positive pressure of general anesthesia. However, it requires aggressive treatment on the sympathetic blockade with fluid therapy and dose titration to avoid decrease preload and jeopardize passive passage of blood to the lungs. Invasive monitoring is recommended to adjust treatment according to the hemodynamic parameters.
Learning Points: The management of these patients should be multidisciplinary. Epidural anesthesia is preferred in order to minimize hemodynamic changes and invasive monitoring is an important tool that allows the anesthesiologist an early prevention and treatment of them.

4AP7-2

Anesthesia for cesarean section in a patient with peripartum cardiomyopathy

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Background: Peripartum cardiomyopathy (PCM) is a dilated cardiomyopathy, characterized by development of heart failure with documented systolic dysfunction occuring in the period between the last month of pregnancy and fifth month postpartum.It is a rare clinical condition with variable prognosis. This case presentation aims to describe an anesthetic strategy and its implications.
Case report: Woman, 35 year-old, nulliparous, 41 weeks pregnant, admitted for labor induction. She presents with respiratory failure with 4-5 days evolution. After Cardiology consultation, transthoracic echocardiography is performed, revealing a left ventricular ejection fraction of 30-35%, restrictive filling pattern and bilateral pleural effusion - interpreted as PCM.The decision was to perform urgent cesarean section. Monitored according to ASA standards plus invasive pressures. Clinical optimization with noninvasive ventilation and diuretics, with improvement after 30 minutes. Epidural catheter placed at L3-L4 interspace. Anesthesia was performed with titrated epidural boluses (3 ml) of ropivacaine plus sufentanil until adequate sensory block.Caesarean section performed without complications and the patient was taken to ICU. Discharged to Intermediate Cardiac Care Unit after 24 hours, and to obstetrics ward after 3 days. Discharged home after 9 days and referred to Cardiology.
Discussion: The choice of anesthetic strategy (general/regional anesthesia) for these cases has been object of discussion. We chose epidural anesthesia because of potential advantages:
1. sympathetic blockade allowing for a reduction of preload, afterload and cardiac work;
2. titrated administration of local anesthetics in order to avoid hypotension;
3. avoidance of the risks associated with a predictably difficult airway and "full stomach";
4. minimal cardiodepressant effects;
5. better control of postoperative analgesia.[1]The mortality of this condition varies between 9 and 32% and in half the patients ventricular function normalizes in the first six months. The case presented, to date, is part of an intermediate category of persistent but stable dysfunction.[2]
References:
1. Curr Opin Anaesthesiol. 2008;21:259-62;
2. Anaesth Intensive Care 1997;25:292-6
Learning Points: This case shows that a well-titrated regional anesthetic technique can be used in a high-risk obstetric case and also the beneficial effect of pre-operative optimization of ventricular function.

4AP7-3

Anesthesia in pregnant women with hypertrophic cardiomyopathy, a rare case

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Background: Hypertrophic cardiomyopathy (HCM) has an incidence of 0.1-0.5% in pregnancy and is an autosomal dominant inheritance[1]. The most common phenotype is an asymmetric septal hypertrophy and left ventricular outflow tract (LVOT) obstruction is present in 70%[2]. Few cases are described and the best way of delivery and the appropriate anesthetic technique remain controversial.
Case report: A twenty-six year old suffering from HCM underwent a cesarean section for steady labor at the 39th gestational week. She had family history of sudden death and carried an intracardiac defibrillator for primary prevention. Echocardiogram demonstrated mild dilation of the left atrium, marked hypertrophy of ventricular walls without LVOT obstruction and preserved bi-ventricular function. Cesarean section was performed under epidural anesthesia with 9mL of ropivacaine 0.75% and sufentanil 0.01mg, without complications. In the postoperative period, she complained of upper abdominal pain, nausea, vomiting and rash, associated with tachycardia, ST elevation without hemodynamic instability, Troponin I 0.2 ng/mL, CK-MB 7.0 ng/mL and myoglobin 129.3 ng/mL. She was admitted to an intermediate care unit and remained asymptomatic, hemodynamically stable without ECG changes or further elevation of markers for myocardial necrosis. Hospital's discharged was 7 days after delivery.
Discussion: Critical periods are delivery and the immediate postpartum period, due to activation of the autonomic nervous system, Valsalva maneuver and blood loss. There is an increased sensitivity to small changes in ventricular volumes, blood pressure, heart rate and rhythm[2]. In the literature, general anesthesia is the safest option and carries less risk in patients with severe obstruction or deterioration of their clinical condition during pregnancy[1]. The use of regional anesthesia is controversial, due to the risk of hypotension in patients with an already precariousness hemodynamic balance[1,2]. However, success has been described in patients with stable clinical condition and careful hemodynamic monitoring. A pulmonary artery catheter may apply to patients with hemodynamic instability, at the risk of complications associated with their use[1].
References:
1. Minerva Anestesiol 2007;73:313-8;
2. Neth Heart J (2013) 21:14-18
Learning Points: A monitored pregnancy in patients with mild to moderate HCM may occur without complications and regional anesthesia with success is possible.

4AP7-4

Brugada syndrome in a pregnant woman. Anesthetic management

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Background: BS is a rare genetic autosomal dominant disease which affects sodium channels of the cardiac conduction system, excluding heart structural aberrance. The prevalence of BS is up to 1/2000 , it is estimated that BS might be the cause of 4-12% of all sudden deaths without an underlying structural cardiopathy.
This disorder raises specific concerns as anesthesiologists routinely administer drugs that interact with cardiac sodium channels and therefore could trigger the development of malignant arrhythmias. There is a wide list of not to use drugs in BS. Given the fact that sodium channel blockers can provoke a EKG pattern of BS and they are used for the diagnose of this disease there is a strong concern about the use of local anesthetics among patients diagnosed with BS. Other factors may precipitate arrhythmias like vagal stimulus or fever.
Case report: Our patient is a 31 year old woman diagnosed with BS at the age of 29 in the context of a syncope attributed to a neurological event. Her basal EKG showed a BS pattern but the patient had never had an automatic defibrillation device implanted.
After a multidisciplinary discussion we decided to allow a vaginal delivery with continuous EKG monitoring without epidural labour analgesia due to the risk of triggering malignant arrythmias if a high dose of sodium channel blockers was given and under strict control of temperature and a low threshold to indicate cesarian section.
After 6 hours of labour a cesarian section was indicated due to fetal distress. We proceeded to a spinal anaesthesia using 10 mg of hyperbaric bupivacaine and 10 mcg intrathecal fentanyl. Standard non invasive monitorization was used and external defibrillation pads were placed but they weren't needed since the surgery was uneventful.
There aren´t any complications recorded in the postoperative period.
Discussion: There is scarce literature about BS in pregnant women.
There is no evidence showing that in a case of BS elective cesarian section is better than vaginal delivery.
We discuss the key points of a safe management in the setting of a pregnant women diagnosed with BS.
Reference: Cesarian section for twin pregnancy in a parturient with Brugada Sndrome" J. Bramall, A. Combeer Int Journal of Obstetric Anaesthesia 2011-04-01
Learning Points: Low doses of intrathecal hyperbaric bupivacaine might be a safe option.

4AP7-6

Influenza A and pregnancy: high risk combination

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Background: Influenza A infection has growing importance since 2009 influenza pandemic. Pregnant women were identified as a high-risk group for developing a more severe form of this infection and a higher mortality rate [1].
Case report: A 35 years old female with no comorbidities on week 35 of gestational age presents with severe respiratory impairment, which leads to require ICU admission. Influenza A is suspected and empiric treatment with antiviral and antibiotic is started.
PCR is positive for H1N1. Chest X-Ray shows bilateral pneumonia superinfection.
In spite of the important respiratory involvement, patient evolution is favorable, being discharged to the floor at sixth day. After 36h, a worsening of her clinical status happens and emergent caesarean is performed. Mechanical ventilation is needed for the first post-operative hours. The new-born presents no immediate or late complications. On next days the improvement of the status of the patient allows her definitive transfer to the floor.
Discussion: This case supports literature which describes a more severe form and more complications in pregnant infected with H1N1 [1].
Although oseltamivir is category C drug, in this scenario we considered benefits outweigh potential risk, as prompt treatment improves outcomes [2].
Infants fail to mount an adequate immune response until 6 months of age so decision of maintaining the pregnancy until clear worsening of the mother was made to try to achieve natural immunization by specific serum IgG and anti-influenza specific IgA in breast milk during lactation, which could give similar protection to fetus/newborn as if patient had been vaccinated previously [3].
References:
1. Denise JJ, Margaret AH, Sonja AR et al. H1N1 2009 influenza virus infection during pregnancy in the USA. The Lancet, Volume 374, Issue 9688.
2. Greer LG, Sheffield JS, Rogers VL, et al. Maternal and neonatal outcomes after antepartum treatment of influenza with antiviral medications. Obstet Gynecol 2010; 115:711.
3. Zaman K, Roy E, Arifeen SE, et al. Effectiveness of maternal influenza immunization in mothers and infants. N Engl J Med. 2008;359:1555-1564.
Learning points:
Pregnancy implicates by itself high risk of more severe form of disease during Influenza A infection.
In non-vaccinated patients, giving time to the pregnant to develop antibodies before delivery can be an alternative.
Benefits seem to outweigh potential risk of using Oseltamivir during influenza A on pregnancy.

4AP7-7

Infusion therapy in pregnant with severe acute respiratory viral infection and influenza

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Background and Goal of Study: ARDS is complicates the severe acute respiratory viral infection (ARVI) and influenza A H1N1 especially in pregnant. Infusion therapy is usually conducting empirically and not based on the strong scientific evidence. The aim of our study is to determine the efficiency of restrictive strategy of infusion therapy in pregnant with severe ARVI and influenza.
Materials and Methods: We conducted the literature search about infusion therapy in patients with ARDS and influenza A H1N1 in general population and in pregnant. We performed case-control study and retrospectively analyzed the histories of diseases of 49 pregnant that have died in Ukraine during the influenza A H1N1 epidemic (case) and 26 histories of pregnant who were treated in our ICU for severe influenza and ARVI during 2009-2014 years and survived (control). Patients in both groups were the same in age, gestation time, time of approach for medical care and hospitalization. Influenza A H1N1 virus was detected in 49% in case group and in 36% in control group (P=0,2845). Hemodynamic parameters and volume of infusion therapy were analyzed during hospitalization and first five days of ICU treatment. Our ICU patients routinely received about 2500 ml/day of fluid per os. Descriptive statistics were used and mean data were compared using the Student's t test and nonparametric methods.
Results and Discussion: Two different patterns of infusion management in patients with ARDS we found in literature that associated with better patient's outcome: 1) liberal infusion in hemodynamically unstable patients followed by conservative; 2) primary conservative infusion strategy in hemodynamically stable patients. We didn't find well designed studies about infusion therapy in pregnant with ARVI.
Majority of pregnant in both groups were hemodynamically stable during investigation period. The patients what died received significantly larger infusion volume in each of the first five ICU days in comparing with survived (866,3+578,5ml vs.464,6+324,2ml, P=0,004). The volume of infusion was significantly increased from the first to the fifth day (from 866,3+578,6 to 1263,75+1019,9ml (t = -2,16; P< 0,05)) in case group, and without changes in survival group.
Conclusion(s): Our data suggest that restrictive type of infusion therapy combined with an enteral nutrition and fluid appointment is feasible and effective in maintaining of adequate volemic status pregnants with ARVI. Further research is necessary.

4AP7-8

Labor analgesia in parturient with Wolf-Parkinson-White syndrome, dilated cardiomyopathy and left bundle branch block

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Background: Physiological hemodynamic changes of pregnancy modify the adaptability of the cardiovascular system in pregnant women with pre-existing heart disease. In these women, pregnancy and childbirth are additional stressors that can lead to cardiac decompensation, arrhythmias and maternal death. [1-2]
Case report: 36-year-old female, gravida 2 para 1, prior eutocic delivery, 38w+6d gestation admitted for elective induction of labor. Medical history: Wolff-Parkinson-White (WPW) Syndrome, dilated cardiomyopathy (ejection fraction about 45%), left bundle branch block, and hypothyroidism. During pregnancy she felt occasional palpitations, worsening dyspnea with exertion and chest tightness. Cardiology prepartum evaluation did not contraindicate vaginal delivery. Patient was monitored with electrocardiogram, noninvasive blood pressure and pulse oximetry during labor. Antiarrhythmic drugs and defibrillator were always available. We decided to perform lumbar epidural analgesia early, uneventful. After an initial 10 mg ropivacaine 0.1% plus sufentanil 0.010mg bolus we started a continuous epidural infusion of ropivacaine 0.1% at 8-12mL/h, according analgesics requirements. Hemodynamic stability was kept during the second stage of labor and delivery which occurred 6 hours after the onset of analgesic technique. At placenta delivery and after starting oxytocin infusion a small period of hypotension was recorded and reversed with fluid challenge. Patient remained at ICU for hemodynamic monitoring during 24h postpartum.
Discussion: In pregnancy, tachyarrhythmias related with WPW Syndrome are potentially serious and should be monitored. Pain and anxiety inherent to labor increased heart rate and stroke volume, enhancing the risk of tachyarrhythmias. On the other hand, blood volume turnovers during childbirth, especially after second stage, potentiate dilated cardiomyopathy decompensation. Therefore, a good pain control, adequate fluid resuscitation and hemodynamic monitoring in the peripartum period are critical for optimal maternal and fetal outcome.
References:
1. J Am Coll Cardiol 2009 Dec 29;55(1):45-52.
2. J Am Coll Cardiol 2011 Jul 19;58(4):337-50.
Learning points: The peripartum analgesic management in patients with dilated cardiomyopathy and WPW Syndrome can be achieved effectively and safely by lumbar epidural analgesia with continuous infusion of local anesthetic and opioid, preventing adverse sympathetic stimulation caused by pain.

4AP7-9

Perioperative management of a patient with dilated cardiomyopathy: a low dose multimodal regional anesthetic technique

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Purpose: Cardiomyopathy in pregnancy has a high mortality rate and is presenting increasingly in clinical practice. We describe a novel anesthetic approach for the management of obstetric patients with dilated cardiomyopathy presenting for operative delivery. Different regional anesthetic techniques have been described for the perioperative management of parturients with cardiomyopathy. Main aim is to avoid stress on the myocardium by avoiding sudden increase or decrease in both preload and afterload which can decompensate heart and result in morbidity or mortality.
Clinical Features: We were involved twice in the management of a case with dilated cardiomyopathy for elective caesarean section. She was managed with multimodal regional anesthetic technique incorporating a spinal mixture of low dose local anesthetic, opioids and clonidine along with epidural catheter insertion for sequential block.
Conclusion: Intrathecal use of a combined low dose mixture including bupivacaine (5mg), fentanyl (20μg), morphine (150μg) and clonidine (15μg) provided adequate operative conditions on each episode and was associated with minimal hemodynamic instability in the patient with cardiomyopathy. Epidural catheter inserted to supplement inadequate block was not required on both occasions.
Further studies will be needed to confirm these findings.

4AP7-10

Pulmonary stenosis in the delivery room

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Background: In western countries, many women with congenital heart diseases underwent heart surgery in childhood, resulting in a new subpopulation of parturients who may develop some residual valvular dysfunction [1]. Pulmonary stenosis (PS) is usually well tolerated during pregnancy[2], however there is limited data to guide their anesthetic management, specially in the delivery room [1].
Case report: A 31-yr-old primigravid presented to the delivery room at 40 wk of gestation. She had a congenital PS and valvuloplasty at 8-yr-old and remained symptomatic (easy fatigability and shortness of breath (NYHA II)). Examination revealed a grade 3/6 ejection systolic murmur, HR of 90bpm and BP of 120/80mmHg. ECG showed sinusal taquicardia and a right bundle branch. Echocardiography presented moderate PS with peak systolic gradient of 32mmHg, and normal right systolic function. This sintomatic moderat PS places her in high-risk for cardiac events. Patient was monitored with non-invasive BP, 3 lead ECG, ST segment analysis and pulse oximetry. A preloading with 500ml of lactated ringer's solution was given prior to insertion of an 18G epidural catheter (L2-L3). Small bolus of analgesic solution with ropivacaine and fentanyl was administred for T8 sensory block. A perfusion of ropivacaine 0,15% was iniciated for maintenance, with top up bolus on demand. Vaginal delivery was uneventful during which was given particular attention to hemodynamic stability. Close monitoring was maintained until discharge.
Discussion: PS increases intraventricular pressure and right ventricle's work. It is important to balance preload to optimize myocardial contractility without precipitating right heart failure and atrial arrhythmias. The goals for this patient were to maintain normal HR and normovolemia witch were achieved by slow titulation of epidural block, careful fluid loading and blood losses' management.
References:
1. Makkar et al. Anesthetic management of a parturient with severe pulmonary stenosis undergoing Cesarean section; S Afr J Anesthesiol Analg; 2010
2. Hameed AB et al. Effect of pulmonary stenosis on pregnancy outcomes - a case control study. Am Heart J, 2007
Learning points: Preconceptual evaluation by a cardiologist and ultrasound examination during pregnancy are advisable. Given that antenatal care and cardiac evaluation are assured, the desired stability for these patients is possible via vaginal delivery under regional analgesia, as long as close monitoring is guaranteed.

4AP7-11

Subarachnoid block for Caesarean delivery in a parturient with postural orthostatic tachycardia syndrome

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Background: Postural Orthostatic Tachycardia Syndrome (POTS) is an autonomic disorder of orthostatic intolerance associated with increased heart rate in the absence of orthostatic hypotension, occurring predominantly in young females. Two distinct pathophysiologic forms (dysautonomic and less commonly hyperadrenergic) have been described.[1] Tilt-table testing confirms diagnosis. Information regarding anaesthetic management of parturients with POTS for caesarean section is limited. [2,3] This case report supports the use of spinal anaesthesia, with invasive blood pressure monitoring, for operative delivery.
Case report: A 37-year-old female (gravid 2, para 1) with POTS presented with spontaneous rupture of membranes at 38 weeks gestation. During her previous pregnancy, she was investigated for seizure episodes (at 18/40 gestation, following commencement of epidural analgesia in labour and post natally), in addition to pre-syncopal events in the post-natal period. MRI brain, 24-hour holter monitoring and echocardiography were normal, however tilt-table testing confirmed the diagnosis of POTS. Antenatal anaesthetic pre-assessment had been undertaken during this pregnancy for scheduled elective caesarean delivery. Literature review yielded limited information regarding anaesthetic preference for operative management. Following establishment of intravenous access, radial arterial line insertion, and fluid loading, we elected to perform spinal anaesthesia. A phenylephrine infusion was commenced, targeting a MAP of 65mmHg. An initial single episode of tachycardia with hypotension responded promptly to minimum phenylephrine boli. The remainder of the procedure and the recovery period were uneventful.
Discussion: Central neuraxial anaesthesia may precipitate significant haemodynamic changes in the parturient. This case demonstrates that by anticipating the haemodynamic challenges encountered in the parturient with POTS, spinal anaesthesia may be safely used for operative delivery.
References:
1. Grubb B. Postural Tachycardia Syndrome. Circulation 2008; 117:2814-17
2. Kimpinski K ret al. Effect of pregnancy on Postural Tachycardia Syndrome. Mayo Clin. Proc. 2010; 85(7):639-644
3. McEvoy M et al. Postural Orthostatic Tachycardia Syndrome: Anesthetic Implications in the Obstetric Patient. Anesth Analg. 2007; 104:166-7
Learning Points: Safe use of spinal anaesthesia in the parturient with POTS is possible once the associated haemodynamic changes are anticipated and managed.

4AP7-12

The role of anaesthesiology in a multidisciplinary management of a pregnant woman with severe congenital aortic stenosis: from *valve-in-valve* aortic procedure to caesarean section

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Background: pregnant woman with congenital heart disease are considered high-risk obstetric patients, and so they need to be managed under a multidisciplinary approach. It remains a significant cause of maternal morbidity and mortality with 56 indirect deaths attributed to cardiac disease in the 2006-8 CEMACE report.
Case report: A 27-year-old woman diagnosed of congenital heart disease in childhood with biological aortic prosthesis due to aortic stenosis. Moderate prosthetic dysfunction. Pregnancy controlled in the High-Risk Obstetric Unit. Asymptomatic until 20th gestation week, when she started an episode of dyspnoea, orthopnoea and thoracic pain, therefore admitted in the Cardiac Intensive Care Unit due to severe heart failure and severe aortic prosthetic valve dysfunction (Transaortic gradient (GTA) medium 63, ejection fraction 45%). Correct foetal development. Multidisciplinary meeting decided to perform a TAVI procedure (*Trans aortic valve implantation*). V*alve-in valve* procedure was performed by femoral access, under general balanced anaesthesia, transoesophageal ultrasound monitoring and foetal monitoring. No incidents happened. GTA medium post-procedure:19. Good outcome. Discharged home after 4 days. Elective caesarean section at 37th week of pregnancy under epidural anaesthesia entitled. Minimally invasive hemodynamic monitoring. Guided fluid therapy. No vasoactive drugs were needed. Bigeminism

coincident with fetal extraction which didn't need treatment. A male 2890 gr baby was born, APGAR 5/10. Admitted in the Cardiac Intensive Care Unit post caesarean section. Epidural catheter during 48 h for postoperative analgesia. Good outcome and discharged home after 4 days.
Discussion: severe aortic stenosis constitutes 3-6% of all congenital cardiac diseases. Early diagnosis and surgical intervention is essential for a better prognosis. For the patient we present, severe aortic valve dysfunction happened in the middle of gestation. Obstetrical and cardiac considerations for maternal safety and foetus may be conflicting. We choose epidural anaesthesia for the caesarean section due to its haemodynamic stability and safety. It's the first time in the world that this *valve-in-valve* procedure is performed by catheterization in a pregnant woman.
Learning points: Key points for caesarean section in a pregnant patient with severe aortic valve stenosis include epidural anaesthesia, maintenance of haemodynamic stability and avoidance of foetal depression.

4AP8-1

Anaesthesia for caesarean in a woman with clivus chordoma - a case report

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Background: Clivus chordoma is a rare bone tumour, with an incidence of 1/1,000,000. It is a benign tumour but can act as malign due to local invasion. It originates from embrionary remains of the notochord and usually is axial (clivus, sacrum and coccyx). To date, only a few reports of regional anaesthesia for labour of parturients with brain tumours have been published. We present the anaesthetic management for elective caesarean section (CS) in a woman with a clivus chordoma (CC).
Case report: A 34-year-old multipara, 72 Kg weight and 161 cm height, was referred at 38 weeks gestation for elective CS. CC, with no indication for surgical removal, was diagnosed in 2006. Strabismus due to VI right pair involvement was corrected with no complications.
The patient was under 40mg/day of enoxaparin until 48 hours before surgery due to thrombophilia PAI-1 and MTHFR1 heterozygous diagnosed 8 years ago. There were no signs of increased intracranial pressure (ICP) or evidence of focal neurological deficits. After team discussion, and patient informed consent, CS was performed under epidural anaesthesia with titrated administration of 90mg of ropivacaine (7.5 mg/ml), and 0.01mg of sufentanil (0.005 mg/ml).
A healthy male baby, weighing 2655mg, was delivered 9 minutes after skin incision. His Apgar scores were 9 at 1 min and 10 at 5 min. The intra and postoperative course was uneventful, and the patient was discharged home 3 days later.
Discussion: The management of a parturient with a brain tumour is a challenge to anaesthesiologists, obstetricians and neurosurgeons. Whenever time permits, early consultations involving the patient are important for successful management. Elective CS is usually preferred. The choice of anaesthetic technique depends upon the status of the foetus, the type and location of the tumour, the neurological condition of the mother and the urgency of surgery. Assessment must include evaluation of the presence or absence of raised ICP. A mother with no signs of increased ICP, foetal well-being, and the mother's will, contributed to the choice of a loco-regional anaesthetic technic.
Reference: CAN J ANESTH 1999; 46:1. *International Journal of Obstetric Anesthesia* (2002) 11.
Learning points: The choice of anaesthetic management for caesarean section in patients with brain tumours remains a challenge. The use of regional technique might be considered in a parturient referred to elective caesarean, with no signs of increased ICP and foetal distress.

4AP8-2

Anaesthesia management of a parturient with Mirror syndrome presenting for emergency lower segment Caesarean section

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Background: Mirror syndrome, (also called Ballantyne syndrome or triple oedema) is a rare condition characterized by a triad of fetal hydrops, maternal edema and placentomegaly. The aetiology may be immunological or non-immunological, ranging from Rh-isoimmunisation to maternal-fetal viral infections, metabolic disorders, fetal malformations and tumours. Its pathogenesis is unclear and is associated with an increase in fetal mortality and maternal morbidity. As Mirror syndrome is a rare entity, there is limited literature on the anaesthetic management of such patients.
Case report: We discuss the anaesthetic considerations and management of a 35-year-old, G3P1 parturient with Mirror syndrome and fetal findings of fetal hydrops, ascites, pericardial effusion and right congenital cystic adenomatoid malformation of the right lung causing severe left mediastinal shift. She presented for emergency lower segment Caesarean section at 29 weeks gestation for deteriorating maternal condition, increasing respiratory distress and decreased CTG variability.
Discussion: Spinal anaesthesia was performed as she was not in severe respiratory embarrassment requiring immediate airway and ventilatory support. The presence of significant anasarca can potentially make tracheal intubation difficult and traumatic, hence the decision to avoid airway manipulation unless absolutely necessary. Other considerations taking into account the multi-organ involvement include pre-operative optimization of maternal fluid balance; exaggerated maternal physiological changes and their pharmacological and clinical implications; and post-operative complications especially postpartum haemorrhage, hence necessitating careful anaesthesia planning and a multidisciplinary approach to reduce maternal morbidity.
Learning Points: In conclusion, a central neuraxial technique can be administered safely in a parturient with Mirror syndrome with minimal haemodynamic changes. It is important to consider pre-eclampsia as a differential diagnosis due to the overlap of features. Anaesthetic management must be carefully planned, giving due consideration to the relevant organ systems, necessitating close collaboration between the anaesthetic and obstetric team.
Reference: Carbillon L, Oury JF, Gucrin JM, Azancot A, Blot P. Clinical biological features of Ballantyne syndrome and the role of placental hydrops. Obstet Gynecol Surv 1997;52:310-314.

4AP8-3

Anaesthetic management of a patient with symptomatic progressive Von Hippel Lindau disease for caesarean section: a case report

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Background: Von Hippel-Lindau disease (VHL) is a rare inherited disorder which causes formation of tumours and cysts in different body tissues. Haemangiomas are common and may form in the central nervous system. This may become worse in pregnancy leading to complications and foetal mortality [1].
Case report: A 29-year-old, 35-week pregnant primigravida with known VLH was scheduled for a caesarean section (CS). She had a resection of posterior fossa haemangioblastoma with a ventriculoperitoneal (VP) shunt inserted for hydrocephalus 3 years previously; a subsequent MRI showed a cyst in the 4th ventricle. She developed symptoms of raised intracranial pressure (ICP) but her pregnant state prevented complex radiological investigations to determine the cause. Agreement was reached with her medical carers to expedite delivery of her baby to allow treatment of her raised ICP.
An initial plan was made to perform the CS under a spinal but worsening symptoms lead to a general anaesthetic being performed after discussion with patient and physicians. Invasive blood pressure in addition to routine monitoring was initiated to allow tight blood pressure control. After standard premedication, a modified rapid sequence induction was conducted, using 140mg propofol, 50mg rocurronium and 1.5mg alfentanil. The airway was secured and sevoflurane used for maintenance. Intubation and extubation of

the tracheal occurred without large blood pressure swings. Paracetamol and morphine were given intraoperatively and a morphine PCA used postoperatively. The operation and recovery were uneventful.
Discussion: In this complex patient, the cause of her raised ICP had not been established and therefore the choice of anaesthesia was uncertain. Of utmost concern was the need to avoid changes in ICP. Spinal anaesthesia avoids aspiration and ICP rises from tracheal instrumentation but risks uncal herniation from the dural puncture. General anaesthesia carries the opposite risks and benefits. We chose a general anaesthesia as the safer option.
Reference:
1. Frantzen C, Lenders JW, Giles RH, Hes FJ, Links TP et al., Pregnancy-related hemangioblastoma progression and complications in von Hippel-Lindau disease. *Neurology*, 2012 Aug 21; 79(8):793-6. PMID: 22875085
Learning point: Early anaesthetic referral and multi-disciplinary discussion should be conducted to ensure a management plan which may change. Avoiding changes in ICP is crucial to avoid neurological sequelae.

4AP8-4

Anesthesic management of patients with Kippel-Trenaunay syndrome in labour

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Background: Klippel-Trenaunay syndrome (KTS) is a rare disease characterized by varicose veins, wine hemangiome and soft tissue hypertrophy. Its clinical presentation is variable as well as its evolution during patient's life. The etiology is unknown. Its complications are venous insufficiency, thrombophlebitis, extremities disparity, thromboembolic disease and bleeding. Pregnancy is not advised due to its great obstetric risk.
Case report: A 40 year old woman with 40 + 2 weeks of her first pregnancy and KTS, arrived to our centre in labour. A wide haemangioma and a light hypertrophy were observed in her right low extremity. After a few hours, caesarean section is prescribed due to a lack of dilatation. Unfortunately, because of an absence of image tests that exclude vascular anomalies (VA) in the spine, a general anaesthesia was performed. There were no complications neither during oral intubation nor the surgical procedure. No VA were observed in the uterus or pelvis. The patient was discharged four days after labour.
Discussion: There is scarce literature about KTS in pregnant women, thus, there is no information about the ideal anaesthesia. They are patients with a high thrombotic and haemorrhagic risk. VA can appear everywhere: spine, brain, small bowel, bladder and pelvis. Commonly, caesarean section is preferred because uterine contractions can break VA in pelvis or vagina. Locoregional anaesthesia can be executed as long as VA are excluded with a MRI of the spine.
In the absence of image studies and considering the neuraxial hematoma risk, locoregional anaesthesia of the spine is contraindicated. Although, difficult airway has been described as a potential danger, there has not been reported any case.
Learning Point: This case illustrates the importance of a multidisciplinary management of these patients. If a preoperatory anaesthesic assessment had been done, image studies would have been performed and the possibility of locoregional anaesthesia evaluated. In some cases, this would allow us to avoid general anaesthesia in pregnant women which always carries a high risk.
References:
1. S. Hannawi1 et al. J Clin Exp Dermatol Res 2013,4:1
2. M J. Sivaprakasam et al. Anesthesic and obstetric considerations in a partutient with Klippel-trenaunay Syndrome. CAN J ANESTH 2006/53:5/487-491.
3. Hayamizu K. et al. Anesthetic management of a patient with Klippel-Trenaunay syndrome undergoing caesarean section. Masui. 2012 Aug;61(8):893-5.

4AP8-5

Anesthetic approach for cesarean section in pregnant patient with moyamoya disease

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Background: Moyamoya disease is rare and its etiology remains unclear. It is a cerebrovascular disease characterized by the circle of willis and internal carotid artery bilateral progressive stenosis (1).
Case report: A 32 year-old pregnant female patient (34 weeks, 3 days) was admitted to our university. The patient was scheduled for an emergency cesarean section. The patient was diagnosed with moyamoya disease. She had no additional problems, and her complete blood count and biochemical analysis were normal. The patient´s first non-invasive blood pressure values measured were evaluated as 120/80 mmHg. Afterward, The invasive blood pressure was monitored, General anesthesia was performed and a nitroglycerin infusion was prepared for a possible hypertensive attack. Anesthesia was induced with 6 mg/kg pentothal and 1.2 mg/kg rocuronium. Following the induction of anesthesia, the patient was intubated. Anesthesia was maintained with a 50% O_2 mixture of 50% air and 1% sevoflurane.
The patient was administered 100 mcg fentanyl analgesia after baby was delivered. The preoperative blood pressure was taken the moment she entered the operating room. During the anesthesia the mean arterial blood pressure was 80-110 mmHg, and the $EtCO_2$ values were maintained between 35-45 mmHg. Her heart rate was between 80-100 beats/min. Due to a lowering of the patient's body temperature of 35.5 ^{0}C, she had to be heated. The operation took approximately 40 min.
At the end of the operation, the patient was followed in the post-anesthesia care unit. The patient was extubated in the thirtieth minute without complications and then transferred to the clinic.
Discussion: Moyamoya disease has decreased cerebral perfusion due to progressive occlusion. Hypovolemia, hypotension, and hypothermia are to be avoided in terms of continuing cerebral perfusion. we observed that general anesthesia was often applied in cesarean section patients with moyamoya disease (2,3).
References:
1. Etus V. Moyamoya Disease. Türk Nörosirurji Dergisi . 2012; 22(3):212-220
2. Dagcınar A, Özek MM, Pamir MN. Moyamoya Disease. Türk Nörosirurji Dergisi 2000;10:176-85
3. Ngan Kee WD, Gomersall CD. Extradural anaesthesia for caesarean section in a patient with moyamoya disease Br J Anaesth. 1996 Oct; 77(4):550-2
Learning points: Necessary steps to prevent hypothermia, hypovolemia, hypotension, should be taken in such patients to prevent cerebrovascular spasms.

4AP8-6

Anesthetic management of an obstetric patient with transverse myelitis

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Background: Acute transverse myelitis (TM) is a very rare acquired neuroimmune spinal cord disorder, causing motor, sensory and autonomic dysfunction. The reported incidence is between one to two new cases per million per year.[(1)]
Case report: A 32-year-old woman, 38 weeks of gestation, presented for an elective cesarean. The patient was diagnosed with idiopathic acute TM 7 years before. She had been tetraplegic and tracheostomized. Her symptoms now involve her left arm and leg, with sensory loss and muscle strength grade 4/5, bladder incontinence and neck pain. MRI of the spinal cord showed an extensive lesion extending from C1 until T1.
Delivery by elective caesarean section was performed under general anesthesia (GA). A modified rapid sequence induction (RSI) was performed with rocuronium 0,5mg/kg, with a time to intubation of 60 seconds. The surgery has lasted 25 minutes, after that we reversed the neuromuscular block with sugammadex in a dose of 2 mg/kg, with a full recovery and extubation approximately 2 minutes after the injection.
Discussion: TM is a very rare condition that is usually associated with immunologic and infectious processes that can trigger the disease. Pregnancy,

by itself, is characterized by immunological changes, making patients more prone to autoimmune conditions. In most of the cases, the aetiology is idiopathic, but there are some reports of the association with the use of neuroaxial anaesthesia.[2]
The effects of anaesthesia on disease progression are unknown. We report the successful use of GA. Anaesthetic concerns include autonomic dysreflexia, hyperkalaemia following the use of suxamethonium and new-onset neuropathic pain on a background of chronic pain symptoms.
Having decided on GA, we considered whether the use of rocuronium in a modified RSI was appropriate. There is one case report in the literature about a patient with TM who developed prolonged residual paralysis after a single intubating dose of rocuronium, which was successfully reversed with sugammadex.[3]
References:
1. Int J Obstet Anesth 2010;19(1):98-101;
2. West Indian Med J 2012;61(6):643-5;
3. Int J Obstet Anesth 2010;19(3):333-6
Learning points: It is not known whether TM has relapses after pregnancy but there are several reported cases of TM following a neuraxial technique. Use of neuraxial techniques in these patients remains controversial. Prolonged residual paralysis after a dose of non-depolarising muscle relaxants is also described.

4AP8-8

Diagnosis of myasthenia gravis during pregnancy: a case report

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Background: The diagnosis of myasthenia gravis (MG) during pregnancy is rare, and the course of disease is variable, with the risk of exacerbation of the disease.[1] Loco-regional techniques should be preferred for analgesia/anesthesia during labor.[2]
We present a case of a pregnant woman with a recent diagnosis of MG.
Case report: Pregnant woman, 39 years-old, gravida 3/para 1, ASA II. Diagnosis of generalized MG in the first trimester of pregnancy, medicated with methylprednisolone, pyridostigmine and intravenous human immunoglobulin.
During pregnancy there were two episodes of exacerbation of the disease, with muscle weakness, ptosis, diplopia and dysphagia.
Birth was planned after multidisciplinary assessment by Obstetrics, Anesthesiology, Neurology and Neonatology.
Admitted at 34 weeks + 4 days with diagnosis of preterm premature rupture of membranes.
Induction of labor with misoprostol 50 μg vaginal tablet.
Performed epidural block (latent phase). Administered bolus of ropivacaine 0.19% 18.75 mg + sufentanil 5μg. Initiated continuous infusion of ropivacaine 0.14% 5 ml/h. An additional bolus of ropivacaine 0.23% 11.25 mg was administered at the end of the active phase. Hemodynamic monitoring was maintained, without changes. It was performed regular monitoring of the blockade level (T4, no motor blockade) and pain (VAS 0/10 to 2/10).
Spontaneous vaginal delivery without complications.
Length of stay in the delivery room: 5 hours.
The postpartum woman was discharged to the ward, where she remained 48 hours with clinical stability.
Discussion: The approach of a pregnant woman with poorly controlled MG was a challenge for the multidisciplinary team. Timely birth planning was essential. The choice of epidural, early and with low local anesthetics concentrations had shown to be safe and effective.
References:
1. Norwood F, et al. J Neurol Neurosurg Psychiatry jnnp-2013-305572Published Online First: 11 June 2013.
2. Ann Fr Anesth Reanim. 2004 May;23(5):459-64.
Learning Points: Having a parturient with myasthenia gravis recently diagnosed and badly controlled is a challenge for the entire team, especially for the anesthesiologist. Having a structured plan is essential to achieve the desired success.

4AP8-9

Management of a parturient with Charcot Marie Tooth disease for instrumental vaginal delivery using physician controlled remifentanil analgesia with bilateral pudendal nerve blocks

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Background: Charcot Marie Tooth disease, also known as peroneal muscle atrophy, is most commonly encountered sensory motor neuropathy. Affected individuals show progressive distal limb atrophy and weakness. The disease can be exacerbated in pregnancy. They have more operative deliveries, malpresentation and postpartum bleeding than general obstetric population.
Case report: A 27 year old primigravida with known Charcot Marie Tooth disease presented for instrumental vaginal delivery following a prolonged second stage of labour. Her neuropathy was worsened during the pregnancy. After giving bilateral pudendal blocks, we used remifentanil boluses each of 40 mcg for the forceps delivery. She required a total of 520 mcg of remifentanil. There was adequate pain relief with minimal itching, sedation, respiratory depression, bradycardia and hypotension. The delivery was uneventful with no major maternal or fetal complications.
Discussion: We probably describe the first case of use of remifentanil for instrumental vaginal delivery in general and in Charcot Marie tooth disease in particular. Remifentanil is being increasingly used as a sole analgesic and sedative for short surgical procedures.
The patients had worsening of weakness in legs during her course of pregnancy, hence we decided to avoid central neuraxial block for forceps delivery. General anaesthesia was avoided due to it´s inherent risk in pregnant patients, although it was kept as a back-up plan. Instead we decided to use remifentanil boluses in addition to bilateral pudendal blocks for forceps delivery. Intermittent boluses helped us to titrate the amount of remifentanil according to the frequency of contractions. This not only provided good analgesia and caused minimal side-effects, but also allowed the patient to participate in the birthing process.
References:
1. Hoff JM, Gilhus NE, Daltveit AK. Pregnancies and deliveries in patients with Charcot-Marie-Tooth disease. Neurology. 2005;64(3):459-462
2. Litman RS. Conscious sedation with remifentanil during painful medical procedures. Journal of pain and symptom management 2000; 19(6):468 - 471
Learning Points: In patients with neurological disorders presenting for instrumental vaginal delivery, remifentanil analgesia with simultaneous use of bilateral pusendal nerve blocks can be considered as good alternative to a cental neuraxial blockade or a general anaesthesia.

4AP8-10

Pregnant patient with possible intracranial space occupying lesion and difficult airway. Which is the best anesthetic management for urgent caesarean section?

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Background: *Primitive Neuroectodermal tumor* (PNET) belongs to the Ewing family of tumors and can affect the central or peripheral nervous system. We discuss the best anesthetic management for a pregnant patient with a PNET diagnosis without staging, a difficult airway with indication for an urgent cesarean section.
Case report: 30 week pregnancy, 19yo, ASA II, cervical PNET diagnosis, without staging, evacuated out of Cabo Verde for termination of pregnancy, in order to rapidly start treatment. After discussion with the obstetrics and neonatology departments, and as the foetus presented severe growth restrictions, an urgent caesarean section was decided. The patient presented a significant cervical mass causing a contralateral tracheal deviation, limited cervical mobility, Mallampati IV, predicting a difficult airway. We performed awake intubation with fibroscopy with a remifentanil perfusion, with no complications, followed by anestestic induction with propofol and rocuronium and maintained with sevoflurane.
Discussion: The absence of imagiological staging that excluded the involvement of the CNS and intracranial space occupying lesion, with possible risk of increased intercraneal pressure (ICP), and the urgency to proceed with cesarean section, lead to the decision to perform general anesthesia. The literature references that the dural puncture in pregnant patients can cause

brain herniation[1], even with a small-gauge spinal needle or when carried out by an experienced anesthesiologist[2]. With a predictably difficult airway and the risk of aspiration of gastric content, it was decided to perform an awake intubation with fibroscopy. Remifentanil was used for sedation and analgesia, as it is easy to titrate, and enables spontaneous ventilation and patient cooperation during intubation.
In addition to maintaining airway reflexes, avoiding aspiration, it limits the sympathetic response associated with intubation and avoids potential ICP increase.
References:
1. Acta Scand 2011; 124:85-98
2. Anesthesiology 2013; 119: 703-18
Learning points: Despite the absence of symptoms suggesting increased ICP, and in absence of imagiological staging, the existence of an intracranial space occupying lesion was assumed and general anesthesia was decided to avoid dural puncture with brain herniation.

4AP8-11

Spinal anaesthesia for Caesarean section in a patient with a surgically corrected type 1 Arnold Chiari malformation

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Background: Type 1 Arnold Chiari Malformation (ACM) is a congenital disorder characterised by downward displacement of the cerebellar tonsils through the foramen magnum. Caesarean delivery may be recommended to avoid rises in intracranial pressure (ICP) caused by labour. General and regional anaesthesia both carry risks to the mother and the technique of choice is unclear.
Case report: A 21 year old (G1P0) with known type 1 ACM was scheduled for a Caesarean section. She had had a posterior foramen magnum decompression aged 17 and had been asymptomatic since; repeated MRIs not demonstrating abnormal CSF flow. She requested regional anaesthesia and after consultation with the neurosurgeons, we agreed on a spinal. A 25G Whitacre meedle was used to inject 2.3 mls of 0.5% hyperbaric bupivacaine and 300mcg of diamorphine intrathecally. A phenylephrine infusion with crystalloid co-loading was used and the patient remained stable throughout the operation.
Discussion: Type 1 ACM can be complicated by abnormal CSF flow and a non-communicating hydrocephalus. Traditional opinion warned against the use of regional anaesthesia[1] as intrathecal injection may cause a rise in ICP. A dural puncture may cause ventral herniation and brain shift, theoretically less likely with a spinal needle than a Tuohy needle as the hole is smaller. General anaesthesia risks pulmonary complications and rises in ICP due to hypertensive surges. Recent case reports[2] have used regional anaesthesia in both corrected and uncorrected cases. After careful consideration and consultation, we decided to comply with the mother´s wishes and performed a spinal as we thought this to be the safest option for her.
References:
1. Agusti M, Adalia R, Fernandez C, and Gomar C. Anaesthesia for caesarean section in a patient with syringomyelia and Arnold-Chiari type I malformation. International Journal of Obstetric Anesthesia, vol. 13, no. 2, pp. 114-116, 2004.
2. Bag T. Saha DP. Dutta R. De AK. Shah A A successful pregnancy outcome after antenatal surgical decompression of Arnold Chiari malformation. Journal of Obstetrics & Gynaecology of India. 62(Suppl 1):13-5, 2012 Dec.
Learning Points: In known cases of ACM, where patients have undergone surgical correction and there is no evidence of a recurrence, spinal anaesthesia should be considered as the technique of choice for Caesarean delivery.

4AP8-12

Spinal anaesthesia for caesarean section in a patient with syringomyelia

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Background: Syringomyelia is the formation of a cyst within the spinal cord. Symptoms are variable and the prevalence is 8.4 per 100,000[1]. A pregnant woman with syringomyelia poses problems as the mode of delivery is controversial. The process of labour causes changes in the CSF pressure which may lead to worsening symptoms.To avoid this, caesarean section (CS) may be recommended but there is a lack of consensus about the best way to anaesthetise these patients.
Case report: A 30-year-old primigravida had a syringomyelia at C6-7 diagnosed on MRI 5 years previously. Her symptoms were chronic neuropathic pain and weakness affecting the right arm. Repeat MRI showed normal intracranial appearances and no change in the syrinx. After consultation with the patient, her neurologist and obstetrician, elective CS under spinal anaesthesia was planned. The spinal was sited at L2/3 using a 27 G Portex pencil point needle, 2.7ml 0.5% heavy bupivacaine and 300mcg diamorphine. Surgery and recovery was uncomplicated and she went home 2 days later.
Discussion: In these cases, the aim of anaesthesia is to avoid changes in CSF pressure which may worsen neurological symptoms. General anaesthesia avoids the risk of dural puncture and the resultant fall in CSF pressure[1] but carries the risk of aspiration as well as rises in CSF pressure during airway manipulation[2]. In contrast, regional anaesthesia carries the opposite risks and benefits. The choice of regional technique can be debated as a spinal is more predictable but the deliberate dural puncture may cause changes in CSF pressure[1,2]. An epidural seeks to avoid a dural puncture but in the event of an accidental dural tap, the loss of CSF will be greater leading to greater pressure changes. In our case, the patient was very keen to remain awake and we performed a spinal anaesthetic as we felt that the benefits outweighed the risk in this patient.
References:
1. Hassaballa et al. Management of syringomyelia in pregnancy. International Journal of Gynecology and Obstetrics 2012; 119:S367.
2. Margarido et al. Epidural anesthesia for Cesarean delivery in a patient with post-traumatic cervical syringomyelia. Canadian Journal of Anaesthesia 2011; 58:764-8.
Learning points: Spinal anaesthesia can be used successfully in a woman with cervical syringomyelia presenting for CS, and should be considered for similar cases but the risks need to be assessed individually.

4AP9-1

Maternal mortality in a tertiary university hospital, a review of 139,616 deliveries between 1998 and 2013

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Background and Goal of Study: A vast majority of the 250,000/year maternal deaths occur in low and middle-income countries, primarily due to hemorrhage, hypertensive disorders and sepsis[1]. In Europe the ratio is 17/100,000 deliveries and in Spain 21/100,000[2]. The aim of our study was to analyze the main causes of maternal mortality in an obstetrics-referral, tertiary university hospital in a high-income country.
Materials and Methods: Data from a 16-year period were obtained from our obstetric anaesthesia database, mortality database and data from the department of obstetrics and gynecology were included. We performed a descriptive analysis of the data.
Results: A total of 139,616 deliveries and 16 maternal deaths were observed between 1998 and 2013 for a total incidence of maternal mortality ratio of 11.5/100,000 deliveries; 11 occurred in the first 42 days after delivery and 5 were considered late maternal deaths. 11/16 direct deaths: 3 amniotic fluid embolisms, 2 post partum hemorrhages due to placentation abnormalities, 2 hypertension related deaths (cerebral hemorrhage and aortic dissection), 1 ruptured ectopic pregnancy, 1 liver failure related to fetal death, 1 necrotizing fasciitis related to the episiotomy and 1 anaesthesia related death (Mendelson syndrome). 5/16 indirect deaths: 2 related to respiratory complications (pulmonary fibrosis and Influenza A), 1 AIDS related, 1 gastric malignancy and 1 anaphylactic shock secondary to antibiotic administration. 3/16 women died during the first 24 weeks of pregnancy.
Discussion and Conclusion(s): The leading causes of maternal death in our centre are direct, mainly amniotic fluid embolism, followed by placentation abnormalities and hypertension. Nevertheless the results from the last CEMACE report[3] showed that indirect causes were most prevalent in UK's general population and that 1/3 of all deaths occurred during the first 24 weeks of pregnancy.
The CEMACE report has been very useful in helping anesthesiologist construct guidelines, however we suggest that differences between tertiary centres and the general population should be acknowledged and anesthesiologist should be aware of those specific scenarios.

References:
1. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health 2014;2: e323-33
2. Trends in maternal mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. WHO Press 2014.
3. CEMACE. 2011 BJOG 1008 (1):1-203

4AP9-2

Pregnancy outcome following nonobstetric surgery and anaesthesia during gestation: a nationwide population-based study in Taiwan

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Background and Goal of Study: Nonobstetric surgery during pregnancy is an uncommon but concernable event. Because of the difficulty of conducting large-scale randomized trials in this population, there are limited data available, especially in Asian. In this study, we aimed to assess the risk of adverse pregnancy outcome following nonobstetric surgery and anaesthesia during gestation using a nationwide population-based database in Taiwan.
Materials and Methods: Data were collected from the Longitudinal Health Insurance Database 2000, which contains claim data from a million randomly selected beneficiaries among 23 million residents in Taiwan. From 1998 to 2010, we identified a total of 106,591 events of pregnancy and 423 of which had nonobstetric surgery under general or regional anaesthesia during pregnancy. Logistic regression analyses were performed to assess the risk of adverse pregnancy outcomes including prematurity, cesarean section, maternal death, and prolonged hospital stay at delivery.
Results and Discussion: Among 423 events of pregnancy with nonobstetric surgery during gestation, 405(95.7%) completed pregnancy while 18(4.3%) end up with abortion. The abortion rate showed no significant difference from those without surgery(4.3% vs. 2.9%, p-value=0.09). Pregnancy outcome for women having nonobstetric surgery, compared with those without, were associated with an increased risk of prematurity [adjusted odds ratio (95%CI), 2.82(2.10-3.80)] after adjusting for age, comorbidities, multiple gestation, gestational diabetes, pre-eclampsia/eclampsia, PROM, antepartum hemorrhage and fetal distress. However, the adjusted odds ratio for cesarean section [aOR, 1.15(0.93-1.43)], maternal death [aOR, 1.68(0.23-12.42)], and prolonged hospital stay at delivery[aOR, 1.01(1.00-1.03)] were not significant different between these two groups. Besides, nonobstetric surgery under regional anaesthesia was associated with an increased risk but not statistical significant of premature labor (aOR (95%CI), 1.61(0.80-3.25), p-value=0.1835) as compared to those under general anaesthesia.
Conclusions: Women having nonobstetric surgery during gestation were associated with an increased risk of premature labor. However, surgery under general anaesthesia was not associated with a higher risk of prematurity than regional anaesthesia.

4AP9-3

Quality of information given by english and french websites concerning epidural analgesia in labour

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Background and Goal of Study: Internet is broadly used by patients to search medical information (MI). The quality of MI concerning Epidural Analgesia in Labor (EAL) available on the Internet in French[1] and in English[2] is poor but was never compared.
Our aim of was to evaluate and compare the quality of MI delivered by English and French speaking websites concerning EAL using the same data form.
Materials and Methods: American, Canadian and French search engines Google® and Yahoo® were queried for the term « epidural », « epidurale » or/and « peridurale ». 2 independent assessors screened and assessed the 20 first websites of each search engine using a data form built from the ASA (*American Society of Anesthesiologists*) and SFAR (*Société Française d'Anesthésie Réanimation*) guidelines.
This data form assessed the quality of the website concerning structure and MI (*Structure* and *Medical Scores*). The sum of the *Structure* and *Medical Scores* gave the *Global Score*. A 15% difference between the 2 assessors for each score conducted to a mutual website's reassessment.
The final scores were the mean of the 2 assessors scoring. HONcode labelling and mention of preanaesthesia evaluation (PAE) were noted.
Results and Discussion:

	French speaking websites (n=39)	English speaking websites (n=32)	p value
Structure Score (/25) (m ± sd)	11.5 ± 4.0	11.1 ± 4.0	0.93
Medical Score (/30) (m ± sd)	12.9 ± 5.2	11.7 ± 4.4	0.38
Global Score (/55) (m ± sd)	24.4 ± 7.7	22.8 ± 7.5	0.88
HONcode	23%	16%	0.62
PAE	54%	25%	0.026

[Table 1]

71 websites were included. There was no significant difference between the 2 assessors' scores. The mean *Structure, Medical and Global Scores* were, respectively, 11.3 ± 4.0, 12.4 ± 4.9 and 23.7 ± 7.6. The best French speaking website was *doctissimo.fr* (39/55), referenced at 1st position on Google® and Yahoo®. The best English speaking website, *oaa-anaes.ac.uk* (34.5/55), was referenced at 20th position on Google® only.
Conclusion(s): There was no difference concerning EAL's information quality between French and English speaking websites. The only significant difference concerned PAE. This is due to French law who specify that PAE have to be realised at least 48 hours before any scheduled anaesthesia. MI on the Web concerning EAL is of poor quality. Physicians should educate and guide their patients among available websites to find the best MI.
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4AP9-4

Quality of the medical information concerning epidural analgesia in labour on the Web: what's new in 2013?

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Background and Goal of Study: Many patients search medical information on the Internet (MII) (1). However variability and quality of MII may raise concerns. We showed that quality of MII concerning epidural analgesia in labour (EAL) was poor, instable and did not improve between 2009 and 2010 (2).
Our aim was to reassess quality and related time improvement of the MII concerning EAL in 2013.
Materials and Methods: Search engines (SE) Google® and Yahoo® were queried for the term "epidural analgesia". 2 independent investigators assessed the 20 first websites (WbS) of each SE using the data form created in 2009. It assessed the quality of the WbS structure (*Structure Score, from 0 to 25)*) and of the medical information (*Medical Score*, from 0 to 30), based on the SFAR recommendations on perimedullary block in adults.
The *Global Score* was the sum of *Structure* and *Medical Scores*. A 15% difference between the 2 assessors for each score led to a consensual new assessment.
The final scores were the mean of the 2 assessors scoring. The rank of apparition of each WbS in each SE was analyzed. A HONcode labelling was noted.
Results and Discussion:

	2009	2010	2013	*p*
Structure Scores (/25) (m±sd)	11±4	11±4	12±4	> 0.05
Medical Score (/30) (m±sd)	12±6	12±5	14±5	> 0.05
Global Score (/55) (m±sd)	23±8	23±8	26±8	> 0.05
doctissimo.fr global score (/55)	40.5	39.5	39.0	-
sfar.org global score (/55)	33.0	39.0	37.0	-

[Table 1]

In 2013, 2010 and 2009 the rank into a SE and the *Global Score* of a WbS were not correlated (*Pearson correlation test, p > 0.05.*).
In 2013, 30% of the WbS were HONcode labelled. They tended to have a better Global Score than the other (29±7 vs 23±8, *p=0.07*), as in 2010 and 2009.
In 2013, 65% of the WbS have been already evaluated in 2010, and 59% in 2009.
In 2013, 2010, and 2009 the best scored WbS was *doctissimo.fr*.
In 2013, the *SFAR* WbS obtained the second best score, ranked at the 20th position on Google® but was not referenced on Yahoo®.
Conclusion(s): In 2013, the quality of MII concerning EAL remained poor. There was no improvement since 2009. Although instability in MII was still present, *doctissimo.fr* remained the best WbS. The *SFAR* WbS offered a good quality of MII. However, this WbS was poorly ranking into the SE. In 2013, *doctissimo.fr* and *sfar.org* WbS could be proposed as complementary MII.
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4AP9-5

Service evaluation of antenatal information on epidural labour analgesia

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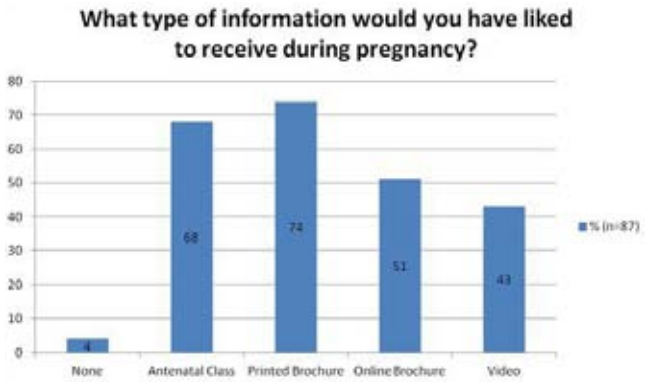
Background and Goal of Study: Informed consent is a contentious subject in obstetric anaesthesia. Validity of consent in active labour may be questioned and recommendations have been made about providing early antenatal infomration[1]. The Royal College of Anaesthetists (RCOA) sets a target of 95% regarding provision of information about epidural analgesia for labour[2]. We conducted a study to examine our compliance with this target and identify areas for improvement.
Materials and Methods: An observational study using a structured patient interview of all women receiving a labour epidural between 11 April - 10 May 2014.
Results and Discussion: We interviewed 87 women; the results are shown in the table and graph. When provided by our trust, women obtained the information from antenatal classes (80%) and the anaesthetic clinic (13%), the remainder from the obstetrician or midwife. Some women received information both from our trust and independent sources. Most women wanted to have different methods for obtaining information from our trust.

	Number of women (%) Total=87
Any information received on epidural analgesia during pregnancy	66 (76%)
Information received from our trust	46 (53%)
Information received from independent sources (includes private classes / NCT, media, relatives, friends)	32 (37%)

[Information provision]



[Type of information prefered by pregnant women]

Conclusion: Our study shows that our unit failed to achieve the RCOA standard of 95%. Antenatal classes proved to be the most common route for distributing the information in our trust but they were attended by only one third of the mothers. A significant proportion of women used other sources of information, the quality of which cannot be guaranteed. We are working to Improve our antenatal education. Popular modalities as identified by participants include a written brochure and on-line resources, both of which are being developed. We hope that using different modalities will improve the accessibility of reliable information for our expectant mothers.
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4AP9-6

Standards of best practice in obstetric anesthesia: 11-year survey in a district general hospital

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Background and Goal of Study: For regional anesthesia, accidental dural punction (ADP) rate vary from 2% to less than 0,26%. Post-dural puncture headache (PDPH) is the most common complication after epidural or spinal anesthesia[1]. The proposed standard for best practice states that less than 1% of epidurals should have ADP and less than 0,5% of spinal anesthesia should be followed by PDPH[2].
This study proposes to evaluate the number of ADP and PDPH in obstetric population of a district hospital from 2003 to 2013 and monitor the concordance with the standards of best practice for obstetric anesthesia.
Materials and Methods: Data has been retrospectively collected in obstetric patients who have had epidural analgesia and spinal anesthesia from 2003 to 2013, including those who had ADP or PDPH. 18G Tuohy needle were used for all epidurals and 25 to 29G, cut bevel (Quincke) and pencil point (Whitacre) needles for spinal anesthesia.
Results and Discussion: Of a total of 10488 women who had epidural analgesia, 58 (0,55%) had ADP and all resulted in PDPH. The incidence of ADP complicating epidural anesthesia was less than 1% in each year over the 11-year period.
Of the 2375 obstetric patients who had spinal anesthesia in the same period, 43 (1,81%) experienced PDPH, which was above the standards. The number of spinal anesthesia performed had a crescent tendency. The percentage of PDPH in the last years 2 years was very different from the mean of the 11-year period of the study (0,38% vs 1,81%). There was an internal audition for this purpose in 2011 resulting in guidelines for preferential use of smaller (27G) and pencil point needles.
Conclusion: With the present study we realize that approximately 0,55% of the obstetric patients receiving epidural had ADP and PDPH, which is acceptable, based on the standards of best practice. The number of PDPH found after spinal anesthesia was greater than expected over the 11-year period but less than the goal of 0,5% in the last 2 years. The acknowledgment for using of small gauge and pencil point needles may be the reason but further studies are needed.
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4AP9-7

The recommended anaesthetic technique for caesarean section surgery in South Africa - results of a national survey

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Background and Goal of Study: In South Africa (SA) the caesarean section rate is above the WHO recommended rate of 10 - 15%. Inadequately treated pain in the post-operative period has a significant negative impact on infant care. In addition, poorly treated post-operative pain can potentially result in a

number of physiological disturbances resulting in significant morbidity.
Anaesthetic management of the obstetric patient in SA has become increasingly important. Appropriate anaesthetic management has the potential to improve patients' birth experiences and decrease the risk of post-operative morbidity.
The Goal of this study is to determine what is considered the gold standard in SA (as determined by the Anaesthesiology Academic HOD's) with regards to caesarean section relating to:
a. Preferred method of anaesthesia
b. Use of adjuvant drugs for neuraxial anaesthesia
c. Post-operative monitoring practices
d. Post-operative pain management
Methods: A structured interview was carried out with the heads of the Anaesthesiology departments at the 8 SA medical schools in order to determine what they consider to be the GOLD STANDARD, in SA, for the administration of anaesthesia for caesarean section surgery.
Results and Discussion: 100% of respondents agreed that a single shot spinal anaesthetic should be the preferred technique for caesarean section surgery. This should be administered with a pencil point needle. The acceptable guage of the needle ranged between 25G and 27G, with 75% of the respondents preferring a 26G pencil point spinal anaesthetic needle. All the respondents also agreed that the 22G needle is not suitable due to the higher incidence of post-dural puncture headaches associated with its use, but admitted that this is often all that is available in the public sector hospitals.
The use of pre-mixed 0.5% bupivacaine with dextrose for spinal administration is the preferred choice of local anaesthetic in 87.5% of the respondents.100% of respondents agreed that the dose of intrathecal bupivacaine should be between 8 - 12.5mg.The majority of the interviewees opted that fentanyl should be administered intrathecally at a dose between 10-20micrograms. Morphine tends to be avoided due to its prolonged duration of action and potential for delayed respiratory depression.
Conclusion: The use of spinal anaesthesia with intrathecal bupivacaine and an opioid is the recommended method of anaesthesia for caesarean section surgery in South Africa.

4AP9-8

What's (my) gender got to do with it? Survey responses to an obstetric dilemma

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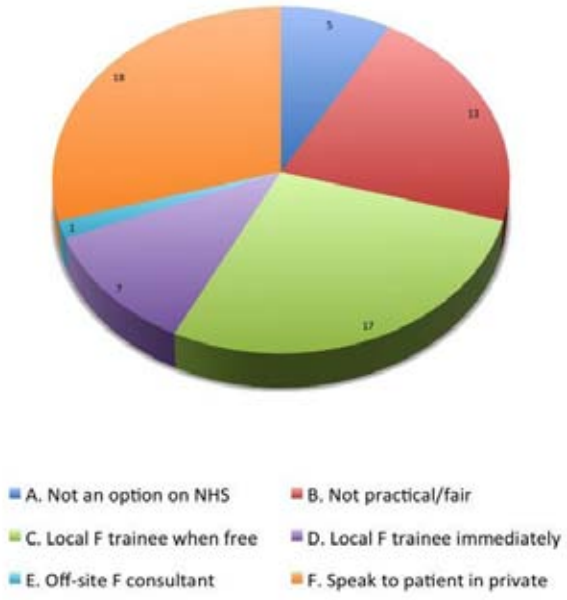
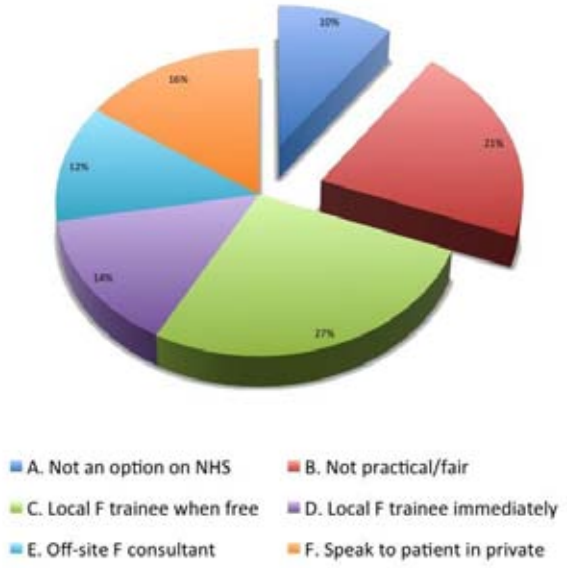
Background and Goals: Consider a scenario where a male trainee doctor covering labour ward has been asked to review a patient for epidural placement. On arrival to the parturient's bedside her husband requests that a female doctor perform the procedure instead. Gender-specific requests, from target ethnic groups, are increasingly common in clinical practice - so much so that Belgium, the Netherlands and France have all issued legislation specifically targeting such circumstances (1).
In the UK opinion remains divided regarding the benefits of ‚faith-based' services (2); this lack of uniformity has prompted us to gauge clinical opinion in response to the scenario cited above.
Methods: Clinicians at a large University Hospital in central London were asked to rank six responses to a scenario in which a parturient's husband requests for a *female* anaesthetist to site his wife's epidural.
Results: Sixty-one surveys were completed from 41 Anaesthetists, 10 Obstetricians and 10 Midwives over a two-week period. The majority of clinicians stated that their first choice would either be to ascertain the parturient's personal opinion privately (30%) or to source a competent female trainee to place the epidural when convenient to do so (28%) (Figure1).
Just under a third (31%) of clinicians did not feel it was ever appropriate to decline the partner's request (Figure 2), and 32% would go as far as asking a female consultant to attend out of hours in order to facilitate the partner's request.
Males were more likely to accommodate gender-specific requests than females (45% vs. 29%). Anaesthetists and midwives tended to accommodate in 40% of responses whereas obstetricians would only do so in 10%.



[Figure 1. Count of candidates first choice to obstetric dilemma]



[Figure 2. Count of all acceptable options demonstrating that over 30% would never decline partners request]

Discussion: Our survey has demonstrated divided opinion regarding requests for gender-specific physicians. The majority of professionals felt that the primary response should be to speak to the parturient in private; a sentiment endorsed by our legal team who advised that the patient's opinion should always be gauged independent of family pressure. However, in reality this may not always practical or desirable.
Conclusions: The range of responses highlights a lack of clarity on this subject, with potential for conflict and discontent.
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4AP9-9

Claims in obstetrics: a study based on French insurance (SHAM) data

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Background and Goal of Study: Obstetrics is a high-risk specialty where the responsibility of the team and therefore the anesthetist can be engaged. The knowledge of these claims must help to improve practices. SHAM insurances are the biggest French provider of medical liability insurances (50% of the market), insuring 80% of public and 27% of private hospitals. The study of the insurance claims provided by this insurer is therefore a relevant source of data.
Materials and Methods: The aim of this study was to analyze the medico-legal claims related to obstetrics. We did a retrospective study on insurance claims provided by SHAM insurances and which has been settled by a court over a three years period (2004-2006).
Results and Discussion: We analyzed 66 closed claims that occurred between 1983 and 2005 in French hospitals (54 general hospitals and 12 universities). The average time between the declaration of the claim and the court conviction was 6 years. The average amount of compensation per claim was €500,000 (median €40,800) and €1,321,000 for an acute fetal distress (AFD) and €298,000 for a shoulder dystocia.
The damage occurred:

- in 54 cases during childbirth (82%) : AFD (n=25), shoulder dystocia (8), postpartum hemorrhage (2), complication of cesarean delivery (9) or vaginal delivery (5), episiotomy (4) or epidural analgesia (1)
- in 9 cases during pregnancy (14%) : fetal malformation (5), undiagnosed gestational diabetes (2), forgetting intra-uterine device (1), delay in the diagnosis of peritonitis (1).
- in 3 other cases : miscarriage without medical assistance, burn of a new born with a water mattress and dysuria after medical abortion.

The consequences are very important: cerebral palsy (16), death of the newborn (12), death of the mother (2) or brachial plexus injuries (6).
Conclusion(s): The causes identified by the expert are always multifactorial with generally and error and/or a delay in medical care:

- misdiagnosis (27), error in the decision (36), error in care by a midwife (21), technical error by an obstetrician (8).
- delay in medical care: response time too long (9) or to perform a caesarean (4)

The anesthetist is usually involved when the completion time of the caesarean section is too long (8 cases) and in epidural related complications (2 cases : delay in the administration and neurological complications).
These data should help strengthen the quality approach in obstetrics.

4AP9-10

Anaesthesia during delivery: association among health problems, pain and satisfaction scores

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With increasing numbers of women asking for a Caesarian section (C/S), the risk of complications rises. The study was designed seeking to encourage doctors and patients to opt for natural labour with no or epidural anaesthesia (EA). The objective is to identify how type of anaesthesia during delivery and health problems resulting from anaesthesia, obstetric and general factors affect pain and satisfaction scores of women undergoing childbirth and soon after.
A prospective study including women admitted for delivery into Vilnius University Hospital Santariskiu Clinics from 2013-11-22 to 2013-12-21 was conducted. Exclusion criteria: refusal to participate, lack of data in patient's files, vaginal delivery ending in C/S. Pain and satisfaction were evaluated using numeric rating scales (0 to 10). Health problems occurring while in the obstetrics unit were divided into 3 categories: anaesthesia related, obstetric and others. Results were compared using Student's t test and Fischer's exact test, with $p<0.05$ conferring statistical significance.
Data of 121 women with the mean age of 29,84 + 4,97 years was analysed. 38 women (31,4 %) underwent C/S, 54 (44,63 %) delivered naturally without EA, and 29 (23,97 %) with EA. Overall health problems were 1,81 times more common when women delivered vaginally ($p=0.0004$). Most of them were obstetric, such as perineal rupture or required episiotomy. Vaginal delivery with EA and without does not statistically differ in health problem rates. Anaesthesia related health problems were 5,34 times more common in C/S group with spinal anaesthesia (SA), than in those delivering vaginally with EA ($p=0,10$). EA given for labour resulted in pain 2,97 points lower during delivery compared to those without EA ($p<0,0001$). Women that experienced health problems during delivery endured pain 3,39 points higher than those with uncomplicated deliveries ($p<0,0001$), yet overall felt better when being discharged ($p=0,05$). Those that had anaesthesia related health problems experienced pain 2,85 points higher than women without such ($p=0,01$), but felt better when leaving the hospital ($p=0,01$).
Anaesthesia related problems result in higher pain score after the delivery and worse overall feeling of patients. EA does not produce a high complication rate and provides excellent analgesia, while SA causes more health problems, especially associated with anaesthesia. Therefore vaginal delivery with EA is a safer, more satisfying and is to be encouraged.

4AP9-11

Analysis of midwives' approach to and knowledge of epidural analgesia

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Introduction: There is a wide range of techniques to treat labour pain, among which epidural analgesia has proven to be the most effective. In Varese, the technique is used routinely, with dedicated 24 hour service a day. We decided to conduct a survey among the midwives of the hospital "Filippo del Ponte" in Varese to obtain information about the teaching received, attitudes to and knowledge of midwives of analgesia in labor in order to improve collaboration in our team and refine our quality service.
Materials and methods: We conducted the survey through a questionnaire. This instrument was based on studies investigating what midwives know about the use and effectiveness of epidural analgesia and their attitude to the procedure [1, 2, 3]. As options we used Likert scales validated in Italian for frequency and intensity. The collected data were analyzed aggregated through SPSS (Statistical Package for Social Sciences) 17.0 for Windows.
Results and discussion: The majority of midwives believe they have received sufficient training on the topics of labor pain and techniques of control, including epidural analgesia. Almost the total of the sample believes that physical or psychological exhaustion are factors that affect woman in the request for epidural analgesia.
Epidural analgesia is considered a useful and safe technique. 85% believe that epidural analgesia doesn't affect on a possible low Apgar score at birth and 72.5% that creates or difficulty for breastfeeding.
Conclusions: Pain is still considered a useful tool for the progress of labor and to live fully the experience of childbirth. There is no real attention to the "care" of pain and to alternative techniques to epidural analgesia, while there is an attempt to take care of the woman as a whole. This cultural issue is probably the biggest obstacle in accepting openly and in providing epidural analgesia and it means refusing to recognize the right of women to receive epidural analgesia whenever they request it.
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4AP9-12

Obstetric enhanced recovery: development and implementation into a district general hospital

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Background:
- A UK wide survey of obstetric units showed 96% supported the idea of obstetric ERAS (OERAS) but that only 4% routinely discharge on D1 (7% for our unit)[1].
- NICE endorses early discharge in appropriate patient groups[2].
- Recent implementation of OERAS in a UK teaching hospital showed improved maternal satisfaction and decreased length of stay[3].

Methods:
- Here we describe our template for implementing OERAS in a DGH as a Quality Improvement initiative with the primary aim of reducing length of stay.
- The primary drivers were optimisation of the antenatal, perioperative and postnatal period.
- These were addressed via the implementation and efficient utilisation of checklists and education and engagement of members of the multidisciplinary team (MDT).

Spanning 18 months and adopting Plan Do Study Act (PDSA) cycles the following 6 stages were defined:
1. Initial audit of elective LSCS practice and outcomes (July-Aug 2013)
2. Formulation of protocols and antenatal, perioperative and postnatal checklists
3. Pilot OERAS data collection (June-Aug 2014)
4. Creation of dedicated antenatal OERAS clinic for all appropriate elective LSCS
5. Official media launch including talk from first mother through the OREAS pathway (Sept 2014)
6. Initial snap audit post launch (Oct-Nov 2014)

Results:
- Initial pilot data showed improved D1 discharge rates (69%,9/13) vs 7% pre OERAS.
- Whilst not the only important outcome measure of an OERAS programme, discharge is easy to measure and can be seen as a surrogate marker for successful implementation of the pathway and therefore other secondary outcome measures. A favourable maternal satisfaction was incidently noted (100%,13/13)
- Of 72 elective LSCS during the 2-month post launch period, 26 were recruited to the OERAS pathway. 7 did not undergo elective LSCS.
- All D1 discharges (47%,9/19) remained "on" pathway whilst 75% (3/4) of D3/4 discharges went "off" pathway. Total discharges were D1-9, D2-6, D3-2 and D4-2.

Conclusions:
- Engagement of obstetric MDT in developing aims, drivers and objectives
- Promising outcome improvements utilising local, hospital developed OERAS pathways
- D1 discharge associated with improved completion of protocols
- Enthusiastic maternal response
- Complete data collection to commence in 2015.

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4AP10-1

Anesthesia for c-section in a tertiary maternity: a five year review

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Background and Objective: The WHO suggests an ideal rate of 5 to 10% of c-section deliveries for optimal mother and baby outcomes. Its choice must balance both maternal and foetal risks. Good interdisciplinary communication is essential to never delay an emergent extraction or put the mother t risk. Regional anaesthesia (RA) is the hallmark choice for c-section, as it provides added safety for both mother and baby. In Portugal, however, both the percentage of c-sections and the rate of general anaesthesia (GA) remain high [1][2].
This study aims to characterize the population of women that underwent c-section at a reference obstetrics unit from January 2010 to Nov 2014.

Materials and Methods: We conducted a retrospective observational study from medical records for the selected timeframe.
Results and Discussion: There were 3766 c-sections (29% of a total of 13005 childbirths). 73% of c-sections were urgent; the most frequent indication was foetal distress (44%) followed by stalled labour (18.4%) and foeto-pelvic incompatibility (FPI) (15.3%).
There were 27% planned c-sections. Breached presentation (37%), FPI (24%), previous uterine surgery (11.7%) and maternal co-morbidities contraindicating (CI) vaginal delivery (8.6%) were the most frequent causes.
RA was performed in 86% of cases. Epidural blockade was the most frequent (79.1%), followed by spinal anaesthesia, either isolated (8.8%) or sequential with epidural technique (12.1%).
GA was chosen for 14% of cases, mainly for emergent foetal extractions (42%) or when there was maternal CI for neuraxial technique (25.2%). Failed RA (15.8%) and maternal refusal (7.7%) were other causes; in 8.9% of cases, the motive was not clear. Foetal heart decelerations (56%), severe pre-eclampsia and HELLP (12%) and prolapsed cord (7%) were the most frequent obstetric emergencies. Coagulation disorders (17%) and spine pathology (30%) or other chronic diseases (29%) were prevalent maternal CIs to RA.
The percentage of c-sections remained stable over the studied period. The rate of GA has shown a slight decrease, 13% in 2014 vs 15% in 2010.
Conclusions: We observe a high rate of c-sections and GA. As a referral centre, we have higher prevalence of maternal disorders and high risk pregnancies, contributing to this circumstance. In addition, as a teaching unit for anaesthesia trainees, the prevalence of a failed technique is probably inflated.

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4AP10-2

Audit of Code Green practice, KK Women's and Children's Hospital (KKH)

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Aim(s): The premise of category 1 caesarian section delivery was to ensure maternal and foetal well being with expedited delivery. Therefore the aims of this study to review current practice relating to category 1 emergency caesarean sections (CS) in KKH and identify areas that can be improved for patient safety and care.
Methodology: After checking that ethical approval was not required, data was prospectively collected for all "Code Green" (category 1) CS for a 3 month period from 13/02/2014 to 13/05/2014 in KKH. A standard data collection sheet in the obstetric theatres was completed at the time by anaesthetic and obstetric doctors whenever a Code Green was called. All theatre records of operation books were checked weekly.
Result(s): 26 cases were recorded within this 3 months of audit. 96.2% of pregnancies were singleton and 3.8% were twin pregnancy. Reasons for Code Green include foetal distress, cord prolapsed, uterine rupture, malpresentation, antepartum hemorrhage, placental abruption and others. Mean decision-to-delivery interval was 8.58 minutes. 80.2% of all cases were performed between 16.00-08.30 (ie out of hours). Neonatal outcome: mean arterial cord blood gas pH was 7.124. Mean 5 minute Apgar score 8.3, with 46.2% having an unanticipated SCN/NICU admission.
Maternal outcomes: 1 iatrogenic bladder serosal tear and 15.4% patients were unexpectedly admitted to ICU/POA. Anaesthesia: 96.2% of cases were performed under GA despite 34.6% of patients having an epidural in situ. There was a 1 in 25 incidence of airway complications, but there was no maternal compromise. Only 38.5% of cases received an antacid and 34.6% an antibiotic prior to transfer to theatre.
Communication: In 38.5% of cases contact was made with anaesthetist outside of the announcement. In 1 case there was a failure in communication - the anaesthetist recorded the reason for the Caesarean as placental abruption when it was actually a cord prolapse. No WHO "time-outs" were performed prior to skin incision. The documentation of reason for and time of decision for Code Green was poor. In 26.9% of cases there was documented intra-uterine resuscitation.
Timings: The only delay recorded was due to the patient being taken to the emergency theatre which was being cleaned and then to the adjoining theatre which was not prepared for the case.

4AP10-3

Determination of the median effective dose of chloroprocaine in labour: preliminary results

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Background and Goal of Study: Chloroprocaine is an old local anaesthetic with renewed interest for its beneficial pharmacodynamic/kinetic profile, which appears particularly suitable for intrathecal analgesia in labour[1]. However, the commonly used dosages are arbitrarily chosen and may be excessive. The primary goal of this study was to determine the median effective dose (ED_{50}) of Chloroprocaine when given intrathecally as part of a combined spinal-epidural analgesia regimen for labour using an up-and-down method[2].
Materials and Methods: In this prospective trial 18 parturients, with a pregnancy duration of 36 to 41 weeks, requesting analgesia, were given a combined spinal-epidural analgesia and received a predetermined dose of chloroprocaine 1% intrathecally, according to an up-down sequential allocation. The initial dose of chloroprocaine was chosen to be 20mg and the testing interval was set at 2mg. Analgesic effectiveness was accepted if the visual analog pain score decreased to 10mm or less on a 100mm scale within 15 minutes. After the study period parturients were offered a conventional patient controlled epidural analgesia protocol with levobupivacaine and sufentanil.
Results and Discussion: Using the Dixon and Mood method, the median effective dose of intrathecal chloroprocaine in the spinal component of a CSE for labour was calculated to be 15 mg (95% CI:11.7-18.3 mg).
Conclusion(s): To our knowledge, this is the first study to calculate a median effective dose for spinal chloroprocaine for labour analgesia. Further inclusion of patients will allow to refine the confidence intervals.
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4AP10-4

Does anaesthetic approach for caesarean section with a combination of rocuronium and sugammadex confers any benefit over suxamethonium, rocuronium and neostigmine? A prospective single blinded randomized study

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Background and Goal of Study: Rocuronium for caesarean section (CS) under general anaesthesia (GA) is now an alternative to suxamethonium for rapid sequence induction (RSI) owing to sugammadex. However, there are no large well-controlled studies that have been done in this setting. The aim of this study was to find out if a combination of rocuronium and sugammadex confers any benefit over suxamethonium, rocuronium and neostigmine in GA for CS.
Materials and Methods: We enrolled 240 parturients (12/2012-12/2013). These were randomized to the ROCSUG group (n=120) where muscle relaxation was induced with rocuronium 1 $mg.kg^{-1}$ and reversed with sugammadex 2-4 $mg.kg^{-1}$. In the SUCNEO group (n=120) suxamethonium 1mg.kg-1 was used for induction, rocuronium 0.3 $mg.kg^{-1}$ for maintenance and neostigmine 0.03 $mg.kg^{-1}$ for reversal of the neuromuscular blockade. The time to tracheal intubation was the primary endpoint with a non-inferiority margin of 20 seconds. We recorded intubation conditions (modified Viby-Mogensen score), neonatal outcome (APGAR 10^{th} min. above 7; pH_{au}) and anaesthesiological complications during CS. We evaluated subjective complaints 24 hours after surgery. To evaluate the primary endpoint a two-sided 95% confidence interval was used. The intubation conditions, neonatal outcome, complications and subjective complaints were tested using the Mann-Whitney and Fisher exact tests.
Results and Discussion: The time to tracheal intubation, on average, 2.9 seconds longer in the ROCSUG group (95% CI -5.3s - 11.2s) was regarded as non-inferior compared to SUCNEO group. There was a difference in the absence of laryngoscopy resistance (ROCSUG 87.5% vs. SUCNEO 74.2%; p=0.019), but no differences in vocal cord position (p=0.447) or intubation response (p=0.308). There were no statistically significant differences in incidence of anaesthesiological complications during CS and in neonatal outcome (APGAR above 7, p=0.066; pH_{au}, p=0.428). We could demonstrate higher incidence of myalgia in SUCNEO group (ROCSUG 0.0%; SUCNEO 6.7%; p=0.007) and decreased the total incidence of subjective complaints in ROCSUG group (ROCSUG 21.4%; SUCNEO 37.5%; p=0.007).
Conclusions: We conclude that rocuronium for RSI brings more frequently absence of laryngoscopy resistance and lower incidence of myalgia in comparison to suxamethonium for CS under GA.
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4AP10-5

Does sugammadex shorten recovery time of rocuronium induced neuromuscular blockade for caesarean section in comparison to neostigmine: randomised single blinded controlled trial

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Background and Goal of Study: Rocuronium (ROC) is commonly used neuromuscular blocking agent for caesarean section (CS) in general anaesthesia (GA). There are two alternatives for active reversal of neuromuscular blockade at the end of surgery: sugammadex and neostigmine. The aim of this study was to find out whether sugammadex shorten recovery time of ROC induced neuromuscular blockade (NMB) for CS in comparison to neostigmine.
Materials and Methods: With Ethical Committee approval we enrolled 346 parturients who underwent CS in GA in the period 12/2012 - 11/2014. NMB was induced with ROC 1 $mg.kg^{-1}$ in ROCSUG group or suxamethonium (SUC) 1 $mg.kg^{-1}$ followed by ROC 0.3 $mg.kg^{-1}$ in SUCNEO group. Depth of NMB during recovery was monitored by TOF-WATCH SX (Organon, Netherlands) in Train of Four (TOF) or PostTetanic Count (PTC) modes. At the end of the surgery there were administered sugammadex 4 $mg.kg^{-1}$ (PTC≥1) or 2 $mg.kg^{-1}$ (TOF≥1) in ROCSUG group and neostigmine 0.03 $mg.kg^{-1}$ (TOF≥1) in SUCNEO group. We recorded maternal characteristics data and noted time from neostigmine/sugammadex administration to TOF 90 % achievement.
Groups were reported descriptively (mean, median, standard deviation); time differences were tested using Kruskal-Wallis test at the 5% significance level (SPSS 21).
Results and Discussion: During the study period we enrolled 169 parturients in SUCNEO and 177 in ROCSUG group. There was deep NMB in 124 parturients (PTC≥1) or shallow NMB in 53 parturients (TOF≥1) in ROCSUG group. We didn't notice any statistically significant differences in characteristics of parturients.
There was statistically significant difference between time of reversal from NMB comparing both ROCSUG subgroups (PTC≥1; TOF≥1) and SUCNEO (TOF≥1) group (median 83s; 109s; 251s; p< 0.001). Parturients who received 4 $mg.kg^{-1}$ of sugammadex had seemingly faster reversal than those who received 2 $mg.kg^{-1}$, but the difference was not statistically significant (p=0.698).
Conclusion(s): We conclude statistically significant faster reversal of neuromuscular blockade with sugammadex compared to neostigmine after caesarean section in general anaesthesia irrespectively to depth of blockade.
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4AP10-6

Efficacy of endotracheal intubation of pregnant women during Caesarean section - own experience

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Background: Pregnant women are at a higher risk of anaesthesia-related complications because their airway might render intubation difficult. The aim of this study was to show our experience in restoring those patient airways.
Methods: The retrospective study included 450 pregnant women who had elective or emergency Caesarean section under general anaesthesia from January 1 2012 to August 31 2013 at the University Hospital Department of Obstetrics and Gynecology Merkur in Zagreb. General date (age, weight, height and body mass index (BMI)), preoperative anasthetic data (ASA and Mallampati classification, Cormac-Lehane laryngoscopic view of the glottis) and intraoperative data (ventilation, airway assessment) were recorded on the anaesthetic list. Endotracheal intubation with a rapid sequence induction using thiopental and suxamethonium we used in all cases.
Results: The assessed group consisted of 450 pregnant women of mean age 31.7 year, mean weight 89.6 kg, mean height 1.63m and mean body mass index 28.9kg//m^2.
Increased incidence of difficult intubation was observed in pregnant women with higher Mallampati score (3,4), obese women BMI ≥ 30kg/m^2) and women with laryngoscopically verified difficult intubation (Cormack- Lehane 3,4). In 25 cases of impossible endotracheal intubation I-gel mask administered (Table 1).

Preoperative and intraoperative variables	Number of cases
ASA Status (1/2/3)	(286/114/50)
Modified Mallampati test (1/2/3/4)	(192/135/63/60)
Cormack-Lehane laryngoscopic view of the glottis (1/2/3/4)	(244/72/58/76)
Establishment of airway (endotracheal tubus/laryngeal mask)	(393/47)
Mask ventilation (successful/ unsuccessful)	(406/44)
Endotracheal intubation (successful/difficult/impossible)	(391/34/25)
Urgency grade (Elective/Emergency)	(132/318)

[Preoperative and intraoperative variables]

Conclusion: In our study there was no record of significantly increased number of unsuccessful intubations. Analysed variables proved to be a reliable prognostic factor for the difficult intubation. We conclude that the laryngeal mask is a useful and safe alternative to endotracheal intubation for Caesarean section (providing effective ventilation and a low incidence of side effects or complications).

4AP10-7

Efficacy of low dose heavy bupivacaine with fentanyl in spinal anaesthesia for Caesarean delivery

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Background and Goal of Study: Spinal anaesthesia is preferred anaesthetic technique for elective Caesarean deliveries, hypotension remains an important side effect. Our study was designed to compare the efficacy of low dose heavy bupivacaine with fentanyl compared to standard dose in avoiding hypotension during spinal anaesthesia.
Materials and Methods: Hundred patients with American Society of Anaesthesiologists physical status (ASA) I - II, age 19 to 38 years, were randomized into two groups. Patients in group A (n=50) were given spinal anaesthesia using 10 mg heavy Bupivacaine with 25 μg fentanyl. Patients in group B (n=50) were given spinal anaesthesia using 7.5 mg heavy Bupivacaine with 25 μg fentanyl free preservative. All the patients received 10 ml/Kg Normal saline before induction. In both of the groups, vital signs were monitored as recommended for caesarean sections. We recorded the blood pressure of each patient every two minute until the baby was delivered and the fetal Apgar score was recorded.We observed the maximal level of sensory block and duration.
Results and Discussion: Duration of effective anaesthesia (block to cold sensation above or at T3) was longer in the A group as compared with B group, P<0.05). When comparing the changes in blood pressure, More patients in the A group experienced hypotension compared with the B group (P<0.05). however, Neonatal outcomes were similar in both groups.Conversion to general anaesthesia occurred only in B group (only one case).
Conclusion(s): We conclude that small-dose spinal anaesthesia (group B) better preserve maternal hemodynamic stability with equally effective anaesthesia that is of shorter duration, it may be feasible only when the block can be reinforced using a functional epidural catheter.

4AP10-8

Estimation of the ED95 of intrathecal hyperbaric prilocaine for scheduled cesarean delivery: a dose-finding study based on the continual reassessment method

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Background and Goal of Study: Prilocaine is an intermediate-acting amide-type local anesthetic which has recently showed its efficacy when applied for spinal anesthesia in various day surgery procedures. As a hyperbaric 2% prilocaine (HP) provides fast onset with a few side-effects. Proposed doses of HP for various operations vary largely, suggesting that targeted studies are required[1]. For cesarean section hyperbaric bupivacaine, coadministered with opioids, is routinely used[2]. HP has not yet been investigated in this context. We used the continual reassessment method (CRM)[3] to find the ED95 of 2% HP for scheduled cesarean delivery under spinal anesthesia.
Materials and Methods: After approval by the local Ethics Committee and signed informed consent, term parturients were enrolled in a dose-finding, prospective, observational study. The statistical model used is the CRM, using a Bayesian estimation of the dose. Four patients per cohort were recruited for each dose. The starting dose of 60 mg was determined by preliminary results, corresponding to the ED95. Subsequent doses were set by the previous patient's response and were allocated by the CRM : 45, 50, 55, 60, 65 and 70 mg, *a priori* corresponding respectively to ED50, 75, 90, 95, 98 and 99 of HP. Morphine (100 mcg) was added to each dose. As success was considered a bilateral T4 sensory level attained within 15 min after the spinal HP dose. Otherwise, we had a failure and epidural supplementation was given. The following variables were also recorded: onset/duration of sensory block, onset/duration of motor block, side effects (hypotension, bradycardia), baby's parameters (Apgar and ombilical pH, methemoglobinemia), maternal satisfaction.
Results and Discussion: 40 patients were included, and, under the conditions of our study, the HP ED95 is 65 mg with a credibility interval lower than 5%. The sensory block had a good quality and lasted 3.31±0.7 h and decrease of the systolic arterial pressure of 6% from baseline was noticed. All newborns were in good health (Apgar 9.25±0.5, pH 7.24±0.1, methemoglobinemia 1.26±0.6).
Conclusion: The ED95 of intrathecal HP, associated with morphine, for cesarean section was estimated to be 65 mg. HP provide a good quality sensory block with no major hemodynamic disorders, neither bad newborns outcome.
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4AP10-9

Purines of blood, cerebrospinal fluid, and the quality of spinal anesthesia for cesarean section

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Background and Goal of Study: To identify (potential) relationships between the features of purine metabolism and quality of spinal anesthesia investigated the correlation between the concentration of purines and dose spinal ropivacaine, speed of onset, height and depth of the spread of spinal block, the need for additional use of intravenous analgesics and anesthetics.
Materials and Methods: We examined 30 pregnant women, who before starting spinal anesthesia for cesarean section was performed over the fence of venous blood, in the performance of spinal anesthesia (before the introduction of anesthesia) - fence CSF. Purines was determined by direct spectrophotometry. Take into account the following characteristics of spinal anesthesia administered dose of spinal ropivacaine mg, speed of onset, depth and height of the spread of spinal block, the need for additional administration of intravenous analgesics and anesthetics. Using parametric and non-parametric correlation analysis, nonparametric comparisons of two groups by Mann-Whitney U Test.
Results and Discussion: Dose spinal ropivacaine positively correlated with blood levels guanine (r = 0,73; p = 0,040), hypoxanthine (r = 0,82; p = 0,013), adenine (r = 0,77; p = 0,023) and xanthine (R = 0,71; p = 0,046).
Time of onset of a sufficient level spinal block positively correlated with blood levels of guanine (r = 0,89; p = 0,003), hypoxanthine (r = 0,85; p = 0,008), xanthine (r = 0,73; p = 0,040) uric acid (r = 0,78; p = 0,022).
Spinal block height correlated with blood levels of guanine (R = 0,74; p = 0,035) and xanthine (R = 0,71; p = 0,048).
Mother with high quality, relevant spinal unit that does not require additional use of intravenous anesthetics from women did not agree with the lower level corresponding to the insufficient number of spinal block, a lower concentration of serum guanine (Mann-Whitney U test, Z = 2,021; p = 0.043).
Conclusion(s): The level of guanine in blood serum can be used to predict the quality of spinal anesthesia in obstetrics, and possibly to define indications for preemptive use of combined spinal-epidural or general anesthesia instead of the single-stage single-dose spinal anesthesia.

4AP10-11

The influence of succinylcholine-induced fasciculation on maternal SpO_2 and neonatal umbilical artery PaO_2 during rapid sequence induction for caesarean section: retrospective study. Comparison with rocuronium bromide

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Background and Goal of Study: Succinylcholine has been the neuromuscular blocking drug of choice for rapid sequence induction (RSI). However, it is potentially life-threatening if it is inadequately managed, particularly in parturients. Additively, maternal hypoxia might have resulted in neonatal hypoxia. Concerns regarding the side effects of succinylcholine have interest in the use of a short acting non-depolarizing neuromuscular blocking drug and the search for this resulted in rocuronium. Accordingly, the aim of the present study was to assess the influence of neuromuscular blocking drug for caesarean section on maternal and neonatal outcome.
Materials and Methods: We have compared succinylcholine (group S, n=56) with rocuronium (group R, n=48) on maternal desaturation and neonatal outcome, in parturients undergoing emergency Caesarean section under RSI. After preoxygenation, thiopental or propofol was given i.v. followed by the neuromuscular blocking drug (Succinylcholine 1.0-1.8 mg/kg, Rocuronium 0.9-1.4 mg/kg). About 60 seconds later intubation was performed. Oxygen desaturation was defined as a decrease in oxygen saturation $\geq$ 5%, assessed by continuous pulse oxymetry, at any time between the start of the induction sequence and three minutes after the completion of the intubation. Neonates were assessed by using Apgar scores, umbilical artery (UA) PaO_2. Values are expressed as mean values±SD. pearson's chi squared and t-test were used for statistical analysis $p < 0.05$ was considered significant.
Results and Discussion: There was significantly difference between succinylcholine and rocuronium regarding oxygen desaturation (Group S : 9/56 ; Group R : 2/48; p=0.04); Failed first intubation attempts (Group S : 1/56 ; Group R : 0/48; ns) did not differ between the groups.
1-min Apgar scores (5.7±3.0, 5.6±2.2), 5-min Apgar scores (7.6±2.1, 7.6±1.3) and UA PaO_2 (17±5, 17±6 mmHg) were similar between groups.
Conclusion(s): In terms of incidence of failed intubation attempts and neonatal outcome did not differ between succinylcholine and rocuronium. However, succinylcholine had increased incidence of maternal desaturations. We conclude that rocuronium in emergency caesarean section can be used safety without side effects.
Reference: 1. Taha SK. Effect of suxamethonium vs rocuronium on onset of oxygen desaturation during apnoea following rapid sequence induction. Anaesthesia 2010; 65: 358-61

4AP10-12

Urgent caesarean-section in a gemelar pregnancy patient under chronic haemodialysis therapy: a multidisciplinary approach

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Background: Haemodialysis (HD) in pregnancy is uncommon and carries a high risk of foetal and maternal complications, but outcomes have improved [1]. Foetal death still is a likely outcome without multidisciplinary approach and communication; accurate maternal and foetal monitoring from an early stage are required [2]. Multiple pregnancies further increase risks. To our knowledge, a gemelar pregnancy on HD has never been reported.
Case report: A 32 year-old, G4 P3, with end-stage kidney failure (KF) started on HD program. An ultrasound for abdominal pain 15 weeks (w) later detected a pregnancy of estimated 19w - therapeutic adjustments were made.
At 27w, she was admitted to the hospital for the remainder of pregnancy, on 6/week HD therapy, frequent foetal ultrasounds and analytical controls. Dexamethasone treatment for foetal lung maturation started at 28w.
A caesarean-section (CSA) was planned for 35w. However, at 34w during a HD session labour started. The session was interrupted, an operating team readied and due diligences made for neonatal transport.
The patient was characterized as ASA IV with a full stomach. Aspiration prophylaxis was administered one hour before induction; anticoagulation from HD precludes a neuraxial technique. With ASA standard monitorization and BIS®, under general anaesthetic, both foetuses were extracted and transported complications-free. She needed labetalol to control rising blood pressure; intravenous morphine for analgesia and 2 units of packed red blood cells for anaemia. After a HD session at 20 hours post-op, she was transported to the maternity ward. HD sessions reduced to 3/week.
Discussion: Gemelar pregnancy and end-stage KF are independent risks factors for both maternal and foetal complications. The mother is at higher risk of preeclampsia, anaemia, postpartum haemorrhage and infection. On the foetus side, polyhydramnios, intra-uterine growth retardation, low birth weight, preterm delivery and stillbirth are more common. HD with heparin derivatives may preclude a neuraxial approach. A multidisciplinary approach proved essential to the good outcome observed.
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Learning Points: A multidisciplinary team is required to ensure maternal and foetal safety. A stable patient with adjusted HD regimen is the key to success.

Paediatric Anaesthesiology

5AP1-1

Assessment of haemodynamics with oesophageal Doppler in a 3-yr-old child with crouzon syndrome undergoing major craniofacial surgery

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Background: Paediatric craniofacial reconstruction (CFR) surgery has been shown to be associated with substantial intraoperative blood loss. Appropriately assessing and maintaining haemodynamics during CFR surgery is the key challenge in today's anesthesiological care. In this regard, we report our experience regarding the haemodynamic monitoring by oesophageal Doppler monitor in major CFR surgery.
Case report: We present a 3-yr old child with crouzon syndrome undergoing monobloc osteotomy for frontofacial distraction. After induction of anaesthesia and oral intubation, the paediatric oesophageal Doppler probe (KDP72, Deltex Medical, Chichester, UK) was inserted orally and connected to the oesophageal Doppler monitor (CardioQP-ODM™). Although, there was no re-adjustment of the Doppler probe made during surgery, an acceptable Doppler signal was observed in 88.3% of case time, while in 11.2% and 0.5% of case time the signal was weak and poor, respectively. There were no complaints by the surgeons regarding the orally placed Doppler probe. The ODM provided additional information on hemodynamic status and supported clinical decisions regarding fluid and blood product administration. Furthermore, the ODM revealed a critical impairment of stroke volume and cardiac output after infiltration anaesthesia of the scalp with local anaesthetic and epinephrine.
Discussion: To day there is little data on an appropriate haemodynamic monitoring in children undergoing CFR surgery with most efforts based on pressure variables. In contrast, we used a device that directly measures flow in the descending aorta and has been shown to appropriately assess CO in children. A few years ago, it was already stated that an appropriate haemodynamic monitoring would enable evidence-based decision-making in pediatric CFR surgery.[1] In this regard, the ODM provides a minimal invasive method for continuously measuring flow and in our opinion there is the need to develop a haemodynamic algorithm based on the ODM, which complements the clinical pathway in this pediatric high-risk surgery.
Reference: 1. Stricker PA, Cladis FP, Fiadjoe JE, et al. Perioperative management of children undergoing craniofacial reconstruction surgery: a practice survey. *Paediatr Anaesth* 2011; **21**: 1026-35
Learning points: During paediatric CFR surgery, the use of the ODM was feasible and the ODM provided additional information on hemodynamic status and supported clinical decisions regarding the haemodynamic management.

5AP1-2

Epidural analgesia for major hepatic resection in an infant

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Background: Hepatic tumors represent 1% of all pediatric malignancies.[1] Surgical resection offers the only possibility of permanent cure.[1] Postoperative pain management remains a challenge after hepatic resection due to the presence of a large surgical incision. Placement of epidural catheter poses a dilemma due to marginal preoperative liver function, extensive intraoperative blood loss and size of resection leading to a high prevalence of hemostatic abnormalities.[1,2,3] For all of these reasons, several clinicians choose to avoid epidural analgesia in patients undergoing major hepatic surgery, especially in the pediatric population.
Case report: 11-month-old male, 10.5 kg, diagnosed with hepatoblastoma (9.5x6.8x6.6cm), proposed for right hepatectomy after neoadjuvant chemotherapy. Preoperative laboratory tests revealed anemia (hematocrit 29,8%), thrombocytopenia (platelet count 116×10^9/L), normal coagulation and hepatic function. Surgical procedure was performed under uncomplicated inhalatory general anesthesia with sevoflurane. An epidural catheter was subsequently placed in the lumbar region (L3-L4) without complications. A bolus of ropivacaine 0.2% (4mL) was administered and after an hour initiated a perfusion at 2mL/h. In the postoperative period it was maintained along with epidural morphine (0.4mg) every 12 hours. On the first day blood analyses revealed coagulation disorders (prothrombin time 17.5 seconds) and lower platelet count (55x10^9/L). Fresh frozen plasma and vitamin K were administered. Four days after surgery platelet count and coagulation values normalized and epidural catheter was removed safely. During this period there was a good analgesic control without any complications.
Discussion: Epidural analgesia may be safely used in infants undergoing major hepatic resection. Preoperative evaluation of coagulation and platelet count is of great importance to access the risk of epidural hematoma. Epidural catheters must be removed only when resection-induced perioperative coagulopathy has resolved.
References:
1. South Afr J Anaesth Analg. 2013;19(6):290-94;
2. Reg Anesth Pain Med. 2009 Jul-Aug;34(4):308-11;
3. J Anesth. 2014 Nov 13. [Epub ahead of print]
Learning points: Patients undergoing elective major hepatic resection have moderate coagulopathy. Conservative hemostatic goals surrounding catheter placement and removal guarantee that epidural analgesia is safe and effective for postoperative pain management in these patients.

5AP1-3

Septo-optic dysplasia/de Morsier syndrome case report

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Background: Septo-optic dysplasia (SOD), also known as de-Morsier's syndrome, is characterized by optic nerve hypoplasia, endocrine dysfunction and agenesis of *septum pellucidum* or *corpus callosum*). It is estimated an incidence of 1/10.000. It is thought to be associated with genetic and environmental influences early in gestation. Hypopituitarism, hypothyroidism, hypogonadism, adrenal insufficiency, delayed growth and development are common clinical presentations. If not treated, SOD can lead to severe hypoglycemia, seizures and sudden death. Anesthetic management of SOD was associated with high perioperative mortality. There are no reported cases of successful anesthesia in patients with SOD.
Case report: Male patient, 9 years old, ASA physical state III, proposed for dental treatments and extractions. Personal history of SOD with hypopituitarism, hypothyroidism and delayed psychomotor development. Usual medication: Hydrocortisone 25 mg/day and Levothyroxine 0.075 mg/day. No known allergies. Physical examination: 50 kg, 151 cm, blood pressure 94/41 mmHg, heart rate 115 bpm. Mallampati classification grade II, normal cardiac and pulmonary auscultation. Blood analyses with liver, kidney, thyroid and pituitary function within normal parameters.
Anesthetic inhalatory induction with sevoflurane plus air and placement of an intravenous access (IV). IV administration of hydrocortisone 50 mg and dexamethasone 4 mg. Infusion of 0.9% saline solution with 5% glucose at a rate of 125 ml/h. Reinforced laryngeal airway mask was introduced. Maintenance of anesthesia with sevoflurane and air, combined with local infiltrative anesthesia with 2% lidocaine. During the procedure the patient was breathing spontaneously, hemodynamically stable and with normal glucose levels measured every 30 min. The patient received 750 mg of Paracetamol IV for analgesia. The procedure lasted about 80 min and the patient was transported to the post-anesthetic care unit (PACU), conscious and with spontaneous ventilation. The child stayed 6h at PACU and was discharged from the hospital 24h after the procedure. During this period there were no complications.
Discussion and Conclusion(s): The mortality related to anesthesia in such patients putted us some challenges. We think that the local infiltrative anesthesia contributed to the abolition of pain and avoided adrenal suppression which was a decisive factor for the success of the procedure in this patient.

5AP1-4

General anesthesia in a 9-year-old child with Kartagener syndrome: a case report

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Background: Kartagener syndrome is a subset of primary ciliary dyskinesia, a rare autosomal recessive condition in which ciliary structure and/or function is abnormal; it is characterized by the clinical triad of situs inversus, chronic sinusitis and bronchiectasis. Clinical manifestations are more severe during the first decade of life and include chronic upper and lower respiratory tract disease due to impaired mucociliary clearance. Recurrent otitis media is a common manifestation. Even though surgical treatment is often needed, this syndrome is rarely encountered in paediatric anaesthesia practice.
Case report: A 9-year-old male child with history of situs inversus with dextrocardia and hypoplasia of paranasal sinuses was scheduled for adenoidectomy and bilateral myringotomy tube placement due to chronic adenoiditis, sleep-disordered breathing and chronic otitis media. He presented frequent episodes of breathlessness and mucopurulent productive cough often needing postural drainage associated with antibiotic and bronchodilator therapy. Pre-operatively, postural drainage and chest physiotherapy were performed. Antibiotics and steroids were administred before induction. Anesthesia was induced with midazolam, propofol and alfentanyl and maintained with sevoflurane. The patient was ventilated with a humidified mixture of oxygen and air in the pressure-controlled mode. Intraoperatively, despite remaining hemodynamically stable, gentle endotracheal tube suction due do accumulated secretions with associated decrease of achieved tidal volumes was needed on three occasions. Bronchodilators were administered prior to deep extubation but mild bronchospasm still followed, requiring additional bronchodilators and assisted mask ventilation. Administration of supplemental oxygen and epinephrine nebulization were maintained during the immediate post-operative period, which was otherwise uneventful.
Discussion: Patients with Kartagener syndrome are prone to airway obstruction, air trapping and hypoxemia. If airway management is required, there may be an increased risk of complications such as bronchospasm or acute respiratory failure. Careful clinical evaluation and pre-operative measures such as chest physiotherapy and administration of steroids and bronchodilators are crucial.

5AP1-5

Anesthetic management of a very rare disease: HSAN type IV

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Background: Hereditary Sensorial Autonomic Neuropathy Type IV (HSAN-IV) a.k.a. Congenital Insensitivity to Pain with Anhidrosis (CIPA) is a rare congenital disease characterized by recurrent unexplained fever, total insensitivity to pain, anhidrosis, and mental retardation in some cases. These patients occasionally develop corneal scarring, teeth eruptions, multiple fractures, osteomyelitis, buccal and lower limb wounds, and injuries of finger tips caused by self-mutilating behaviors; so they often undergo surgery.[1] We report our experience with HSAN-IV patient developed tibia fracture.
Case report: A 7 year old-male patient admitted to hospital with left tibia fracture. He had clinical diagnosis of HSAN-IV; history of ulna fracture, minor burns on the finger tips, and circumcision without anesthesia. The patient was scheduled for elective operation under monitored anesthesia care (MAC). Routine monitorization was made, including electrocardiogram, pulse-oximeter, non-invasive blood pressure and body temperature measurement in the operating room. Closed reduction and external fixation of tibia was performed without any complications. The patient was discharged after one night uneventful follow-up.
Discussion: Patients with CIPA have insensitivity to pain, but MAC can sometimes yield problems. Tactile stimulus can cause hyperesthesia and unpleasant feeling during surgery. Patients with CIPA are prone to regurgitation and cardiac dysrhythmias. Appropriate airway control must be provided. Body temperature monitorization is vital, because the regulation is impaired due to anhidrosis. We suggest routine application of general anesthesia to these patients. They have low plasma levels of epinephrine and norepinephrine, so cardiovascular reflexes are preserved. Atropine, merperidine, fentanyl, succinylcholine, atracurium, vecuronium, ketamine, propofol, barbiturates, benzodiazepines and inhalation agents have been safely used in CIPA.[2] In conclusion, although patients with CIPA have insensitivity to pain, general anesthesia is suggested in them for operations, and body temperature monitoring must be a part of routine monitorization.
References:
1. E. Achouri, M. Gribaa, J. Bouguila et al. HSAN type IV: A report on two cases Archives de Pe'diatrie 2011;18:390-3.
2. Sheng-Chin Kao, Chien-Kun Ting, et al. Desflurane Used in a Patient with CIPA during Septic Shock. J Chin Med Assoc 2004;67:305-7.
Learning Points: Important features of anesthesia for CIPA.

5AP1-6

Apparent mineralocorticoid excess (AME) syndrome - anaesthetic management of Omani siblings with hypertension and hypokalemia

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Background: Congenital deficiency of 11β-hydroxysteroid dehydrogenase type-2 enzyme, which normally inactivates cortisol and confers aldosterone specificity on the mineralocorticoid receptor, leads to Cortisol behaving as a potent mineralocorticoid, Hypertension and hypokalemia are thus grave risks for concomitant general anaesthesia.
Case report: Two Omani sisters aged 6 yrs (weight-13 kgs; BMI-6.7) and 10 yrs (weight- 20kgs; BMI-12.1) with Hypertensive Retinopathy were scheduled for Ophthalmological examination under General Anaesthesia. Initially presenting with severe failure to thrive, hypertension, hypokalemia (K-2.1) and polyuria-polydipsia, they also had progressive learning disability, easy fatigability, enuresis and bladder dysfunction. Cortisol level was normal but 24-hr urine cortisol/ cortisone ratio was raised 50-fold. Treated with potassium supplements, Ameloride and Atenolol. Anaesthesia assessment revealed normal airway and clear chest. Propofol and Fentanyl induction led to atropine-sensitive bradycardia. Maintenance was with Sevoflurane through LMA proseal. No intraoperative hypertension and smooth recovery.
Discussion: Hypokalemia and Hypertension are potential anaesthetic risks. Intraoperative cardiac arrhythmias, hypertensive cardiac failure/cerebrovascular accidents and delayed recovery due to poor muscle strength are realistic possibilities. It is imperative to optimize and also be vigilant intraoperatively, while managing patients with such rare syndrome.
This case report is to highlight the potential clinical catastrophe that are incipient in anaesthesia management of these children. Regional anaesthesia is also potentially harmful in view of contracted intravascular volume and altered autoregulation; with significant perfusion loss after sympatholysis. Active multi-disciplinary optimization in the peri-operative phase is essential to ensure smooth anaesthesia conduct.
References:
1. Al-Harbi T, Al-Shaikh AJ. Apparent mineralocorticoid excess syndrome: report of one family with three affected children. Pediatr Endocrinol Metab. 2012;25(11-12):1083-8.
2. Parvez Y, Sayed OE. Apparent mineralocorticoid excess (AME) syndrome. Indian Pediatr. 2013 Apr;50(4):416-8.
Learning Points: Hypertension and hypokalemia in children with rare congenital syndromes are important potential harbingers of Stroke and heart failure during anaesthetic management. Diagnosis and pro-active multi-disciplinary management are imperative for continued care.

5AP1-7

Anesthetic management of child with anterior mediastinal mass: a case report

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Background: General anesthesia in children with anterior mediastinal mass may be accompanied by serious life-treating complications, as a result of compression of the airway and large blood vessels.
Case report: An 11 years old boy was admitted with acute dyspnea, cough, tachycardia, headache and malaise. Radiographic, ehosonographic and CT

examination of the thorax visualized a large tumor mass in the mediastinum, superior vena cava syndrome, compression of the pulmonary trunk, distal trachea and left bronchus. Echocardiography detected significant pericardial effusion around the left ventricle with ejection fraction of 56% and no signs of tamponade. Consilium indicated biopsy of the tumor mass under general anesthesia. Induction of anesthesia was with sevoflurane. After administration of midazolam (0.05mg/kg) and ketamine (1mg/kg), patient was intubated without the use of neuromuscular blocking agents. Maintenance of anesthesia was with sevoflurane, bolus doses of ketamine (1mg/kg) and fentanyl (50μg). Spontaneous ventilation was maintaining. Anterior mini thoracothomy, tumor and bone marrow biopsy were done. A fall in blood pressure was registered, corrected by a fluid bolus and lightening the depth of anesthesia. There were no other complications. Patient was extubated and transported to Intensive Care Unit.

Discussion: Based on symptoms and preoperative examination, our patient was at high risk for serious complications in general anesthesia (1-3). Anesthetic plan with therapeutic options for possible complications was made. Hematologist disagreed with the preoperative administration of corticosteroids, since may interfere with histological diagnosis (1). The maintenance of spontaneous ventilation is recommended (1-3).

References:

1. Hack HA, Wright NB, Wynn RF. The anesthetic management of children with anterior mediastinal masses. Anaesthesia. 2008;63(8):837-46.
2. Blank RS, de Souza DG. Anesthetic management of patients with an anterior mediastinal mass: continuing professional development. Can J Anaesth. 2011;58(9):853-867.
3. Slinger P, Karsli C. Management of the patient with a large anterior mediastinal mass: recurring myths. Curr Opin Anaesthesiol. 2007;20(1):1-3.

Learning points: Induction of anesthesia with sevoflurane and maintenance with sevoflurane, low dose ketamine, reduce dose of fentanyl and midazolam, maintaining spontaneous ventilation via the endotracheal tube, may be an appropriate choice for patients with anterior mediastinal mass.

5AP1-8

Potocki-Lupski syndrome - an anaesthetic challenge?

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Background: Potocki-Lupski syndrome (PLS) is a rare disease with an estimated incidence of 1 per 20000. In most cases it is caused by a mutation de novo. It is caracterized by multiple congenital abnormalities, mental retardation, infantile hypotonia, sleep apnea and structural cardiovascular anomalies. This syndrome has a peculiar phenotype: triangular facies, cleft palate, mandibular hypoplasia, malocclusion, prominent forehead and dental abnormalities1.PLS features may suggest a probable difficult airway, for which the anesthesiologist shall be prepared.

Case report: 5 year old child, male, 15 Kg, ASA III (PLS and epilepsy), proposed for a cranial MRI. The child presented severe mental retardation, epilepsy, triangular facies, prominent forehead and mandibular hypoplasia. Previous surgery without history of difficult airway. Pre-anaesthetic evaluation revealed Mallampati grade 3 and short thyromental distance.

Inalatory induction of anaesthesia was attempted with 8% sevoflurane in spontaneous ventilation. An iv line was then inserted, followed by the administration of atropine (0,3mg) and succinilcoline (25mg). Direct laringoscopy was attempted and revealed a Cormack-Lehane grade 2. A 5.5 mm size uncufed tube was inserted and the airway secured. The patient was maintained on 2% sevoflurane in spontaneous ventilation.

The MRI scan took 2 hours and the child remained hemodinamically stable. At the end of it, the patient was extubated without complications. After 2 hours of observation in the recovery room, he was discharged home.

Discussion: There are few clinical reports in the literature about the anaesthetic management of patients with PLS. It is a rare genetic condition characterized by the referred abnormalities that may lead to a difficult airway management and marked hemodynamic instability during surgical procedures and the anaesthesiologist must be prepared for the worst possible scenario.

Reference: Journ Clin Inves 2006 Nov, 116 (11): 3035-41

Learning points: Despite the rarity of this syndrome, the main purpose of this case report is to highlight the clinical features that can be present, which may be of significant importance and an anesthetic challenge.

5AP1-9

Shamrock child - a case report

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To achieve a complete sensory block of the lower limb one must anesthetize up to five nerves. To overcome the unpractical aspect of this, we can choose to perform a lumbar plexus block (LPB). In children this technique is not widely used, in detriment of the neuraxial techniques. Multiple techniques to approach the lumbar plexus have been described, mostly with aid of ultrasound guidance or the nerve stimulator.

We report a case of a ten year-old girl with a right osteoarticular hip dysplasia and a history of myelomeningocele, proposed for a femur osteotomy and open reduction of the hip dislocation. Given her medical history we decided to execute a LBP, for intra operative anesthesia and short post operative analgesia, using the “Shamrock Method” - a new ultrasound-guided approach that has been recently described.

After general anesthesia was performed, the patient was proper positioned and a curved ultrasound transducer was placed transversally in the left abdominal flank, just above the iliac crest. Then, tilting and moving the probe caudally, we tried to identify the described pattern of a “tree leaves shamrock” - the psoas muscle anteriorly, the quadrates lumborum muscle at the apex of the tranverse process of L4 and the erector spinae muscle posteriorly. With the help of an electrical nerve stimulator, *twitching* of the *patella* (quadriceps) at 0.5 mA was observed. With a posterioranterior ultrasound approach and with the needle in-plane, we injected 10 ml of 0.5% ropivacaine between the hyper echoic oval structures of the lumbar plexus nerves, in the medial and posterior part of the psoas muscle. During the surgery the patient had mild tachycardia (<125 bpm) attributed to blood loss (total of 700 ml) due to an accidental artery laceration. Complementary analgesia was made with 525gr of intravenous paracetamol and 15 mg of ketorolac.

In the recovery room, and after 8 hours since the anesthetic was injected, the patient reported right lower limb paresthesias and no pain at all. In the nursery, she remain the night also with no particularly complains.

With this case, the first one described in the literature of the LPB via the Shamrock approach in a child so far, we intend to highlight the potential that this new technique has in the pediatric regional anesthesia, mainly in the cases of anatomical neuraxial deformities.

5AP1-10

Anesthetic management of a type II mucolipidosis (intermediate form) pediatric patient

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Background: Type II mucolipidosis is a rare lysosomal disorder. The phenotype resembles Hurler syndrome. This patients pose a high risk anesthetic but reports on their management are scant.

Case report: 4 year old boy, 12 kg. Hurler phenotype. Good mouth opening and sufficient neck extension. Gingival hypertrophy, Mallampati class I. Moderate aortic regurgitation and mild to moderate mitral regurgitation. Near normal ejection fraction. ECG: sinus rhythm with inverted T waves from V1 to V5. Apparent good functional class. Currently on captopril. Nasendoscopy: upper airway demonstrates infiltration by deposits but no obstruction. Scheduled for correction of an umbilical hernia and bilateral carpal tunnel and flexors release.

After standard monitoring, general anesthesia was induced with sevoflurane in oxygen and nitrous oxide (50/50) and peripheral vascular access was obtained. After denitrogenation with 100 % oxygen and a 20 mg bolus of propofol a supreme # 2 laryngeal mask was introduced without difficulty. Patient was connected to mechanical ventilation and adapted well to a pressure support mode. Maintenance of anesthesia was with sevoflurane 2-3 % and titration of fentanil. Local anesthesia was also administered before surgery. At the end of the case, the laryngeal mask was removed with the child almost awake and blood was noticed on its tip.

Discussion: We could only find one type II mucolipidosis case report (1) in which complications during intubation are described. We can probably extrapolate most of the important anesthetic issues in this rare disease from the closely related mucopolysacharidoses patients for whom the medical anes-

thetic literature and experience are more abundant. These would include a difficult airway; various respiratory and cardiac problems; potential c-spine instability and cord compression among many others (2).

References:
1. Difficult intubation management in a child with I-cell disease. Abdul Kader M et al. Saudi J Anaesth. 2010 May-Aug; 4(2): 105-107.
2. Perioperative Management of Children with Mucopolysaccharidoses. James H. Diaz et al Anesth Analg 1993;77:1261-70.

Learning points: We can extrapolate most of the important anesthetic issues from the mucopolysacharidoses patients in order to administer a safe anesthetic in patients with type II mucolipidosis, for whom the anesthetic literature is more scarce.

5AP1-11

Prospective audit to incidence and prophylaxis of postoperative nausea and vomiting in a pediatric population

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) have a double incidence in children than in adults (incidence of 33,2-82%). Postoperative vomiting (POV) occurs in 13-42%[1]. Our goal was to audit PONV incidence and prophylactic practice in a pediatric population.
Materials and Methods: Prospective audit to all consecutive pediatric patients submitted to in-patient elective surgery from March-April 2014. Excluded if re-intervention/un-reachable/no access to records. PONV were evaluated 24 hours after surgery (records and personal/phone interview).
Eberhart modified scale was registered. Prophylaxis was evaluated according to Portuguese Recommendations for Ambulatory Surgery[1](table 1). POV were evaluated in all patients; nausea (PON) was evaluated in collaborating children.
Spearman correlation test was used (p<0,05)

Eberhart risk factors:	PONV Risk:	Risk Groups:	Recommended prophylaxis:
Age ≥3 years old	0FR=9%	Low risk	Monotherapy: Ondansetron 0,1mg/kg or dexamethasone 0,15mg/kg
Squint surgery/ tonsillectomy/ adenoidectomy	1FR=10%	Low risk	Monotherapy: Ondansetron 0,1mg/kg or dexamethasone 0,15mg/kg
PONV personal or family history or motion sickness	2FR=30%	Moderate risk	Double therapy: Ondansetron 0,1mg/kg +dexamethasone 0,15mg/kg or ondansetrom 0,15mg/kg +droperidol 0,015mg/kg
Surgery >30minutes	3FR=55%	High risk	Double or triple therapy: ondansetron 0,1mg/kg, dexamethasone 0,15mg/kg or droperidol 0,015mg/kg
Total	4FR=70%	High risk	Double or triple therapy: ondansetron 0,1mg/kg, dexamethasone 0,15mg/kg or droperidol 0,015mg/kg

[Table 1]

Results and Discussion: 74 patients evaluated, submitted to general/urologic/plastic/ENT/dentistry surgeries. General anaesthesia in 84% of patients (15% total intravenous), combined in 16%.
Comparing to recommended prophylaxis: 53% had adequate, 19% less and 28% more than recommended.
PON global incidence was 35% (n=14), POV incidence was 5,4% (n=4).
In the recovery room, PON incidence was 9,5% (n=7), none vomited.
PONV incidence correlates to risk factors (r=0,28, p=0,04) (table 2).

Risk factors:	Number of patients:	PONV incidence	Group risk	PONV incidence
0	6	0%	Low	8%
1	30	10%	Low	8%
2	26	19.2%	Medium	19%
3	8	37.5%	High	50%
4	4	75%	High	50%

[Table 2]

Conclusion: In this audit we found a PONV incidence in the lower limit and POV incidence inferior to that reported in literature. Despite the small sample, PONV incidence increased as expected by Eberhart risk scale, so prophylaxis according to this system seems adequate. Still, more aggressive prophylaxis and attitudes to reduce PONV basal risk should be implemented, mainly in high risk patients. A larger, prospective study should be conducted to validate a protocol to in-patient pediatric surgery.

Reference: 1.Revista SPA2011; 20(2):10-21

5AP1-12

Paediatric cardiac catheterization: anaesthetic conduct of the last 14 years in a paediatric center

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Background and Goal of Study: Paediatric cardiac catheterization (PCC) is a routine procedure in our hospital since 2000, mainly due to complex congenital heart disease. Due to paediatric population' characteristics anaesthesia plays a key role in these procedures. The aims of this study were to determine the characteristics of paediatric population submitted to PCC and to analyse the anaesthetic approach and PCC complications.
Materials and Methods: A retrospective study was carried out by analysing PCC records performed between 2000 and 2014 in a paediatric hospital. SPSS20.0® was used for descriptive analysis.
Results and Discussion: In the last 14 years 1338 PCC were performed; 1257 elective (93.9%) and 81 urgent (6.1%); 726 boys and 612 girls, with a mean age of 6,6 (+/-5,0) years. There were 26 cases of cardiac arrest (1,9%), resulting in 1 death. The post-intervention care was provided in PACU (42,0%) or in the PICU/NICU (5,7%) and transport made by the paediatric SIV. Table 1 presents additional results regarding the patients' physical status, anaesthetic technique, type of CCP, procedure duration and patient destination.

Paediatric cardiac catheterization (CCP)		N (%)
Type of CCP		
Diagnostic CCP		848 (59,9)
Intervention CCP		568 (40,1)
ASA physical status		
I		298 (21)
II		703 (49,6)
III		354 (25,2)
IV		60 (4,2)
V		0
Anaesthetic technique		
Sedation		76 (5,3)
General Anaesthesia	Balanced	1184 (83,7)
	Intravenous	81 (5,7)
	Inhalational	13 (0,9)
	Dissociative	61 (4,3)
MAC		1 (0,1)
Anaesthetic procedure duration		
30min – 1h		30 (25,4)
1 – 2h		849 (60,0)
2 – 4h		191 (13,5)
>4h		16 (1,1)

[Table 1. Statistical analysis of the total CCP performed since 2000]

Most of CCP were elective suggesting the low incidence of critical events in this population. As noted in the table, the majority (61,5%) of the CCP was diagnostic, probably due to a benign prognosis or to a surgical option. The ductus arteriosus closure was the most frequent intervention CCP, probably due to greater prevalence of this malformation and to a more frequent technique made by CCP instead of open surgery. Most of children were ASA ≤II. The most common anaesthetic technique was balanced general anaesthesia and in 85.9% CCP lasted < 2 hours. The most frequent complications were oxygen desaturation, bronchospasm and ECG changes.
Conclusion(s): : Present data shows a low rate of complications, being safety in the anaesthetic approach for these high risk procedures a central concern

for the anaesthesiologist (1). Studies like this are crucial to understand current practices, to recognize the paediatric population features and to analyse clinical outcomes in this area.
Reference: (1) Anesthesiol clin.:2009;27:47-56

5AP2-1

The transversus abdominis plane block in children: efficacy and safety

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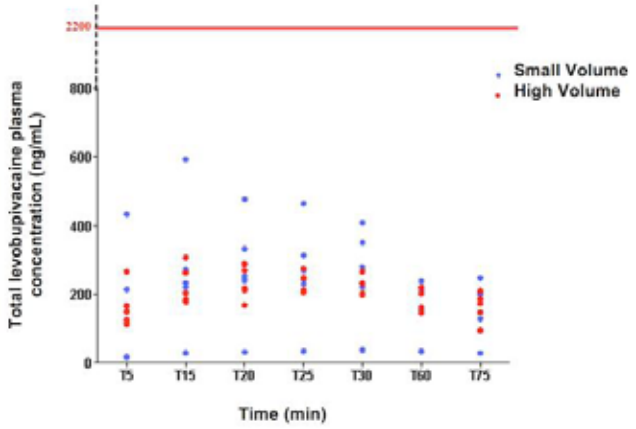
Background: The transversus abdominis plane (TAP) block provides efficient analgesia for children abdominal surgery. The ultrasound (US) guidance reduces the local anaesthetic (LA) requirement to an optimal dose of 0.4mg/kg of L-bupivacaïne[1]. This prospective randomized study aims to assess the effect of 2 regimens - Small volume (SV) and High volume (HV) solution - on analgesic efficacy of US-guided TAP block in children. In parallel, a pharmacokinetic study of L-bupivacaine was performed.
Methods: After IRB approval and parental consent, children (1-5 years) scheduled for outpatient inguinal surgery were prospectively included. Standardized general anaesthesia was induced using sevoflurane (Fi 6%) associated to 1µg/kg remifentanil for laryngeal mask insertion. TAP block was performed with 0.4mg/kg of L-bupivacaïne, according to two randomized regimens: 0.4ml/kg of 0.1% or 0.2ml/kg of 0.2% L-bupivacaïne. At surgical incision, an increase of MAP and/or HR > 20% led to reintroduce remifentanil. Perioperative opioid rescue requirement was compared between SV and HV groups. For LA pharmacokinetics study, blood samples were drawn at 0, 5, 10, 20, 25, 30, 60, and 75 min.
Results: 22 and 23 children were respectively included in the SV and HV groups. Demographic and surgical data were comparable between both groups. The number of children requiring rescue analgesia was no significantly different, at surgical incision (SV:45% vs HV:30%) and in the recovery room (SV:32% vs HV:43%). Need for remifentanil reintroduction was associated with an increased risk of postoperative rescue analgesia requirement (p=0.04; RR=2.19, 95%CI [1.03-4.62]). After PACU, pain scores were low (FLACC< 3) in 100% of children. At 0.4mg/kg, the mean total L-bupivacaine Cmax was 282±138ng/mL with a peak reached at 23±6 min. Plasma concentrations remains up to 0.6mg/mL consistently far from the toxicity threshold of 2.2µg/mL.



[Total levobupivacaine plasma concentrations (ng/mL) at T5, T15, T20, T25, T30, T60 and T75 min. 2200 ng/mL = theoretical toxicity threshold]

Conclusion: For inguinal surgery, volume and concentration of LA solution not appears to impact the perioperative analgesia quality in children. At the dose of L-bupivacaine 0.4mg/kg, the risk of systemic toxicity remains very low.
Reference: 1. Eur J Anaesthesiol.2014;31:327-32

5AP2-3

Assessment of aseptic skin preparation for caudal blocks in children

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Background and Goal of Study: Caudal blocks have been used for 15 years in our clinic and no case of infection (epidural abscess) was reported or detected. The caudal region in children is considered a dirty area; therefore, ensuring that there is an aseptic field in the site of injection is of great importance. We compared two cleaning techniques of the skin. The aim of our study is to find the appropriate technique of cleaning which would provide a safe injection in the aseptic conditions during caudal blocks in children. There is a need for clearer professional guidance to support a minimum level of aseptic precaution for single-shot caudal epidural blocks.
Materials and Methods: After the institutional ethical committee approval and parents consent, we included 60 children in the study, aged 1-16 years old and both genders, ASA physical status I-II, undergoing the lower abdominal surgery (hypospadias, hernia repair surgery or orchiopexy surgery). After the general anesthesia, the children are placed in the lateral decubitus position. A dry gauze swab is placed in the anal cleft to protect the anal area and genitalia from povidone-iodine (Betadine) or other disinfectants (especially alcohol) used to sterilize the skin. The children were randomly allocated in two groups (n=30 per each group); Group I, the skin is cleaned firstly one time with 70% alcohol (Isopropyl alcohol) and after that three times with 10% povidon-jod (Betadine). And, Group II, the skin is cleaned three times with 10% povidon-jod (Betadine). Specimens from skin are taken before cleaning and after each cleaning procedure. Diagnostic microbiological testing was done using standard procedures.
Results and Discussion: There were no significant differences between the two study groups with respect to age, sex distribution, weight, proportions of patients with physical status ASA I and II, and type of operation. The results of microbiological investigation of skin swabs taken after the skin was cleaned were negative, in both groups and in all phases of cleaning. Normal skin colonies were isolated from swabs taken before cleansing of the skin.
Conclusion(s): Both methods provide aseptic and safe environment for the application of caudal blocks. The skin preparation with 10% povidon-jod (Betadine), and without alcohol, seems to be a sufficient method of cleansing, thus ensuring an aseptic field in the site of injection.

5AP2-4

Postoperative outcome and analgesic effectiveness of ultrasound-guided rectus sheath (RS) block for abdominal surgery in neonates and young infants

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Background: Caudal epidural block is a useful method in neonates and young infants undergoing abdominal surgery. However, in patients with abnormal coagulopathy, the benefits of central block must be weighed against its risks. As an alternative method, RS block is predicted to be safe and effective for abdominal surgery in these children. For abdominal surgeries in neonates and infants, periumbilical incision is usually selected, and RS block supposedly alleviates incisional pain. We reviewed perioperative analgesia and complications in neonates and infants less than three months old who underwent abdominal surgery with RS block.
Aims: The primary aim was to evaluate respiratory status and postoperative analgesia and the secondary aim was to evaluate postoperative complications.
Methods: After receiving the approval of the ethics committee of our institute, we conducted a retrospective review of the anesthesia and postoperative records of 25 patients who underwent abdominal surgery under general anesthesia with RS block in their first three months of life from April 2010 to November 2014.
Results: The median age was 36 days (range 1 to 78 days). The surgical procedures included laparoscopic assisted pyloromyotomy (n=21), laparoscopic assisted pyloromyotomy with resection of intestinal duplication (n=1), diamond-shaped anastomosis for duodenal atresia (n=1), and colostomy for anal atresia (n=2). All patients received ultrasound-guided RS block using

ropivacaine (1.2 mg/kg at 0.1~0.2%) under general anesthesia, which was maintained with sevoflurane, fentanyl, and remifentanil. All but one patient were extubated in the OR. There was no remarkable complication. No patient required analgesics postoperatively. On the first postoperative day, 24 patients were able to ingest milk orally, while the one patient who underwent resection of intestinal duplication required an enteral tube.
Discussion: Usually abdominal surgery in neonates and infants less than three months old is initiated with a transverse periumbilical incision. This retrospective study indicated that RS block is an effective and successful method of pain management in this area. Since the abdominal rectus muscle is developed even in neonates and infants younger than three months, the RS is not difficult to visualize with ultrasound.
Conclusion: RS block is an effective regional anesthesia for management of abdominal surgery pain in neonates and young infants and an alternative to caudal block.

5AP2-6

Ultrasound guided lumbar plexus block combined with general anesthesia for pediatric hip surgery - a comparative study with transversalis fascia plane block combined with general anesthesia

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Background and Goal of Study: To compare clinical effect especially about postoperative analgesic effect between adjunctive ultrasound guided lumbar plexus block and transversalis fascia plane block for pediatric hip surgery under general anesthesia.
Materials and Methods: Forty ASA I or II children aged 1 to 10 years scheduled for hip surgery under general anesthesia were randomly assigned to 2 groups: adjunctive ultrasound guided lumbar plexus block (group L, n=20) or adjunctive ultrasound guided transversalis fascia plane block (group T, n=20). 0.3% ropivacaine 0.8 ml/kg was used in both block. MAP and HR were measured during the operation. After the operation, we recorded FLACC scores and Wong-Backer faces pain rating scale, the occurrence of adverse reaction.
Results and Discussion: There were no differences between the 2 groups regarding MAP OR HR during the operation and occurrence of adverse reaction. TFLACC and Wong-Backer scores was lower in group L than that in group T($P < 0.05$).

Conclusion(s): As an adjunction for general anesthesia, ultrasound guided lumbar plexus block provides safe and better postoperative analgesic effects compared with transversalis fascia plane block.
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Christine L. Mai;Mark J. Young;Sadeq A. Quraishi. Clinical implications of the transversus abdominis plane block in pediatric anesthesia.*Pediatric Anesthesia* 2012 Sep;22(9):831-40.
Suresh S,Chan VW. Ultrasound guided transverses abdominis plane block in infants, children and adolescents: a simple proceduralguidance for their performance. *Pediatric Anesthesia* 2009 Apr;19(4):296-9.

5AP2-7

Thoracic epidural analgesia with continuous ropivacaine infusion during of postoperative time in children

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Background and Goal of Study: Study of postoperative pain control after repair of Pectus Excavatum and Carinatum in children.
Materials and Methods: Studied the postoperative pain relief for 61 children the age 8 till 16 years ASA I-II (63,7% males) to whom Pectus repair. After induction (Sevoflurane or iv Propofol) and intubation (Rocuronium and Fentanyl 3-4 $\mu g \cdot kg^{-1}$) placed catheter to epidural space up to tips in Th5-Th6 level. Ropivacaine (2 $mg \cdot kg^{-1}$) injected for pre-emptive 15-20 min prior to the beginning of the surgery (duration 2,36±0,42 h). Postoperative analgesia by continuous epidural infusion (64-72 h) of Ropivacaine 0.2% with 0,5 $mg \cdot kg^{-1} \cdot h^{-1}$. Pain relief estimated by Heart Rate (HR), Mean Arterial Pressure (MAP), Cardiac Index (CI), Stroke Index (SI) and Index of Systemic Vascular Resistance (ISVR). After restored adequate consciousness used Hanallah-Broadman Pain Scale for additional examination of a pain.
Results and Discussion: In 5-7 h postoperative time 6 patients (9.8%) demonstrated an inefficient analgesia with change in hemodynamic: went up HR by 27,4%, MAP - by 21,4% , CI- by 26,7% and SI went down by 29,5%/ Observed increase of ISVR by 22,1 %. Hemodynamic changes were accompanied by augmentation of indicators in the Pain Scale. In such situations has demanded supplement use of opioids. The Cardiac Output of 90,2% children remained stable at all investigation phases without significant changes in SI and HR with ISVR. Scores of the Pain Scale were not exceeded as a proof of reliable nociception block.
Conclusion(s): Postoperative pain control at children by continuous thoracic epidural infusion of Ropivacaine 0,2 % sol demonstrated of efficiency analgesia after repair of Pectus Excavatum and Carinatum.

5AP2-8

Developmental hemostasis in neonates: evaluation through the viscoelastic properties of the clot

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Background and Goal of Study: Developmental hemostasis refers to the age-related changes in the coagulation system that are most marked during neonatal life. An understanding of these changes is crucial to the accurate diagnosis of hemostatic abnormalities. However it's difficult to establish the definition of reference ranges and laboratory diagnosis in infant coagulation disorders for the need to adapt the analytical tools to the small blood amount. Thromboelastography (TEG) provides an efficient analysis of the dynamic viscoelastic properties of whole blood by using small, rapid and immediate blood samples.
Objective of this study was to evaluate the coagulation characteristics in neonates through the TEG by taking small blood samples from the umbilical cord.
Materials and Methods: We enrolled in the study infant born with gestational age >25 weeks. After birth, after clamping of the umbilical cord, 2.5 ml of blood was collected and stored with sodium citrate. TEG was performed using a Hemoscope TEG 5000. After recalcification with CaCl, each blood sample was analyzed by two reagents: Kaolin and Functional Fibrinogen.
Results and Discussion: We studied 52 infant, 5 cases of less than 36 weeks, including a birth at 25 weeks.TEG shows a time of first fibrin strands formation, expressed by R (nv 2-8 min) with an average value of 6.88 ± 3.4 minutes and 2 cases with an R value longer than 8 minutes (max 18.1 min) coincident with preterm deliveries (30 and 35 gestation weeks); K time is above the normal range: 3.58 ± 3.87 min(n.r 1-3 min) with a max value of 24.6 ; alpha angle of 51.82 ± 16.91 degrees and the maximum amplitude (MA) of 52.38 ± 16 mm both signifant reduced respect the normal. In almost 50% of newborns, the measurement of the levels of fibrinogen in the blood results below the normal range of 200-400 mg / dl, showing an average of 217.78 ± 85.67 mg/dl and the minimum value of 84.1 m /dl found in an infant of 30 weeks of gestation.
Conclusion(s): Those preliminary data confirm the progressive improvement of clot formation with gestational age but overall that TEG proved an alternative test for assessing clot formation by using whole blood and testing small volumes. Maximal clot firmness, a parameter affected by platelet number and function, correlated with gestational age, yet the predictive value of clot formation tests in neonates deserves further attention.

5AP2-9

Retrospective assessment of continuous perioperative and postoperative epidural analgesia in children: a single center experience

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Background and Goal of Study: The aim of this retrospective study is to assess the efficacy of the analgesia, and to determine the incidence and type of complications during the epidural pain treatment after major surgery in the pediatric patients.
Materials and Methods: Data were collected from 119 children who were undergoing major surgery and receiving continous epidural infusion via epidural catheter at an university hospital between 2012-2014. Age, gender, pain

scores, duration of epidural infusion types of side effects were collected with during the routine pain control. The epidural catheters were inserted preoperatively and infused both perioperatively and postoperatively. The patients were evaluated in to two groups. The epidural solutions were prepared by either, bupivacaine 0.01% and morphine 0.05 mg/ml, Group BM, and bupivacaine 0.01 %, Group B. The infusion rates were chosen for the case based on patients perioperative and postoperative reqirements. The pain scores and side effects were assessed three times in a day with Faces Pain Rating Scale. iv Tramadol and Paracetamol was administered if required as additional analgesics.
Results: There were 50 children in bupivacaine and morphine group (Group BM), and 69 children in bupivacaine group (Group B). The two groups didn't show statistically significant diffirence to demografic data. The duration of infusion in Group BM; 2,5±4 days, in Group B; 2.1±5.1 days. The catheters were inserted at a segmental level appropiate to the surgery, 43 of patients were inserted from the thoracal levels. There was no significant difference between two groups for pain scores; in Group BM:1,71±1,4, in Group B:2,3±1,8. The significant difference was determined between two groups for analgesia requirment and side effects. Although the number of patients whom required additional analgesic were significantly higher in the Group B, the side effects were determined lower incidence in this group.
Conclusion: The using epidural continous infusion in either bupivacaine or bupivacaine and morphine are effective methods for providing pain relief with few serious complications. The selection of the patient and drug combination for the continous epidural infusion with being aware of the side effects are essential for the success and safety of the treatment.

5AP2-10

Changes of pulmonary function tests in children with complex congenital heart disease and scoliosis corrected by posterior approach

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Background and Goal: The association between congenital heart disease and scoliosis is well studied. It is well known the relationship between spinal deformity and deterioration of lung function, which may stabilize after surgical correction.
The aim of this study is to determine the relationship between the degree of correction and the evolution of lung function tests at one and two years after corrective surgery in patients with congenital heart disease and scoliosis
Materials and Methods: We retrospectively reviewed the records of 27 patients (19 female /8 male) with congenital heart disease which 7 were Tetralogy of Fallot, 8 univentricular hearts with Fontan, 3 with aortic coarctation, 4 ventricular septal defects, 1 truncus, 1 complete atrioventricular defect and 3 with aortic stenosis, all corrected before scoliosis surgery. All patients were surgically treated with segmental instrumentation by posterior procedures. Spinal cord monitoring and Transesophageal Echocardiography was used in all patients. Cobb, Pedriolle, spirometric values (preoperative (PRE), year and 2 years) and type of heart disease were compared with the Friedman test.
Results and Discussion: Mean age was 17.3 years. Mean ejection fraction of the left ventricle (LVEF) was 55,6. American Society Anaesthesiologists score was III in 20 patients and IV in 7 and New York Heart Association score ranged was found between I and II. The PRE average Cobb was 60.8 and postoperative (PO) was 17. The average degree of PRE kyphosis T5- T12 was 29.6 and 23.5 at 2 years. Percentage values of Forced Vital Capacity (FVC) and Forced expiratory volume in the first second (FEV1) showed improvement, being not significant for FVC (p 0,06) and significant for FEV1 (p 0,004). The improvement of FVE1/FVC was not significant. 8 patients had a PO spirometric pattern consistent with moderate restriction, 15 with severe restriction, 2 a mixed pattern and 1 a pattern consistent with normality. There was no relationship between type of heart disease and the spirometric improvement.
Conclusions: There was no relationship between the type of heart disease and the evolution of spirometric tests. The spirometric impairment at 1 year could appear to be due to surgery, subsequently improved at 2 years.

5AP2-11

Remifentanil - a retrospective evaluation of acute opioid tolerance and chronic pain in children undergoing general anesthesia for hypospadias surgery

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Background and Goal of Study: Remifentanil is often used in pediatric anesthesia due to its short acting effects, but different studies have shown that patients who have received remifentanil are more likely to develop acute opioid tolerance (AOT) (children and adults) as well as chronic pain (adults) (1-3).
Materials and Methods: To confirm this data, we designed a retrospective study; enrolling 102 pediatric patients who underwent hypospadias surgery at the University Hospital Leipzig between 2007 and 2012. Patients receiving remifentanil were compared to patients receiving a different opioid (control group). We analysed the documented pain medication given after the surgery to identify AOT. Furthermore, we sent a questionnaire to filter patients who suffer from chronic pain. This questionnaire was adjusted to the German Pain Questionnaire and addressed to the parents of the patients. The two groups were compared by using IBM SPSS Statistics 21. The local ethics committee approved this study in 2013.
Results and Discussion: 77 patients were included, reasons for exclusion were invalid contact information (8 patients) and consent forms (17 patients). 46 patients received remifentanil (0,254 μg/kg/min, SD: 0,076) and 31 patients a different opioid intraoperatively. Both groups are similar throughout the characteristics of age, height, bodyweight, ASA classification, length of surgery, performing surgeon as well as the length of the stay. Caudal anesthesia was performed in 37 patients; 31 (83,8%) belonging to the remifentanil group and 6 (16,2%) to the control group. In average postoperative pain medication was applied 3,56 times per postoperative day in remifentanil patients and 3,30 times in the control group. There is no difference between the amount of applicated pain medication between these groups (p=0,905). Regarding the questionnaire, only one parent recorded chronic pain in a patient.
Conclusion(s): Pediatric patients receiving remifentanil do not need more pain medication than patients receiving a different opioid, when adequate postoperative analgesia is applied. Acute opioid tolerance as well as chronic pain are not associated with the application of remifentanil in our study, probably caused by the different kind of surgery and retrospective design compared to (1) and (3).
References:
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2. Sammartino M et al. (2010) Pediatr Anesth 20, 246-255;
3. van Gulik L et al. (2012): Br J Anaesth 109, 616-622.

5AP3-1

A survey on emergence agitation among German anaesthesiologists

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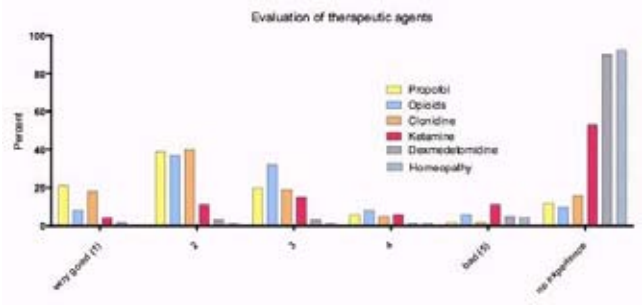
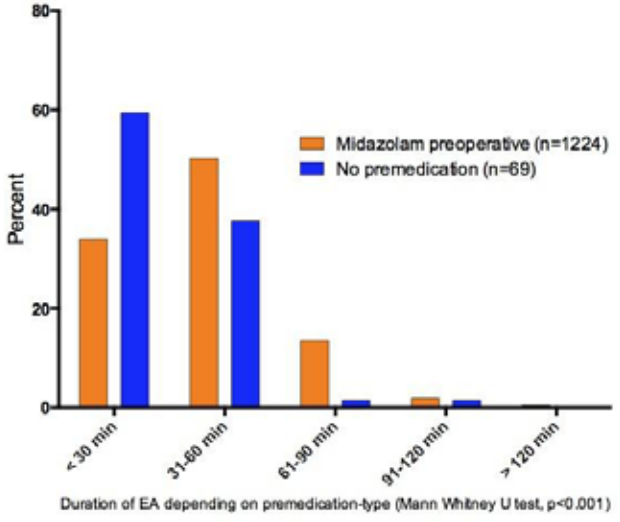
Background and Goal of Study: To examine the perioperative management of paediatric Emergence Agitation (EA) among German anaesthesiologists with respect to their level of professional experience.
Materials and Methods: A 33 item web-based survey was developed in order to investigate routine management (prevention and treatment) of EA depending on professional experience, facility structure and patient population. The link was sent to all enlisted members of the German society and association of anaesthesiology (DGAI, BDA) in June 2014 including one reminder. The results were filtered according to interview data quality indicators being completion time and percentage of missing relevant answers.
Results and Discussion: 1.229 questionnaires were analyzed. Anaesthesia was mostly provided in the field of ENT (49%) and paediatric surgery (23%). The children's most common age was 3 to 6 years (69%). Premedication was performed using midazolam in 84% and general anaesthesia was induced with propofol in 74%. Hypnotic maintenance of choice was sevoflurane (51%) followed by propofol (38%) and desflurane/isoflurane (7% and 3%, respectively).
90% of respondents saw EA as an issue of clinical relevance. Despite this fact only 5% applied postoperative scores to evaluate the degree of agitation or

delirium. The incidence of EA was given as 1-10% by 45% and 11-20% by 30% of participants.
First choice EA prevention was to perform total intravenous anaesthesia (TIVA) (63%) whereas first choice therapeutic postoperative agents were propofol, clonidine and opioids to virtually same parts (31%, 29%, 32%, respectively). Therapeutic propofol was preferentially used by anaesthesiologists with a higher individual paediatric caseload (p=0.0003). Therapeutic drug effects were rated with slightly higher satisfactory levels for propofol and clonidine compared to opioids. A longer stated duration of agitation could be identified for premedication with midazolam in comparison to those refraining from any premedication (p< 0.001).
Conclusions: Although first choice prevention strategy of EA is TIVA (63%) volatile anaesthesia is still performed by the majority of anaesthesiologists (61%). Despite a higher satisfactory level for propofol, the usage seems to be dependent on paediatric experience. Midazolam premedication may be linked to prolonged EA.



[Evaluation Of Therapeutic Drugs]



[Premedication-type]

5AP3-2

Girls 6-13 years old have increased risk of immediate postoperative cognitive dysfunction; prospective cohort study

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Background and Goal of Study: Higher BIS values were found to be associated with greater incidence of immediate POCD in adults. Higher BIS values have been reported in adult females compared to males even when similar anesthetic drugs dosages were administered. These two premises may result in the hypothesis of gender dependent difference in incidence of POCD. It is reasonable to expect similar effects in children. The aim of this study was to assess whether a child's gender is associated with the incidence of immediate POCD.
Materials and Methods: This nested, prospective cohort study was conducted at the University Hospital with 64 children (aged 6-13, ASA I-II) undergoing elective adenotonsillectomy. Children were randomized into sevoflurane, and TIVA in equally large groups. In TIVA group anesthesia was induced with propofol, fentanyl and vecuronium, and maintained with continuous infusion of propofol. In sevoflurane group, after fentanyl anesthesia was induced and maintained with sevoflurane in O_2/$N_2$0 (50:50) mixture. Cognitive assessment was conducted with psychomotor evaluation test (PsychE). The key outcome was relative change in reaction time from the baseline to two hours after the surgery. Mann-Whitney U test with two-tails exact test of statistical significance was done in "R".
Results and Discussion: At baseline 33 girls and 31 boys were strictly comparable in terms of age, type of anesthesia, surgical procedures, and all PsychE test results except simple reaction thinking time. At baseline girls had 16% shorter (better) thinking time. Gender was statistically significantly associated with changes in all three simple reaction times: total time (P=0.012), moving time (P=0.045), thinking time (P=0.038). Total time increased (indicating cognitive dysfunction) in girls for median (interquartile range) of 19% (9%-33%), and in boys it remained unchanged. Move time increased in girls for 23 (3%-36%), and in boys for 10% (-7%-26%). Thinking time increased in girls for 18% (5%-36%), and in boys it remained unchanged.
Conclusion(s): Girls 6-13 years old have increased risk of immediate postoperative cognitive dysfunction indicated by prolonged simple reaction time.

5AP3-3

Electrical stimulation of the bilateral heart 7 acupuncture points for preventing emergence agitation in children: a prospective double-blind randomized controlled trial

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Background and Goal of the Study: Emergence agitation (EA) is a common phenomenon in children recovering from general anaesthesia. An EA increases the risk of patients injuring surgical wound, themselves, and caregivers. Therefore, prevention of EA remains an important challenge in paediatric anaesthesia. Previous studies reported that EA is effectively prevented by stimulating the heart7 (HT7) acupuncture site using a capsicum plaster or needle. However, anaesthesiologists are not familiar with these stimulation methods. The objective of this study was to examine the effectiveness of electrical stimulation to the HT7 using a neuromuscular transmitter monitoring (NTM) for preventing EA in pediatric patients.
Methods and Materials: In this prospective, double-blinded, randomized controlled study, children scheduled for surgery under sevoflurane anaesthesia were randomly assigned to either
(1) the HT7 group: bilateral stimulation of HT7 located on the ulnar side of the wrist using an NTM (1 Hz, 50 mA) throughout surgery; or
(2) the control group: only electrodes were attached to HT7 and electrical stimulus was not applied.
Children with developmental delays and psychological or neurological disorders were excluded. The primary outcome was EA incidence in the post-anaesthesia care unit (PACU). EA was evaluated using the paediatric anaesthesia emergence delirium scale, and a score ≧10 defined as presence of EA. Preoperative anxiety scores, duration from operation completion to extubation, PACU stay duration, and postoperative pain were also recorded. A power analysis ($\alpha = 0.05$, $\beta = 0.20$) indicated that 55 patients were required in each group. To allow for a 20% dropout rate, we recruited 66 patients for each group.
Results and Discussion: One hundred thirty-two children were enrolled in this study, and 12 were excluded before randomization. Patient characteristics, type of operation, duration of anaesthesia and surgery, time to extubation, and preoperative anxiety were not different between groups. EA incidence was significantly lower in the HT7 group (31.7%, HT7 group vs. 56.7%, control group; P = 0.010); the risk ratio was 0.56 (95% confidence interval: 0.36-0.86). There was no statistical difference between the PACU stay duration and postoperative pain for the groups.
Conclusion: Electrical stimulation of HT7 using an NTM significantly decreased EA incidence without adverse effects in paediatric patients emerging from sevoflurane anaesthesia.

5AP3-4

The effect of unilateral electrical stimulation of the heart 7 acupuncture point in preventing emergence agitation in children: a prospective double blind randomized controlled trial

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Background and Goal of the Study: Emergence agitation (EA) is a frequent phenomenon in children recovering from general anaesthesia and increases the risk of self-injury. Previous studies have reported that EA was effectively prevented by stimulating the heart 7 (HT 7) acupuncture point using a capsicum plaster or a needle. Our group found that stimulating the HT 7 acupuncture point bilaterally using a neuromuscular transmission monitor decreased the incidence of EA; the risk ratio was 0.56 (95% confidence interval: 0.36-0.86). To easily utilize this method in a clinical situation, we need to optimize the electrical stimulation conditions of HT7. Bilateral stimulation is a barrier to clinical use because two machines are needed for one patient. The objective of this study was to examine the efficacy of unilateral electrical stimulation of HT 7 using a neuromuscular transmission monitor to prevent EA in paediatric patients.
Methods and Materials: This was a prospective, randomized, double-blind controlled study, that included 36 children (ages 18-96 months) scheduled to undergo sevoflurane anaesthesia. The enrolled subjects were randomly assigned to one of the following two groups:
(1) HT 7 group: unilateral (right side) stimulation of the HT 7 acupuncture point located on the ulnar side of the wrist by using a single-twitch electrical stimulus (1 Hz, 50 mA) throughout the surgery, and
(2) control group: only electrodes were attached to the right side HT 7 point; an electrical stimulus was not applied. The primary outcome assessed was the incidence of EA. The incidence and severity of EA were evaluated using the paediatric anaesthesia emergence delirium (PAED) scale, and a score ≥ 10 demonstrated the presence of EA. Anaesthesiologists or nurses, blinded to the group allocation, recorded the PAED score in the recovery room.
Results and Discussion: All 36 enrolled subjects completed the study. There was no statistical difference between the incidence of EA in the HT 7 and the control group (36.8% vs. 35.2%; P = 1.0). The risk ratio was 1.044 (95% confidence interval: 0.44-2.50). The wide range of the confidence interval precludes any definitive conclusions. A larger sample size (N > 1000) is needed to assess the efficacy of unilateral electrical stimulation of HT 7.
Conclusion: In this study, we did not identify a difference in the incidence of EA between the unilateral HT 7 stimulation and control groups, contrary to findings with bilateral HT 7 stimulation.

5AP3-6

Development of a risk score for emergence agitation after general anesthesia in children

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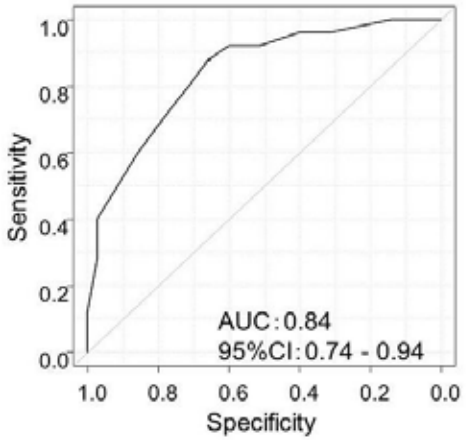
Background and Goal of Study: Emergence agitation (EA) is a common complication after general anesthesia in children. However, reliable predictive methods have not been established for this phenomenon. The goal of this study was to develop an EA risk score.
Methods: The data from 120 children enrolled in our past randomized controlled trial (RCT) were used for this study. In the RCT, the effect of meridian stimulation on EA after sevoflurane anesthesia was studied, and EA was evaluated using the pediatric anesthesia emergence delirium (PAED) scale. After assessing multi-co-linearity, the predictive value of 6 parameters (age, gender, preoperative anxiety, operative procedure, anesthesia time, and airway management) with a modulator (meridian stimulation) for detecting EA was determined using logistic regression with Akaike's information criterion stepwise selection. The scores of the selected predictors were determined using their odds ratios, and the risk score was calculated by summing them. The predictive ability of the risk score was examined by generating the receiver operating characteristic (ROC) curve and the gray zone (defined as the range without >90% sensitivity or specificity) approach.
Results: Age, preoperative anxiety, operative procedures, and anesthesia time were selected for the risk score, which ranged from 0 to 23 points (Figure 1). The best cut-off point was 10 (sensitivity: 66%, specificity: 88%), the area under the ROC was 0.84 (95% confidence interval: 0.74-0.94) (Figure 2), and the gray zone ranged from 9 to 14 points, including 42% of the patients.
Conclusion: We developed a risk score that can predict EA after general anesthesia in children with >90% accuracy in approximately 60% of the patients. Further prospective observational studies are needed to evaluate its validity.

	Score
Age (year)	9−Age
Operative procedure	
strabismus surgery	7
adenoidectomy or tonsillectomy	7
others	0
Preoperative anxiety score	
screaming or shouting	4
Tearful and/or withdrawn but compliant with induction	2
Calm and controlled	0
Anesthesia time	
> 2 hours	4
1 to 2 hours	2
< 1 hour	0

[Figure1]



[Figure 2]

5AP3-7

Effect of melatonin premedication to prevent emergence agitation after general anesthesia in children: a systematic review and meta-analysis

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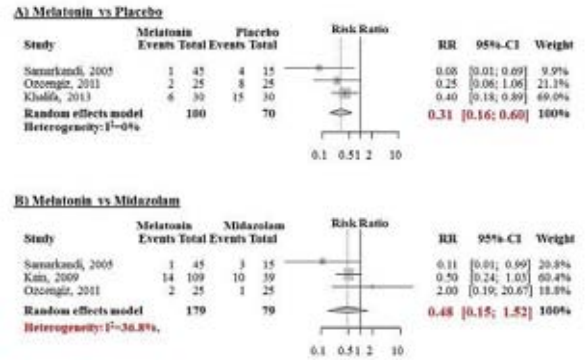
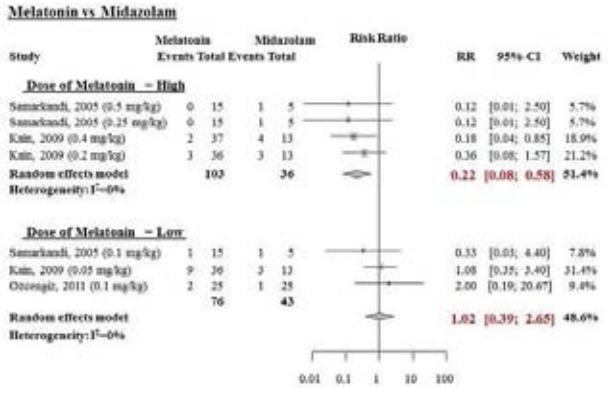
Background and Goal of Study: Emergence agitation is a frequent phenomenon in children recovering from general anesthesia. An emergence agitation reaction increases the risk of injuring their surgical repair, themselves, and their caregivers. We studied the efficacy of melatonin premedication in emergence agitation prevention by systematic review and meta-analysis of randomized controlled trials.
Material and methods: MEDLINE, the Cochrane Central Register of Controlled Trials, Embase, Web of Science, clinicaltrials.gov, and UMIN Clinical Trials Registry were used to identify relevant publications. A random-effects model was used to combine the results. Heterogeneity was quantified with I^2 statistics. The study quality was assessed using the Cochrane risk of bias tool. The quality of evidence was assessed using the GRADE approach.
Results and Discussion: Four studies (358 participants) were analyzed. The combined results showed melatonin premedication is effective in emergence agitation prevention compared to placebo (risk ratio [RR] 0.31, 95% confi-

dence interval [CI] 0.16-0.60; I^2 = 0%, Figure 1A). The results were not affected by low-quality studies. The effect of melatonin in preventing emergence agitation compared to midazolam was not statistically significant (RR, 95% CI: 0.48, 0.15-1.52) with significant heterogeneity (I^2 = 36.8%) (Figure 1B). Meta-regression analysis revealed that melatonin dose was significantly correlated with the effect (P = 0.024). The RRs (95% CI) of low- and high-dose melatonin compared to midazolam were 1.02 (0.39-2.65) and 0.22 (0.08-0.58), respectively (Figure 2).

Conclusion: Melatonin premedication is effective in preventing emergence agitation in children compared to placebo (GRADE: moderate). High-dose melatonin compared to midazolam may have a significant effect in preventing emergence agitation.



[Figure 1]



[Figure 2]

5AP3-8

Postoperative cognitive dysfunction (POCD) in children: comparison of TIVA and sevoflurane

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a subtle disorder of thought processes which may influence isolated domains of cognition. The cause is still unknown and the aim of this study was to assess whether the different types of anesthesia may impact upon the incidence of POCD.

Materials and Methods: Prospective study was conducted on 64 children (aged 6-13, ASA I-II) undergoing elective adenotonsillectomy. The children were randomized into 2 groups: TIVA (T) and sevoflurane (S). Cognitive assessment was conducted with two psychomotor evaluation tests (PsychE): simple reaction time and dual task. Each subject was examined preoperatively, 2 h and 24h after surgery.

Results and Discussion: There were significant changes ($p<0.001$) of the total reaction time with an increase of total reaction time in S group 2h after surgery and also a decrease 24h after surgery ($p<0.05$), but without significant difference between S and T group ($p=0.763$). There were significant differences in thinking time within S group between three measures ($p<0.05$), whereas there was no statistically significant difference in moving time ($p>0.05$).The shortest total reaction time was 24h after surgery with a significant difference ($p<0.001$) among repeated measures but without significant difference ($p=0.943$) between S and T group.The variability of reaction time was highest 2h after surgery and a significant decrease occured 24h after surgery in both groups ($p<0.001$). There were no significant differences between the groups ($p>0.05$). Deterioration in tracking performance expressed as the percentage of time on target was lowest 2h after surgery in T group and there were significant differences in contrast to the preoperative period ($p=0.027$), as well as 24h after surgery ($p=0.049$).

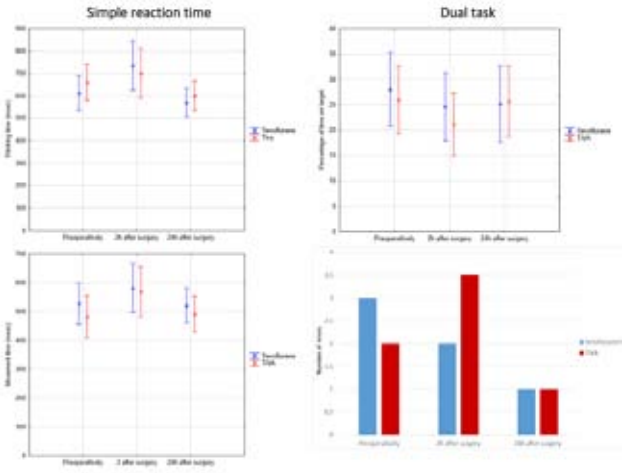

Figure 1. Results on simple and dual task tests according to type of aneshesia

[Simple reaction time and dual task]

Conclusion(s): In S group there were statistically significant differences in simple reaction time whereas in dual task performance there was deterioration in T group. Anesthesia has an impact on the incidence of POCD but without significant differences between intravenous and inhalation anesthesia.

5AP3-9

Neonatal sevoflurane exposure induces adulthood amygdala dysfunction in fear conditioning test

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Background: We previous reported that neonatal sevoflurane exposure induces neuronal apoptosis and long-term cognitive impairment in mice. However, the mechanisms underlying the neonatal sevoflurane exposure induced long-term cognitive deficits remains unknown. To address this, we investigated whether the expression of c-Fos as a marker of neuronal activation after conditioned fear behavior to reveal the differences between non-anesthesia experienced mice and neonatal sevoflurane exposure experienced mice in contextual fear conditioning test in adulthood.

Materials and Methods: Postnatal day 6 (P6) C57BL/6 male mice pups were randomly divided into two groups; 3% sevoflurane 6 h exposure group (SEVO group) and carrier gas only exposure group (non-anesthesia group, NA group). The pups in each group were allowed to mature and weaned at age of 3-4 weeks. Following the contextual fear conditioning test performed after 24 h retention at age of 12-13 weeks, the duration of freezing time was recorded to measure fear memory. Two hours after the contextual test session, we sacrificed the mice for c-Fos immunohistochemistry and counted the number of c-Fos positive cells in regions including prefrontal cortex, thalamus, hippocampus (dorsal hippocampus, CA1, CA3, dentate gyrus), amygdala (central nucleus and basolateral amygdala) and periaqueductal gray (PAG). Comparisons of the freezing time and the number of c-Fos positive cell between SEVO group and NA group were made using Mann-Whitney U test. Values of $P<0.05$ were considered statistically significant.

Result: Neonatal sevoflurane exposure experienced mice reduced freezing time in contextual fear conditioning test compare with non-anesthesia experienced mice (SEVO group versus NA group, $P<0.05$). Analysis showed that

the c-Fos expression was significantly reduced in the region of basolateral amygdala in neonatal sevoflurane exposure experienced group (SEVO group versus NA group, P< 0.05), while the other regions did not show significant difference in c-Fos activation between two groups.
Conclusion: In this study, we found that c-Fos expression in the basolateral amygdala after contextual fear conditioning text in the neonatal sevoflurane exposure experienced mice was reduced, suggesting that the dysfunction of the amygdala mediates the effect of neonatal exposure to the sevoflurane on the cognitive deficits in fear conditioning in the adult mice.

5AP3-10

Respiratory distress complications after extubation in infants undergoing palate and cleft lip repair surgery in Khulna Division Hospital (Bangladesh): anaesthetic considerations

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Background and Goal of Study: Team cleft care is usually lacking in developing countries due to shortage of qualified manpower. Anaesthesia for cleft lip and palate repair is associated to respiratory distress complications: laryngospasm, bronchospasm and acute airway obstruction after extubation . Many studies have been carried out on the epidemiology, etiology and surgical management of cleft lip and palate, but none made any reference to the anaesthetic issues in this context.
Methods: A retrospective survey of cleft lip and palate repair surgery has been carried out on those patients who were treated during activities at "Santa Maria Hospital" - Khulna Division (Bangladesh) in October 2014. The preoperative screenings included history of illness, medical conditions and general examination.
Results: Forty seven cleft patients presented for surgical repair under halothane general endotracheal anaesthesia and neurofacial local block. The population characteristics were recorded. (Table1).The 72% of infants underwent cleft palate or associated lip repair showed distress respiratory complications after extubation. (Table 2). Two infants (5 mth - 4 Kg) presented severe laringo-bronchospasm associated to hypoxia. There was no mortality or anaesthesia-related morbidity at the time of discharge in all cases.
Conclusions: In recent years, especially in advanced countries, the surgical repair of both cleft lip and palate is performed in the neonatal period. In contrast, this survey shows that 95% of patients has been presented later for surgical treatments. The low weight linked complex palate anomalies might complicate laryngo-bronchosmasm during extubation (6%). The complications can be avoid by vigilance, experience of specialized anaesthesia staff and mutual understanding between surgeon and anaesthesiologist.

Age (m=month - y=years)	N°Patients	Weight(Kg)	Sex (M/F)	N° ET TUBE
3-6 m	2	4	2/0	3
7-12m	5	5-8	4/1	3 1/2
1-5 y	29	9-15	18/11	3 1/2
6-9 y	10	16-20	6/4	4
>10 y	1	> 20	0/1	> 4 1/2
TOTAL	47		30/17	

[Table 1. Population characteristics]

COMPLICATION	N° PATIENTS	PERCENTAGE (%)
Difficult Intubation	1	3
Hypoxia after extubation	2	6
Laryngo-bronchospasm	30	88
Inadvertent Extubation	1	3
TOTAL	34	72

[Table 2. Perioperative complications]

5AP4-1

Measurement of cardiac output in children: comparison between Fick method and pressure recording analytical method (PRAM)

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Background and Goal of Study: Recently a less-invasive CO monitoring method has been developed: beat-to-beat values of CO can be obtained by pressure recording analytical method (PRAM). This new method is based on the mathematical analysis of the arterial pressure profile changes. It allows beat-by-beat stroke volume (SV) assessment from the pressure signal recorded in an artery.
The goal of this study is to investigate the reliability of an uncalibrated pulse contour method, the MostCare system, in pediatric patients scheduled for diagnostic right and left heart catheterization by comparing its measurements of cardiac output (CO) with those determined by the direct and indirect-oxygen Fick method.
Materials and Methods: Pediatric patients scheduled for routine diagnostic right and left heart catheterization in whom an invasive blood pressure (IBP) is monitored were studied.
CO was estimated simultaneously by indirect Fick method, direct Fick method, and PRAM
All measurements were performed in steady-state condition. When steady-state conditions were achieved, oxygen uptake measurements were continued for 3 mins, during which, pressure recordings, and blood samples were obtained for estimating Fick CI. PRAM CI measurements were obtained during the 3 minutes period of oxygen uptake. The single CI measure was the result of the mean value of the beat-to-beat CI analysis during the 3 minutes period, and was compared with the Fick CI value. The agreement between Fick-CI and PRAM-CI was assessed using the Bland-Altman method.
Results and Discussion: Forty three CI measurements were performed in 43 patients. The data showed good agreement between CI-Fick and CIPRAM: r2 0.98; bias −0.0074 L/min/m2; limits of agreement from −0.22 to 0.22 L/min/m2. The percentage error was 8%.
Conclusion(s): PRAM provides reliable estimates of cardiac output in hemodynamically stable pediatric cardiac patients compared with the direct Fick method.
Reference:
Romano SM, Pistolesi M: Assessment of cardiac output from systemic arterial pressure inhumans. Crit Care Med. 2002 Aug;30(8):1834-41.

5AP4-2

BIS monitoring guided anesthesia: TIVA vs. VIMA for adenotonsillectomy in pediatric patients

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Background and Goal of Study: The bispectral index (BIS), which is a measure of a hypnotic component of anesthesia, can be used for an adequate dosing of anesthetics. The studies on use of BIS monitoring in children are insufficient. The study compared the time of extubation in pediatric patients undergoing adenotonsillectomy using two standard anesthetic technique - BIS monitoring guided total intravenous anesthesia (TIVA) and inhalation anesthesia (VIMA).
Materials and Methods: One hundred pediatric patients (ASA I and II) between 3 - 10 years of age were randomly divided into two groups TIVA (T group, n = 49) and VIMA (V group, n = 51). In both groups, BIS value was maintained between 40 and 60. The time of extubation and Aldrete score were monitored and recorded. In the following 24 hours the occurrence of postoperative complications (nausea and vomiting - PONV and bleeding) were monitored.
Results and Discussion: The average time of extubation in the T group was 587 seconds with an average value of the Aldrete score of 8.80, and for V group 618 seconds with an average value of the Aldrete score of 8.82. The difference between the mean values obtained empirically for the extubation time (expressed in seconds) in patients who have undergone various techniques

of anesthesia were not statistically significant (t = -1.141, p = .257), meaning that there is no difference in terms of time of extubation in patients who are undergoing confirmed anesthesia techniques. The total number of postoperative complications was 7 (T Group 2, V Group 5). Statistically significant difference in the number of postoperative complications, depending on the type of applied anesthetic technique
($\chi 2$ (1) = 1.26, p = .262) was not detected by using Pearson's chi-square test.
Conclusion(s): Regardless of the applied BIS monitoring guided anesthetic technique, there is no effect on the time of extubation. Also, there were no statistically significant evidence on difference in the number of postoperative complications.

5AP4-3

Effect of magnesium sulphate on bi-spectral index (BIS) values during general anesthesia in children

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Background and Goal of Study: Magnesium was reported to reduce the anesthetic requirements and the period needed to reach a bi-spectral index value of 60 when used as a supplement to general anesthesia [1-6]. Magnesium was said to minimize the emergence agitation [7]. Previous studies examined the influence of magnesium on the anesthesia dosing requirements while they maintained the bi-spectral index values within a constant range. This paper evaluates the effect of the intraoperative magnesium on the bi-spectral index values during pediatric anesthesia while keeping other anesthetic variables unchanged.
Materials and Methods: Inclusion criteria of 80 pediatric patients in a prospective randomized controlled study compromised ASA physical status I, age 2-8 years and scheduled for minor infra-umbilical elective procedures. Dividing randomly patients into two groups.
Group I (40 patients); received a bolus dose 50 mg/kg of magnesium sulphate followed by an infusion at rate of 15 mg/kg/h throughout the procedure.
Group II(40 patients);received the same amount in the form of ringer acetate for blinding. Comparing between the groups regarding:1-BIS values, 2-Hemodynamic parameters, 3-Arterial oxygen saturation, 4-End-tidal Co2, 5-Respiratory rate and 6-Tidal volume.
Results and Discussion: Magnesium group (Group I) showed statistically significant lower BIS values and shorter time to achieve BIS values below 60. Respiratory parameters(tidal volume and respiratory rate)were significantly lower in the magnesium group. Otherwise,we did not detect significant differences between the study group and the control group.
Conclusion(s): Patients who received magnesium sulphate had lower BIS values,less time to reach BIS values below 60,lower tidal volume and lower respiratory rate than patients in the control group during general anesthesia in pediatric patients. No complications were reported.

5AP4-4

Is response entropy possible in children anesthetized with sevoflurane?

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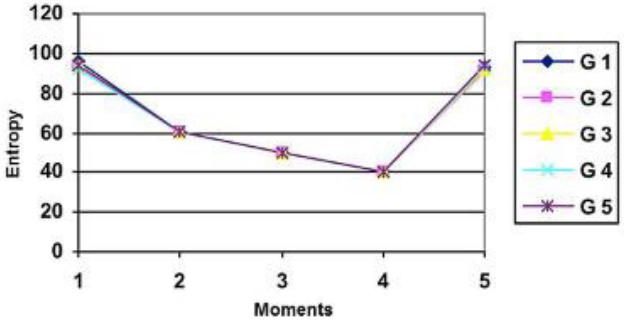
Background and Goal of Study: The use of response entropy (RE), which is derived from electromyographic activity of the facial muscles and cortical electrical activity, has been evaluated in adults, but no data is available validating the use of this new technology in children at different ages.
The objective of this study was to evaluate RE during induction and emergence, correlating findings with end-tidal sevoflurane concentrations (ETSC) in different age groups.
Materials and Methods: The sample consisted of 200 patients divided into 5 groups of 40: G1 (0-6 months), G2 (>6-24 months), G3 (>2-12 years), G4 (12-18 years) and G5 (18-40 years). No pre-anesthetic medication was used. The following parameters were registered: BP, HR, SpO_2, $P_{ET}CO_2$, ETSC, ECG, TOF, RE and ETSC/ $MAC_{age\text{-}related}$. Anesthesia was induced with sevoflurane and 60% N_2O in O_2 until attaining RE=30. Then 0.3 $mg.kg^{-1}$ rocuronium was administered i.v. in order to insert the laryngeal mask airway and initiate mechanical ventilation, and N_2O was discontinued. Measurements were taken at 5 moments: in the wake state (M1), at RE 60 (M2), at RE 50 (M3), at RE 40 (M4), and upon emergence (M5).
Results and Discussion: Changes in hemodynamic variables did not exceed the limits predetermined for each age group. In each age group, RE values of 40, 50, 60 and upon emergence displayed a linear correlation with ETSC/ $MAC_{age\text{-}related}$ ($p>0.05$).
Conclusion(s): RE may be used to monitor adequacy of anesthesia with sevoflurane in children based on the same parameters used in adults.



[Results]

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5AP4-5

Comparison of temporal artery, nasopharyngeal, and axillary temperature measurement during anesthesia in children

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Background and Goal of Study: Pediatric patients receiving anesthesia are prone to hypothermia due to anesthetic drugs, surgical procedures, less subcutaneous fat, and relatively large body surface area. In this study, our aim was to evaluate the performance of the infrared skin thermometer applied to the temporal artery in comparison to axillary and nasopharyngeal temperature recordings, and to evaluate the impact of hemodynamic parameters on these recordings in anesthetized pediatric patients.
Materials and Methods: Sixty ASA physical status 1 and 2 children, ranging in age from one month to 4 years of age, scheduled for elective lower abdominal surgery with an expected operation time of 120 to 180 minutes, were enrolled in the study. During anesthesia, temperature measurements were recorded with three different techniques: temporal artery, nasopharynx, and axillary temperature. Temperatures measured from the nasopharynx, temporal artery, and the axilla were recorded at 15-minute intervals for the first hour, then at 30-minute intervals until the completion of surgery. During each measurement, heart rate and midarterial pressure were recorded.
Results: There were no statistically significant differences between temperatures recorded at the temporal artery and nasopharynx at 15, 30, 45, 60, 90, and 120 minutes, and the completion of surgery. Axillary temperatures were statistically lower than those recorded at the nasopharynx and the temporal artery ($P<0.001$). Bland-Altman plots showed a correlation of temperature measurements between the temporal artery and nasopharyngeal methods. The axillary method had a lower correlation with the temporal artery and the nasopharyngeal methods.
Conclusions: The temporal artery thermometer is a substitute for the nasopharyngeal thermometer for core temperature measurement during anesthesia in children.

5AP4-6

Lactate levels and acid base status in pediatric laparoscopic pyeloplasty

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Background and Goal of Study: Laparoscopic pyeloplasty is one of the most common methods for ureteropelvic junction obstruction surgery. The pneumoperitoneum may cause physiological and metabolic alterations such as increased CO2 load and the mechanical effects of insufflation.
In this study we aimed to compare the metabolic and acid base status of the children undergoing laparoscopic pyeloplasty or open urological surgery.
Materials and Methods: Eighty-three children aged between 1-15 years, undergoing urological surgery were allocated into two groups; Group O (n=33): Open urological surgery group including ureteropelvic junction obstruction or bladder surgery, and Group L (n=50): Undergoing to the laparoscopic pyeloplasty. A standard anesthesia technique of sevoflurane and fentanyl, remifentanyl was used for patients. The ventilation was provided with pressure-controlled mode, respiratory rate and tidal volume adjusted to provide end tidal carbon dioxide at 35-40 mmHg at the beginning of the surgery. The carbondioxide pneumoperitoneum was maintained with insufflation pressure limited to 10-12 mmHg. The acid- base status parameters; pH, HCO_3, Base excess (BE), lactate, PaO_2, $PaCO_2$ and glucose levels were measured 30 min. after induction of anesthesia (T1), 2 hrs. after the beginning of surgery (T2) and at the end of surgery (T3) consequently.
Results: There were no significant differences between two groups for age, ASA physical status, weight and operation time. PaCO2 levels were increased significantly at T2 measurement in Group L (p=0.006); pH was significantly higher in Group O (p=0.001) at T2 measurement. PaO2, HCO3, BE and glucose levels remained between normal ranges and there were no significant difference between two groups at each measurement time. Lactate levels were increased significantly at T3 measurement in Group L as compared to Group O (p=0.05).
Conclusion: The pneumoperitoneum caused statistically significant elevation in PaCO2 and pH levels intraoperative. At the end of the surgery the levels return to physiological ranges in both groups. We also noted that the significant rise in blood lactate in-group undergoing laparoscopic pyeloplasty.

5AP4-7

Postoperative hyponatremia following craniosynostosis surgery: our experience

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Background and Goal of Study: The incidence of hyponatremia occurring during and after pediatric craniosynostosis surgery has been recently reported. We undertook this study to establish the incidence and severity of hyponatremia following craniosynostosis surgery and to identify risk factors for postoperative hyponatremia.
Materials and Methods: We reviewed the medical records of 17 patients, who underwent a surgical correction of craniosynostosis at Vilnius University Children Hospital from 2009 to 2012, in a retrospective study. Hyponatremia was defined as serum sodium value lower 135 mmol/l. We looked for the factors associated with hyponatremia including gender, weight, age, syndromic or not craniosynostosis, type of surgery, duration of surgery and volume of intra- and postoperative fluids.
Results and Discussion: The majority of children were infants < 1 years of age (70%), with mean body weight was 10.2±2.0 kg. There were no incidences of postoperative hyponatremia on the day of the surgery, mean serum sodium value was 140,5 ±3.4 mmol/l. On the first postoperative day hyponatremia occurred in three children (17,6%), mean serum sodium value was 137.4 ±4.6mmol/l. Patients with postoperatively developed hyponatremia intraoperatively received more total fluids then children without hyponatemia (184.4 vs 129,3 ml/kg). Total volume of fluids increased throught larger volume of crystalloid, the volume of administered colloid and red blood cells was similar. Larger volume of Ringer administered intraoperatively was significantly associated with the development of hyponatremia on first postoperative day.
Conclusion(s): Our study shows that postoperative hyponatremia is relatively common on the first postoperative day and associated with intraoperatively administered volume of Ringer.
However, the degree of hyponatremia was mild and the hyponatremia was self-limiting. Further research is needed.
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5AP4-8

Prospective single blinded randomized controlled study comparing the efficacy of epsilon- aminocaproic acid and tranexamic acid in pediatric patients undergoing elective idiopathic scoliosis corrective surgery

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Background and Goal of Study: Epsilon-aminocaproic acid (EACA) and tranexamic acid (TXA) are routinely used to prevent significant blood loss during multilevel pediatric scoliosis surgeries. Efficacy of these anti-fibrinolytic drugs was demonstrated in cardiac, total joint arthroplasty and in adult spine surgeries. Purpose of this study was to compare the efficacy of EACA and TXA in reducing intraoperative blood loss, post-operative drain output and blood transfusion requirements.
Materials and Methods: This is a single center, prospective, single blinded, randomized controlled study comparing the efficacy of TXA and EACA in pediatric patients undergoing multilevel idiopathic scoliosis corrective surgery. After obtaining IRB approval, idiopathic scoliosis patients undergoing corrective surgery were randomly assigned to one of the two groups - TXA or EACA. The following parameters were analyzed: intraoperative estimated blood loss (EBL), perioperative blood transfusion requirements, surgical drain output on post operative day (POD)-1, POD-2, POD-3 and total 72 hr drain output.
Results and Discussion: Forty six patients were randomly assigned to receive TXA (n=23) and EACA (n=23). Groups were similar at baseline with regards to weight, starting hematocrit level and gender distribution . Age and number of spinal fusion levels were different in the two groups. The median (25th and 75th percentile) EBL in TXA and EACA group were 600 (400-800) and 600 (450-800) respectively, p 0.580. The median 72 hours drain output in the TXA and EACA group were 303.5 (186.5-553) and 330 (165-513) respectively, p 0.991. Additionally there were no differences in the blood transfusion requirements between the two groups.
Conclusion(s): TXA and EACA showed no difference in EBL, 72 hour drain output and blood transfusion requirements in pediatric patients undergoing scoliosis repair. The endpoints analyzed did not demonstrate superiority of one drug over the other. Additionally, no adverse events were reported in both groups. Even though study was not powered to demonstrate equivalency, as there were no differences in any of the endpoints measured, cost of the drugs can be an important factor in deciding the choice of treatment. Limitations of the study are single center, small sample size; anesthesiologist was not blinded to the treatment and occurrence of baseline differences in the two groups.

5AP4-9

Determination of the minimal tranexamic acid concentration inhibiting t-PA activated hyperfibrinolysis in children with congenital heart disease

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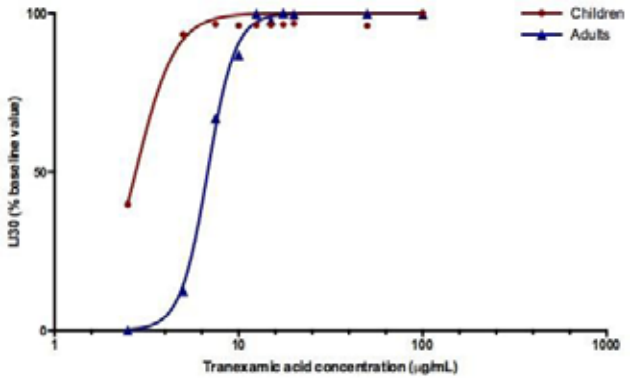
Background and Goal of Study: Tranexamic acid (TXA) is routinely administered in children undergoing cardiac surgery with the aim to decrease fibrinolysis activation, reduce bleeding, and transfusion requirement. Although recent studies assessed TXA pharmacokinetic characteristics in different population, the minimal TXA concentration inhibiting fibrinolysis remains to be determined. (1)
Materials and Methods: Ten healthy volunteers and 20 children aged <8 years old who underwent elective cardiac catheterization were enrolled in this

prospective in vitro study. A blood sample, consisting in 2 citrated tubes (1.8 mL each), was obtained in volunteers after venous puncture and from the arterial catheter inserted by the cardiologist in children. Rotational thromboelastometry was used to assess the degree of fibrinolysis measured on the EXTEM test using an experimental model previously described. (2) The degree of lysis measured after 30 minutes (LI30) was recorded at baseline, after addition of 1535 units t-PA/ml, and following the addition of increasing TXA concentrations (2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 50, 100 µg/mL) in t-PA activated samples. After logarithmic transformation and normalization, LI30 was modeled as a function of TXA concentration using linear regression.
Results and Discussion: Our dose-response analysis allowed the determination of the EC50 and EC95.



[Figure 1 - Dose-response curve for LI30]

In adult, EC50 was 6.8 µg/mL (95% CI 6.4 - 7.2 µg/mL) and EC95: 11.3 µg/mL (95% CI 10.6 - 12.9 µg/mL). In children, EC50 was 2.77 µg/mL (95% CI 2.56 - 2.98 µg/mL) and EC95: 8.58 µg/mL (95% CI 6.88 - 14.9 µg/mL).
Conclusion(s): In this in vitro study, we observed that the minimal TXA concentration that completely inhibits t-PA induced hyperfibrinolysis in children with congenital heart disease is 8.58 µg/mL, and significantly lower than the concentration obtained in healthy volunteers.
References:
1. Koster et al. Anesthesiology *in press,*
2. Faraoni D et al. Blood Coag Fibrinol 2014 *in press*

5AP4-10

Improving cervical spine positioning during newborn intubation

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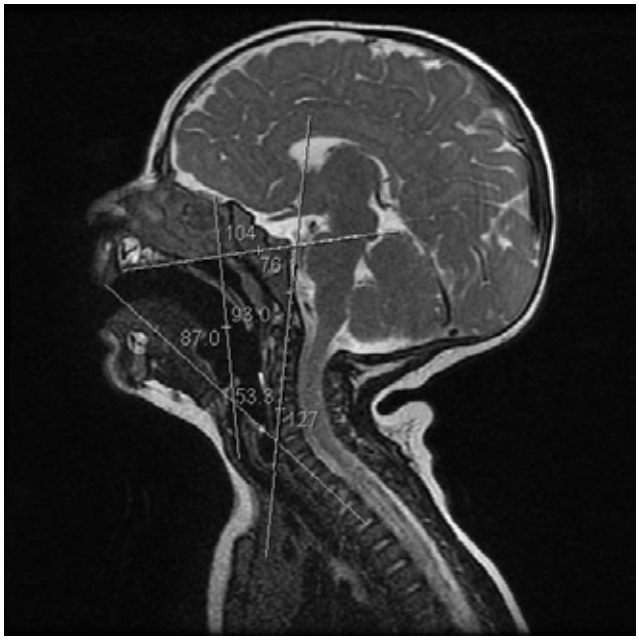
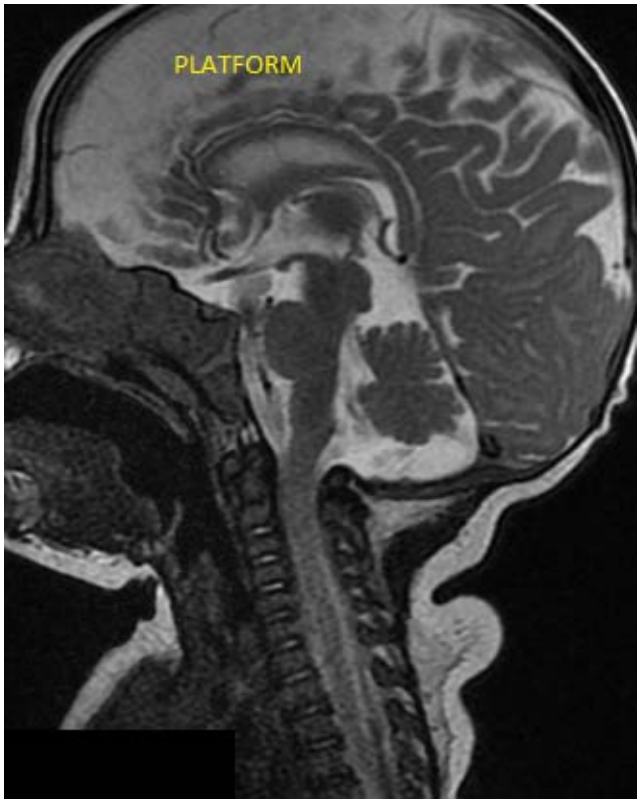
Background and Goal of Study: Newborn tracheal intubation and upper airway axis alignment are some of the well known challenges in paediatric anaesthesia. Prominent occiput may worsen this, as it trends to flex the neck. Usually, we all use a shoulder roll to extend the neck and to gain a clear view of the glottis. There is little information on the effects of this flexion on the cervical spine.
Materials and methods: 13 patients, aged under 6 months were enrolled in this study. Under general anaesthesia, cervical MRI scan images were obtained for other clinical reasons. Images were obtained in two different positions for each patients. First, using the classical shoulder roll technique and after that, with a same height platform.
Head was maintained in neutral position for the study. Lines along trachea, upper and lower cervical spine, pharyngeal axes (upper maxilla to C1) and skull base were drawn to assess the angles between.
Flexion of the cervical spine, extension of the neck, and alignment between trachea and the pharyngeal axis, were evaluated in both positions.



[MRI scan image. Shoulder roll]



[MRI scan image. Body platform]

Results: Demographic data were also recorded and compared.

	roll	platform
spine flexion	143±8,06	164,38±8,01
C1 - upper spine	65,75±5,79	66,86±3,92
Pharynx-trachea	114,91±9,92	116,69±10,29

[Statistical data]

No statistical differences were found on the angle between tracheal and the pharyngeal axis in both groups (114,9 ± 9,42 vs 116,69 ± 10,29). Spine flexion was much higher in the pillow group (143 ± 8,03 vs 164 ± 8,38) than in the platform one. No difference was found on the angle between upper cervical spine and cross section of C1.

Conclusion: Routine use of shoulder roll helps to align the upper airway axes during intubation. Despite of that, excessive flexion of the cervical spine can be harmful. This can be minimized with the use of a platform with similar alignments results.

5AP4-11

Anaesthesia for paediatric cardiac catheterization: a different place with different results?

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Background and Goal of Study: Complex congenital heart diseases are a prevalent indication for conducting paediatric cardiac catheterizations (PCC) under anaesthesia[1], what is being performed at our hospital centre since 2000. By 2012, the haemodynamics unit (HU) where these procedures are held moved to another hospital, so the aim of this study was to analyse what has changed with this new reality.
Materials and Methods: A retrospective study was carried out by analysing with SPSS20.0® a total of 1338 PCC performed between 2000 and 2014 in our hospital centre, comparing 2 groups:(A) before and (B) after 2012, that represent CCP performed at the first HU (A) and CCP performed after the change to a different HU, respectively.
Results and Discussion: Group A included 1069 PCC and group B 269 PCC. Data regarding type of procedure, ASA physical status, age, gender, anaesthetic technique, PCC duration and major complications are described at table 1.

Paediatric cardiac catheterization (PCC)		Group A N (%)	Group B N (%)
Type of PCC			
Diagnostic CCP		740 (69,2)	83 (30,9)
Intervention CCP		329 (30,8)	186 (69,1)
ASA physical status			
I		161 (15,1)	113 (42,0)
II		557 (52,1)	115 (42,8)
III		298 (27,9)	39 (14,5)
IV		52 (4,9)	2 (0,7)
Age			
Mean age ± sd		5,0 ± 4,0	6,6 ± 5,0
Gender			
Male		581 (54,3)	145 (53,9)
Female		488 (45,7)	124 (46,1)
Anaesthetic technique			
Sedation / Monitored anaesthesia care		65 (6,1)	9 (3,3)
General Anaesthesia	Balanced	852 (79,7)	259 (96,3)
	Intravenous	77 (7,2)	1 (0,4)
	Inhalational	13 (1,2)	0
	Dissociative	62 (5,8)	0
Anaesthetic procedure duration			
30min – 1h		263 (24,6)	93 (34,6)
1 – 2h		654 (61,2)	139 (51,7)
2 – 4h		140 (13,1)	33 (12,2)
>4h		12 (1,1)	4 (1,5)
Major complications			
Cardiac arrest		25 (2,3)	1 (0,4)
Death		1 (0,09)	0

[Table 1. Statistical analysis of the total PCC performed on the first HU - Group A (since 2000 until May 2012) and on the actual HU - Group B (after May 2012 until December 2014)]

The results obtained from PCC in group B show that there were differences comparing to group A mostly in the type of PCC, anaesthetic technique and rate of complications. Intervention PCC are now more prevalent probably suggesting that other diagnostic methods, such as echocardiography, are being preferred. There was also a change in the anaesthetic technique, showing that dissociative anaesthesia was abandoned and that there is a tendency regarding balanced general anaesthesia. There were less major complications in group B probably due to the increasing experience of the cardiology and anesthesia teams.

Conclusion(s): This study show that has been a change in the type of PCC and anaesthetic technique, as well a decrease in major complications. As anaesthesia is increasingly required for this type of interventions, safety in the anaesthetic approach for these high risk procedures is a central concern for the anaesthesiologist, particularly in paediatric population[1]. Studies like this are crucial to understand current practices, to recognize the paediatric population features and to analyse clinical outcomes in this area.
Reference: 1. Anesthesiol clin.:2009;27:47-56

5AP5-1

Preoperative fasting time for clear fluids. Single centre experience in paediatric patients with elective surgical procedures

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Background and Goal of Study: The intake of clear fluids until two hours prior to induction of anaesthesia is recommended in recent guidelines. The aim of this prospective study was to evaluate the actual length of fasting periods for clear fluids in patients scheduled for elective surgical procedures.
Materials and Methods: After Ethics Committee approval patients < 18years were included. They were supplied with exact information concerning the preoperative fasting periods (6 hours for solid food, 4 hours for breast milk, 2 hours for clear fluids) and informed consent was taken. On the day of operation a detailed questionnaire was filled in. General anaesthesia was performed.
Results and Discussion: A total of 348 patients were included. The mean age was 8,9 years (range: 1 week -17 years 11 months). 327 Patients/parents (94%) stated that they felt well informed by the anaesthetist after leaving the outpatient department. 209 patients/parents (60,1%) admitted that they were aware of the advantage of clear fluid intake up to 2 hours prior to anaesthesia. But only 136 patients (39%) had taken in clear fluids within 2 - 4 hours prior to induction of anaesthesia. 112 patients (32,1%) had a fasting period for clear fluid between 4 - 12 hours, but in fact 88 patients (25,3%) hadn't drunk any fluid for more than 12 hours. The reason was a postponed operation in 27 cases (7,8%), 56 patients (16,1%) were not sure how long they were allowed to drink, 45 parents (12,9%) stated that they did not want to wake up their children so early, 35 more (10,1%) gave other reasons. During induction of anaesthesia gastric aspirate was taken in 275 out of 348 patients. The mean amount of total gastric fluid was 22,9ml (range: 0,5 - 200ml) which comes to a mean amount of 0,698ml/kg (range: 0,03 - 6,67ml/kg). The gastric fluid of these patients had a mean pH of 1,95 (min:0,5 max:7,00).
Conclusion: Although 94% of patients felt well informed only 60,1% clearly got the message of the advantage of clear fluid intake up to two hours prior to anaesthesia. In the end only 32,1% followed the recommended fasting regime. In order to increase the number of responders further improvement of the oral and written information will be necessary.
Reference: Itou K, Fukuyama T, Sasabuchi Y et al; Safety and efficacy of oral rehydration therapy until 2 h before surgery: a multicenter randomized controlled trial. J Anesth. 2012 Feb;26(1):20-7.

5AP5-2

Parental presence at induction of anaesthesia - let's ask the parents!

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Background and Goal of Study: Parental presence during anaesthetic induction is increasing worldwide. The benefits for children are practically consensual.
However, from the perspective of parents it can be a double edge sword. The aim of this study was to determine how parents felt about this experience.
Materials and Methods: A satisfaction survey was created with the purpose of evaluating parental feelings outside and inside the operating room (OR), including the importance of their presence, opinions and fears. [1][2]
During one year, between December of 2013 and November of 2014, all parents who decided to be present at elective anaesthetic induction were invited to fill out the survey questionnaire. The questions were answered anonymously and immediately after the experience. A casuist analysis was performed.

Results and Discussion: A total of 388 parents completed the questionnaire, of which 87% were mothers. The majority of children were either preschoolers (46%) or school-aged (32%); 72% of the adults took part of a child induction for the first time, although 94% of them considered themselves as properly informed and 93% felt prepared for it.
Before entering the OR, only 26% of the parents were calm, 25% were preoccupied, 33% felt anxious, 15% very anxious and 5% in panic. Inside the OR, 35% of them reported to be calm, 23% preoccupied, 30% anxious, 11% very anxious and only 2% in panic. Anxiety decreased with the development of the procedure, probably because imagining the unknown can be more frightening than the reality.
The majority believe that their presence was fundamental or at least very important to the child (95%), to the anaesthetic team (71%) and to themselves (89%). No one thought that his/her presence was harmful.
Regarding elements of concern by parents, the majority reported that "seeing the child fall asleep" (40%), "abandoning the child" (36%) and "anxiety/fear felt by the child" (27%) all contributed to their fears.
When asked about overall satisfaction, 90% were satisfied with the experience and 94% would repeat it. One possible limitation of this study was the exclusion of parents who denied entering the OR.
Conclusion(s): Despite being a difficult experience, parents believe that their presence is beneficial to everyone. With careful preparation, parents are more likely to be present in the anaesthetic induction of their children.
References:
1. Paediatr Anaesth. 2002 Mar;12(3):261-6.;
2. AANA J. 2003 Aug;71(4):293-8.;

5AP5-3

Preoperative anxiety in children: why choose between sedation and distraction? A prospective randomized study

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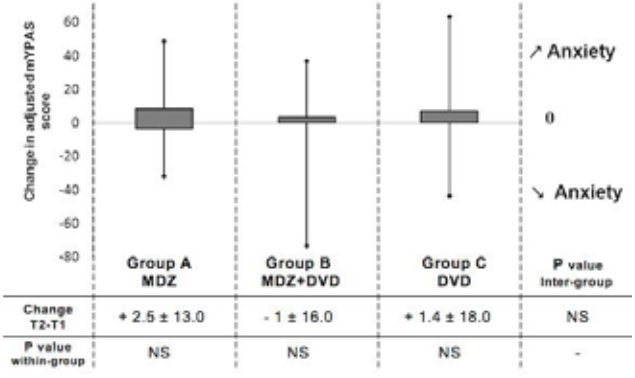
Background: Neglected for a long time, preoperative anxiety management receives currently special attention in paediatric anaesthesia. Various preventive techniques have been considered in relation to poor outcomes associated with a high preoperative anxiety. This prospective randomized-controlled study was designed to assess 3 different strategies on preoperative anxiety in children: midazolam (MDZ) premedication, distraction strategy (DVD player) and a combination of both (MDZ+DVD).
Methods: After IRB approval and parental consent, all children aged 2 to 12 years undergoing outpatient surgery were candidate. The day of surgery, included patients were randomized in three groups: MDZ, MDZ + DVD or DVD. 30 min before transfer to the holding area, preventive strategy to alleviate preoperative anxiety was started: midazolam administration and/or video distraction (stopped once loss of consciousness). Preoperative children's anxiety was assessed at hospital admission (baseline) and at separation from parents by the mYPAS and VAS-anxiety scores. Induction compliance, delirium emergence, postoperative pain, and parental satisfaction were also collected.
Results: 135 patients were enrolled. The 3 study groups were similar with regard to demographic data. The overall baseline means adjusted mYPAS (31±14) and VAS-anxiety scores (2.4±2.8) did not differ among the groups. Whatever the strategy implemented, no change in the anxiety level from baseline to the separation from parents was reported as showed below.

Children's anxiety scores at the hospital admission (T1) and separation from parents (T2) by treatment group.

	Group A MDZ N = 45	Group B MDZ + DVD N = 45	Group C DVD N = 45	P value
Baseline anxiety scores (T1)				
- Adjusted mYPAS scores	30 ± 10	31 ± 16	33 ± 15	NS
- VAS-anxiety scores	2.3 ± 2.4	2.6 ± 2.7	3 ± 2.9	NS
Separation from parents (T2)				
- Adjusted mYPAS scores	32 ± 13	30 ± 14	35 ± 19	NS
- VAS-anxiety scores	2.7 ± 3	1.8 ± 2.2	2.8 ± 3	NS

Change in children's anxiety score mYPAS from hospital admission (T1) to separation from parents (T2) by treatment group.



Data are expressed as means ± SD.

Group A (midazolam), Group B (midazolam+DVD), Group C (DVD).
T1: baseline anxiety scoring; T2: anxiety scoring at separation from parents; Adj. mYPAS: adjusted modified Yale Preoperative Anxiety Scale; NS: not significant.

Shaded box represents the interquartile range from 25 to 75 percentile. Upper and lower whiskers indicate range of scores.

[Children's anxiety scores]

Irrespective of the group, up to 70% of children were considered perfectly cooperating during induction and no poor compliance occurred in the group MDZ+DVD. Emergence delirium, postoperative pain score and analgesic consumption were similar in the 3 groups. Parents' satisfaction was excellent.
Conclusion: Choosing between sedation and distraction does not seem relevant. Both pharmacological premedication and video distraction are effective strategies for controlling preoperative anxiety in children. A multimodal approach could be beneficial. Future research should focus on the best preventive strategy depending on the child's behaviour and his developmental stage.

5AP5-4

Evaluation of the incidence of post-operative pain in pediatric day case adenoidectomy with or without grommets and of the effect of pre-operative administration of paracetamol

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Background and Goal of Study: Although adenoidectomy with or without grommets (A/G) is a frequently performed procedure in children, available data on the incidence of post-operative pain after this procedure is very limited. In the present study, we planned to measure the incidence of post-operative pain and the effect of intravenous administration of paracetamol at the start of surgery.
Materials and Methods: After obtaining informed consent from the parents, patients (aged 6 months to 6 years) planned for A/G were included in the study protocol. Patients were randomized to receive either paracetamol 10 mg/kg (group 1) or an equivalent volume of NaCl 0,9% (group 2) intravenously at the start of surgery.
Post-operative pain was assessed 45 minutes after surgery (time point 1) and at dismissal (time point 2) by the recovery room nurses, who were blinded for the study group the patient was in. Pain scoring was performed with the FLACC score (1). A score ≥ 4 indicated the presence of pain, in which case ibuprofen 5-10 mg/kg was administered rectally. Pain scores are presented as mean ± SD. The Wilcoxon rank-sum test was used to analyze the difference in pain scores at both time points.
Results and Discussion: In total, 174 patients were included: 89 were assigned to group 1, 70 to group 2. 15 patients could not be assigned to an experimental group because no pre-operative IV access could be obtained. The mean post-operative pain score was low in both patient groups at both time points: 1,8 ± 2,7 (group 1) versus 2,1 ± 2,9 (group 2) at time point 1 and 0,0 ± 0,1 (group 1) versus 0,2 ± 1,0 (group 2) at time point 2, respectively. There were no statistically significant differences in pain scores between both patient groups at each time point (P=0,45 and 0,13 at time point 1 and 2, respectively). In group 1, 12% of patients received additional pain medication post-operatively, versus 13% of patients in group 2.

Conclusion(s): Post-operative pain scores in pediatric patients after adenoidectomy with or without grommets are very low. Intravenous administration of paracetamol at the start of surgery does not result in even lower pain scores.
Reference: 1. Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: A behavioral scale for scoring postoperative pain in young children. Pediatric Nursing 1997; 23(3):293-297

5AP5-5

Tramadol for postoperative pain in children: a quantitative systematic Cochrane review

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Background and Goal of Study: Tramadol is a weak μ-opioid agonist and inhibits reuptake of noradrenaline and serotonin. Due to its pharmacodynamics it might be an interesting drug for postoperative pain treatment in children. However, the efficacy and relative risks (RR) for adverse events following tramadol administration (in comparison with placebo or other opioids) for postoperative pain treatment in children is currently not clear.
Materials and Methods: We systematically searched the the Cochrane Central Register of Controlled Trials, MEDLINE and EMBASE. All randomised controlled trials comparing the administration of tramadol with placebo or other opioids for postoperative pain treatment in children were included. RR and mean differences (MD) were calculated with their 95% confidence interval (95% CI) by using RevMan statistical software 5.2.
Results and Discussion: We finally included twenty randomised controlled trials (1170 patients) into this systematic review. Eight trials compared tramadol administration with placebo and showed that the RR for the need for rescue analgesia in the postoperative care unit (PACU) was significantly reduced in children receiving tramadol (RR 0.40; 95% CI 0.20 - 0.78; P=0.008). Due to the variety of different opioids used, the comparison of tramadol with other opioids was difficult to assess. Most data could be pooled for the comparison with morphine (four trials). The RR for the need for rescue analgesia in the PACU (RR 1.25; 95% CI 0.83 - 1.89; P=0.28) was slightly but not significantly higher in children treated with tramadol compared to morphine.
Generally, adverse events were only poorly reported. Most data could be pooled for the comparison with placebo focusing on the RR for postoperative nausea and vomiting (PONV). Children treated with tramadol compared to placebo did not show a significant higher RR for PONV in the PACU (RR 0.84; 95% CI 0.28 - 2.52; P=0.75) and 24h postop (RR 0.78; 95% CI 0.54 - 1.12; P=0.18).
Conclusion(s): The overall evidence regarding tramadol for postoperative pain in children is currently limited and should be interpreted with caution because of methodical problems of included trials and unexplored heterogeneity. Nevertheless, we demonstrated that tramadol administration compared to placebo might improve pain treatment. The comparison with morphine indicated a comparable analgesic efficacy. However, adverse events were only poorly reported.

5AP5-6

Comparision of the sugammadex and neostigmine usage for extubation time in pediatric patients

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Background and Goal of Study: Neostigmine is a cholinesterase inhibitor which is commonly using reversal of neuromuscular block.
These drugs have some disadvantages such as muscarinic side effects, slow onset of action and ineffective for reverse of the profound neuromuscular block. Sugammadex is a new drug specify to steroidal neuromuscular blocker. It was reported that sugammadex effects more rapidly and well tolerated even in profound block.
The purpose of this study was to compare the recovery and extubation time of the neuromuscular block, and the other object was to evaluate the hemodynamic effect of sugammadex and neostigmine during the extubation period.
Materials and Methods: 37 pediatric patients, aged 2-16 yr, scheduled for urological surgery with the same anesthesia regime were received an intubating dose of rocuronium(0.6 mg/kg) and maintenance doses at reappearance of the second twitch (T2) of train-of-four (TOF) if required. Neuromuscular blockade was monitored using acceleromyography (TOF Watch SX). At end of surgery, at reappearance of T2 after the last dose of rocuronium, patients were randomized to into two groups to reverse the block induced by rocuronium; Sugammadex 2 mg/kg was received in Group S, neostigmine 50 mcg/kg in Group N. The primary efficacy end point was evaluated as time to recovery of train of four (TOF) ratio 0,9 and extubation time described as opening the eye to verbal order. The drug related hemodynamic alterations were recorded during the extubation period.
Results: 37 patients were randomized; 37 of whom received sugammadex (n=16) or neostigmine (n=21). The mean time to recovery of the TOF ratio to 0.9 was significantly faster with sugammadex compared with neostigmine. The recovery of the TOF ratio to 0.9 were 1,68±0,97 min after sugammadex and 5,30±2,98 min after neostigmine administration (p<0.0001).
Extubation time was significantly longer in Group N (6,06±2,47 min) than the Group S (4,30±2,48 min) (p<0,04).
No significant difference was found in terms of hemodynamic alterations between two groups.
Conclusion: Sugammadex provides safe and significantly faster recovery time than neostigmine in pediatric patients.

5AP5-7

Audit on post-operative vomiting in paediatric daycase surgery at Sheffield Children's Hospital in July 2013

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Background: Post Operative Nausea and Vomiting (PONV) is a known complication of anaesthesia with reported incidence between 13-42%[1,2]. PONV rate in children can be twice as high as in adults which suggest a greater need of recognition, prevention and intervention. Aim of this project is to audit the risk assessment, incidence and management of POV in Paediatric Daycase Surgery at Sheffield Children's Hospital.
Methods: All paediatric cases from aged 6 months to 18 years of age undergoing day case surgeries were included in this prospective audit. No ethical approval needed for this audit. Data was collected from 23rd of July to 3rd of August 2013 on a designed questionnaire with information from preoperative, intraoperative and postoperative recovery forms. Any relevant data was also noted from nurses notes in recovery room and day case unit. Episodes of vomiting, delay in discharge, or unplanned admission due to PONV were documented.
Result: Out of 143 patients only 73% of patients had a risk assessment for POV with wide discrepancy between individual assessments on categorising patient into low, increased and high risk for PONV. Overall incidence of PONV was 3% with 50% of cases did not follow Association of Paediatric Anaesthetists of Great Britain and Ireland (APAGBI) guidelines on treatment. There was 1% incidence unplanned admission due to PONV in paediatric day cases during the period of our audit.
Discussion: Severe PONV can result in a range of complications including wound dehiscence, dehydration, electrolyte imbalance and pulmonary aspiration[3]. It is distressing to the parents and the child and may lead to delayed discharge, unplanned admission and readmission after surgery. Implementation of a prediction rule to guide risk tailored PONV prophylaxis changes physician behaviour, resulting in an increase in preventive anti-emetic treatments. Although our unit have a low incidence of POV but there is room for improvement especially in standardising the risk assessment so that prophylactic and treatment management can be tailored as per APAGBI guidelines. With a proper risk stratification and appropriate treatment, unplanned admission can be avoided.
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5AP5-8

Comparison of laryngeal mask removal in anesthetized versus awake pediatric surgical patients

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Background and Goal of Study: The purpose of this study was to compare the incidence of complications associated with the removal of the laryngeal mask airway (LMA) in children, at the end of surgery in an anesthetized and in an awake state.
Materials and Methods: 84 children who underwent elective surgical procedures were enrolled in this study. Anesthesia was induced and maintained with Sevoflurane. Neuromuscular blocking agents were not administered. After anesthesia induction, patients were randomly allocated into two groups, concerning the removal of LMA at the end of the surgery,
Group A (n=45) in deeply anesthetized state and;
Group B (n=39) in awake state.
The size of LMA used and the number of insertion attempts were recorded. During the first 15 min after LMA's removal, complications such as laryngospasm, desaturation (SpO_2<95%), vomiting, coughing, teeth clenching, hypersalivation, breathing retention and the need for intubation were also noted. Statistical analysis was performed with Fisher's exact test and Student t-test. Statistical significance was set at p<0.05.
Results and Discussion: Demographic data were similar between groups. LMA insertion attempts were not statistically significant in both study groups. The frequency of airway-related complications was insignificantly higher in Group B (20.5%) compared to Group A (19.5%). Regarding to complications, cough (A:2.1% vs B:0%), desaturation (A:2.1% vs B:0%), hypersalivation (A:15.2% vs B:25.6%), teeth clenching (A:17.1% vs B:25.6%) and laryngospasm (A:4.3% vs B:2.5%) were recorded with no statistical significance between groups. LMA was removed intraoperatively and endotracheal intubation was performed in two patients of Group A (4.3%) and one patient of Group B (2.5%) (p>0.05). No significant difference was also noted in the incidence of breathing retention.
Conclusion(s): Concerning LMA removal at the end of surgery in pediatric patients, the awake anesthetic state is preferable, as it presents fewer overall airway-related complications, but with no statistical significance between the two states.

5AP5-9

The effects of the use of preoperative montelukast sodium on the airway reactivity

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Background: Laryngeal mask airway (LMA) used during anesthesia practise can lead to airway reactivity (AR) or even laryngospasm (LS) in sensitive children.
Montelukast Sodium (MS), used in asthma treatment,is a leukotrine antagonist which reduces $LTC_4D_4E_4$synthesis.The use of MS in AR is known to reduce the need for bronchodilators and steroids(S).
The aim of this study was to research the effects of preoperative 10days use of MS on AR development in preoperative period in patients diagnosed with asthma undergoing inguinal hernia operation under general anesthesia with LMA
Method: After ethics committee approval, the study comprised 31ASA I-II patients, aged 4-8, undergoing inguinal hernia surgery. Patients were excluded if receiving asthma treatment, if they had URTI recently and if LMA could not be placed at a single attempt.
Patients were separated into 3 groups as Group E (n=11) with high IgE, Group C (n=10) with normal IgE and Group M (n=10) who were administered with 4mg PO MS 10 days before surgery with high IgE.
Induction was achieved with 0.01mg.kg^{-1}midazolaml-1mg.kg^{-1} ketamine IV and 1.5 MAC sevoflurane inhalation. With spontaneous breathing, a classic LMA was placed. Anaesthesia was maintained with a mxture of 1.3 MA Csevo 50% O_2-N_2O. At 5 minute intervals, SpO_2,$ETCO_2$,HR,VT,f, peak airway pressure (PAP), coughing, apnea, LS, bronchospasm (BS), desaturation (DS) and need for S were noted.

Results: No statistically difference was determined between the groups in respect of demographics, operating time, SpO_2, $ETCO_2$, HR, VT, f, during the operation or rates of apnea, BS, DS, coughing and S(p>0.05)

	Group E (n:11)	Group C (n:10)	Group M (n:10)	p
[1]Sex n,%				
Male	9 (81.8%)	7 (70%)	9 (90%)	0.523
Female	2 (18.2%)	3 (30%)	1 (10%)	
[2]Age (years) Mean±SD	5.55±1.04	5.20±1.14	5.60±1.43	0.724
[2]Weight (kg) Mean±SD	24.91±5.34	24.20±4.94	23.80±6.94	0.906
[3]IgE Mean±SD	224.65±140.07 (160)	40.68±24.86 (32.5)	281.80±268.95 (189)	0.001**
[2]Operation Time (min) Mean±SD	25.45±6.87	22.50±4.25	29.50±8.96	0.096
[1]Steroid n,%	6 (54.5%)	3 (30%)	3 (30%)	0.406
[1]Apnea n,%	4 (36.4%)	3 (30%)	1 (10%)	0.361
[1]Bronchospasm n,%	6 (54.5%)	2 (20%)	2 (20%)	0.144
[1]Laryingospasm n,%	7 (63.6%)	1 (10%)	3 (30%)	0.034*
[1]Desaturation n,%	2 (18.2%)	0 (0%)	1 (10%)	0.371
[1]Cough n,%	7 (63.6%)	2 (20%)	3 (30%)	0.097

[1]Chi-Square Test [2]Oneway ANOVA [3]Kruskal-Wallis Test *p<0.05 **p<0.01

[Table 1. Assesment of demographic data]

A significant difference was found between the groups in terms of rates of LS seen following removal of LMA (p:0.034,p< 0.05). The rate of LS in GroupE was higher than that of GroupC (p:0.024,p< 0.05) The mean PAP measured during the operation was determined as higher in GroupE than in GroupsC and M(p:0.001,p< 0.01).
Conclusion: The results showed that 4mg MS used for 10 days preoperatively on allergic children reduced AR and had positive effects on PAP and postop LS, compared to allergic children not using MS. The preop use of MS, which is currently often used in AR treatment, can be considered effective in reducing periop pulmonary complications.

5AP5-10

Cost-effectiveness analysis of Sevoflurane in the management of pediatric anesthetic in rigid bronchoscopy

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Background and Goal of Study: In Moldova (developing country) bronchoscopy is performed in children with the help of a rigid bronchoscope.With a small financial budget , it is very important to make adequate, safe and efficient general anesthesia, with a good cost-effectiveness ratio.
Materials and Methods: The last five years at the Institute of Mother and Child were performed over 1160 bronchoscopy with rigid bronchoscope. The children were between 1 to 3 years old. Rigid bronchoscopy was performed under anesthesia with Sevoflurane 8% bolus and O2 4-6 l min. and topical anesthesia for vocal cord - Lidocaine 10% -spray. Induction in 30-40 sec. Catheterization of peripheral venous was with subsequent administration of Atropine 0.01 mg / kg. The extraction of foreign bodies of the upper airways is done in 1-2 minutes.For extraction of foreign bodies of the lower airways with rigid bronchoscope was administered Succinylcholine 0.5-1 mg / kg, maintenance of anesthesia was performed with Propofol 1 mg / kg. Mechanical ventilation was done manually with bag -Oxygen 100% - 8 l / min.
Results and Discussion: In previous years the bronchoscopy was performed with Halothane anesthesia, but it was banned in Moldova. Currently, it raises the question of cost-effectiveness, because neither Sevoflurane nor Propofol are not cheap drugs for Moldova. A Sevoflurane bottle (250ml) costs 170 $ (national average salary) and a bottle of Propofol (20ml = 200mg) costs 5 $.In this article we intended to argue the use of Sevoflurane and Propofol in general anesthesia. Despite the high price, we get a low cost-effectiveness, given the fact that children quickly enter into anesthesia and after 20 minutes of anesthesia, the awakening is rapidly, they are active and without complications. Mothers are not retained in recovery room and does not require additional medication for postanesthetic period. In 20 minutes rigid bronchoscopy with Sevoflurane (1min = 1ml) and Propofol (1min = 3mg) for a child 14 kg, the cost is around 16-17 $, which is much cheaper and more effective than total intravenous anesthesia.

Conclusion(s): Anesthetic management conducted with Sevoflurane and Propofol in rigid bronchoscopy has a better cost-effectiveness than total i.v.anesthesia. The protective effect of Sevoflurane and Propofol in hypoxia for preventing cardiovascular response,as well as the quality of an early recovery lead to improve pediatric anesthesia management.

5AP5-11

Repeated pediatric sedation in hematological patients: analysis of factors influencing the induction dosage of propofol

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Background and Goal of Study: Pediatric patients suffering from oncological-hematological diseases, require frequent sedations to perform invasive procedures aimed at diagnosing, staging, and treating those diseases.
Pediatric sedation service at the San Gerardo Hospital, Monza, Italy, performs about 1000 sedations every year of oncological-hematological patients.
Aims of this study are to evaluate the dosage of Propofol required to achieve the adequate level of sedation in pediatric hematological patients requiring repeated sedation. We also investigated the factors influencing the required dosage of Propofol.
Materials and Methods: We retrospectively analyzed the pediatric sedation service database in a cohort of 100 pediatric patients with haematological malignancies undergoing 1597 sedations at the San Gerardo Hospital, Monza, Italy. All patients were sedated with fentanyl 1 mcg/kg while the dosage of Propofol was titrated to achieve the required level of sedation.
Results and Discussion: Patient characteristics at first procedure are: age (years) 7 (0-18); sex: male 61%, female 39%; weight (kg) 23 (7-140); diagnosis: acute lymphoblastic leukemia 81%, acute myeloid leukemia 7%, other 12%. Mean number of sedation procedures per patient 15.9 (4-40); time from first to last procedure (days) 289 (14-911). Propofol dose (mg/kg): 2.7 (1.0-12.5), 3.5 (1.4-14.2) and 3.0 (1.0-14.2), respectively at first procedure, at last procedure and overall.
The multivariate generalized linear mixed model showed a significant increased Propofol dosage over time and a significant decrease dosage with increasing age and weight.
Conclusions: The dosage of Propofol necessary to adequately sedate pediatric patients with haematological malignancies undergoing multiple sedations is affected by age, weight and the time elapsing from the first sedation.

5AP5-12

Effect of premedication with midazolam on total propofol dose used for sedation in children undergoing endoscopic procedures

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Background and Goal of Study: In the pediatric population, the level of sedation required to perform diagnostic esophagogastroduodenoscopy (EDG) procedures ranges from minimal sedation to general anesthesia. The aim of this study was to compare the effectiveness of sedation using fentanyl and propofol with and without midazolam premedication in children undergoing EGD procedures.
Materials and Methods: Our prospective study included 36 children that underwent elective EGD procedures. Premedication with midazolam syrup was used in all children that could tolerate it. Sedation was achieved using 1μg/kg of fentanyl, followed by 1mg/kg of propofol. After the administration of 100% O_2 by nasal prongs, the child was placed in a lateral position and a gastroscope was introduced by an endoscopist. Vital signs were monitored using ECG, NIBP and spO_2. If significant movement or coughing was registered, additional boluses of propofol were given until a motionless state was achieved and the procedure could be carried out safely.
Results and Discussion: Patient characteristics of boys (N=15) and girls (N=21) were similar in terms of age and body weight. The mean age was 7.47±4.7 years. All children were ASA class II or III. Diagnostic EGD was successfully performed in 34 out of 36 children. Two children required conversion to general anaesthesia (one had difficult EGD introduction and another had rapid spO_2 deterioration). Eighteen children received premedication with midazolam according to our hospital algorithm. Total propofol dose varied from 20-150 mg. The children that were not given premedication required statistically significant more propofol boluses (5,81±3,18 vs. 2,78±1,67, t=3,62, P=0,002) and had lower body weights (15,94±5,97kg vs. 22,44±9,93kg, t=-2,35, P=0,026) than children that received premedication. Children with ASA II status were younger (5,48±2,73 years vs. 12±5,24 years, t=-3,56, P=0,006), had lower body weights (16,76±6,43kg vs. 26,67±10,76kg, t=-2,6, P=0,026) and required statistically significant more propofol boluses (4,84±2,82 vs. 2,44±1,67, t=2,39, P=0,023) than children with ASA III status.
Conclusion(s): Premedication with midazolam could significantly decrease the total propofol dose used for sedation in children undergoing EGD procedures. If children are unable to swallow a liquid an alternative route of administration could be suggested.

Neuroanaesthesiology

6AP1-1

Dexmedetomidine conditioning in cerebral ischemia: findings from an *in vitro* model

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Background and Goal of Study: Dexmedetomidine is a selective agonist of α_2-adrenergic receptors with clinical anesthetic and analgesic properties that has also shown neuroprotective effects on several models of brain injury. We examined different mechanisms potentially involved in dexmedetomidine-mediated neuroprotection in an *in vitro* model of cerebral ischemia.
Materials and Methods: Primary mixed rat brain cortical cultures were subjected to oxygen and glucose deprivation (OGD) and treated with dexmedetomidine (0.3, 1 or 10 μM) in order to analyze preconditioning (dexmedetomidine 1 hour before OGD) and postconditioning (dexmedetomidine 30 after OGD) strategies. Samples from cell cultures were taken at 24 hours after OGD to analyze cell death, inflammation (interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α)), and oxidative stress by measuring total reactive oxygen species/reactive nitrogen species (ROS/RNS). After the normality of data were assessed by Kolmogorov-Smirnov test, statistical analysis was performed with ANOVA followed by *post hoc* test when appropriate using statistical software Prism 5 (GraphPad). A $p < 0.05$ was considered statistically significant.
Results and Discussion: All dexmedetomidine pre- and postconditioning treatments showed neuroprotective effects reducing brain cell necrosis (all $p<0.001$), although only preconditioning strategy showed antiapoptotic effects ($p<0.01$) compared to controls. Dexmedetomidine treatments also reduced IL-6 and TNF-α levels in both the preconditioning (all $p<0.001$ for IL-6 and all $p<0.05$ for TNF- α), and the postconditioning group (all $p<0.01$). Oxidative stress was attenuated with all dexmedetomidine preconditioning treatments (all $p<0.05$), whereas no effects were observed in the postconditioning group (all $p\geq0.05$).
Conclusion(s): Dexmedetomidine-mediated neuroprotective effects in an *in vitro* model of cerebral ischemia are associated with a reduction of inflammatory mediators as well as oxidative stress response.

6AP1-2

Doppler based non-invasive estimation of intracranial pressure in a model of acute intracranial hypertension

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Background and Goal of Study: In many acute neurological diseases intracranial pressure (ICP) is elevated and needs to be actively managed. ICP is typically measured with an invasive transducer, which carries inherent risk. Therefore, non-invasive techniques for monitoring ICP (nICP) have been developed. The aim of this study was to compare three different methods of transcranial Doppler (TCD) -based nICP assessment in an animal model of acute intracranial hypertension.
Materials and Methods: Experimental data recorded in 30 New Zealand white rabbits ICP was increased by infusion of Hartmann's solution into the lumbar subarachnoid space to produce a controlled and marked rise in ICP to 70-80 mmHg, has been retrospectively analysed. Doppler flow velocity was measured in the basilar artery and ICP was measured in the right frontal cortex. nICP was assesed through 3 different methods: Gosling's pulsatility index(gPI) ,Aaslid's method (aanICP) and flow velocity diastolic Formula (fdICP). One minute mean values of each parameter were calculated
Results and Discussion: Linear regression showed a positive relationship between nICP and ICP when 1 minute data form all rabbits were combined (fdICP R = 0.58, aanICP R = 0.37, gPI R = 0.30). 95% confidence intervals for prediction of ICP were 12-34 mm Hg for fdICP, 18 - 26 mm Hg for aanICP and 14- 35 mm Hg for gPI. [m1] When changes within each rabbit were considered, the relationships were stronger, particularly for fdICP (mean R = 0.77). The ability to predict intracranial hypertension was highest for fdICP (AUC = 0.84 at ICP >20 mm Hg, AUC 0.84 at ICP >30 mm Hg and AUC 0.87 at ICP >40 mm Hg).
Conclusion(s): TCD based nICP methods are better at detecting changes of ICP within a subject, rather than absolute prediction of ICP. Of the studied nICP methods, fdICP is best able to discriminate between raised and 'normal' ICP.
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6AP1-3

Argon post-surgical treatment delays axotomy-induced apoptosis in mouse retinal ganglion cells

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Background and Goal of Study: The neuroprotective influence of noble gas treatment has been demonstrated in a number of ischemic and apoptotic systems. Little data has been presented that characterizes the anti-apoptotic potential of noble gas exposure in a highly specified model of injury-induced programmed cell death, that doesn't also include significant necrotic cross-talk. Utilizing the retinal optic nerve axotomy model of target-derived trophic support disruption, we investigated changes in apoptotic and cell death reporters in genetically-labeled retinal ganglion cells (RGC).
Materials and Methods: After approval by the local animal care committee, Thy1-YFP (line 16) reporter mice underwent unilateral optic nerve transection, with confirmed preservation of blood supply to the retina, followed by a two-hour exposure to 70% argon + 30% oxygen. Quantification of YFP cell populations, Annexin-V apoptotic indices, and 7-AAD dead cell indices were achieved by flow cytometric evaluation of dissociated retinas at various times following injury. Confocal analysis of YFP reporter expression and histopathological stains were used as a correlative analysis to population data.
Results and Discussion: We describe a significant reduction in Annexin V binding in YFP cells that peaks at 48 hours post injury, relative to normal atmospheric controls. This protective effect is absent at 72 hours, suggesting that neuroprotection is transient. Evaluation at 8 days post-injury revealed the retention of YFP labeling relative to controls, suggesting a preservation of RGCs in response to argon treatment. Annexin V and 7-AAD labeling of 8-day retinas, however, indicated that this effect is transient.
Conclusion(s): We demonstrate that a single, two hour exposure to argon transiently delays apoptosis in axotomized retinal ganglion cells, suggesting that argon treatment may open an efficacious treatment window post-injury.

6AP1-4

Argon provides long-term neuroprotection in an *in vivo* model of cerebral ischemia

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Background and Goal of Study: *In vitro* studies have well established the direct neuroprotective action of the noble gas argon (Ag)[1]. However, only limited data from *in vivo* models are available, and particularly whether pre- or post- ischemic Ag inhalation can provide neuroprotection *in vivo* still remains

to be demonstrated. The aim of this study was to demonstrate Ag-induced pre- or post-conditioning effect on *in vivo* focal cerebral ischemia in rats and whether any protective effect is evident after long-term survival.
Materials and Methods: 48 male Sprague-Dawley rats (250g) were randomly allocated in 4 groups: Control exposed to O_2 (C; n=12), Preconditioning group (Ag-Pr; n=12) exposed to 50 % Ag and 50 % O_2 (60 min) 120 min before surgery, Direct Neuroprotection group (Ag-DN; n=12) exposed to 50 % Ag during ischemia and a Post-conditioning group (Ag-Po; n=12) exposed to 50 % Ag (60 min) 60 min after the end of ischemia. Animals in both groups were subjected to transient middle cerebral artery occlusion (MCAO) by use of the intraluminal filament model. Anaesthesia was discontinued as soon as the MCAO was initiated and the animals were allowed to awaken. After 60 min of focal ischemia the filament was removed. Neurologic function (mNSS score) was determined at 1, 3, 7 and 14 days after the MCAO. Change in blood brain barrier (BBB) disruption at D2 and apoptosis activation at D3 were assessed *in vivo* using a nanoSPECT-CT with respectively (99m)Tc-DTPA and (99m)Tc-annexin V-128. Data are presented as mean±SD. Statistical analysis used ANOVA.
Results and Discussion: Control rats had severe neurological dysfunction, while Ag-treated animals showed significant improvements in the mNSS score after day 1 for ND group and day 3 for Ag-Pr and Ag-Po groups. This improvement persisted in both argon groups until day 14. Compared to the control group, in all Ag groups the DTPA activity at D2 (Ag-Pr -72%, Ag-DN: -114%, Ag-Po -69% of Controls; $P < 0.05$) and the annexin V-128 activity at D3 (Ag-Pr: -24%, Ag-DN: -36%, Ag-Po: -28% of controls; $P<0.05$) were significantly lower.
Conclusions: These results suggested that Ag-induced pre- and post-conditioning in brain. Moreover, our study also demonstrates that Ag inhalation before, during or after ischemia significantly counteracted the ischemic-induced BBB disruption and apoptosis activation. Finally, this protection afforded by Ag seems not to be attenuated in late recovery periods.
Reference: 1. David et al.,PLoS ONE 2012

6AP1-5

Neurons protected by thiopental sodium did not show L-glutamate-induced hyposensitivity after hypoxic insults *in vitro*

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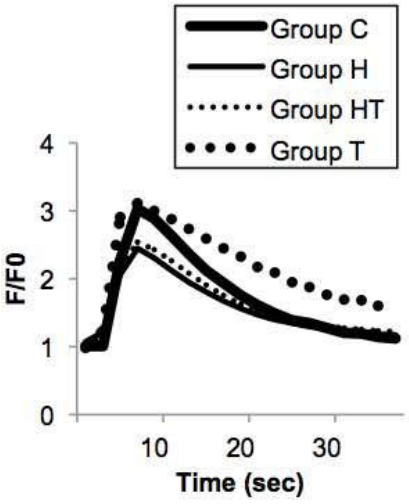
Backgrounds: The neuroprotective effects of thiopental sodium (TPS) against hypoxic insults have been shown in many *in vitro* studies. However, the response to glutamate in survival neurons protected by TPS against hypoxic insults still remains unknown. We investigated the degree of L-glutamate-induced intracellular calcium ($[Ca^{2+}]i$) elevation using rat primary cultured cortical neurons exposed to hypoxic insults with or without TPS administration.
Material and methods: Neurons prepared from E17 Wistar rats were used after 10 days in culture. The neurons were exposed to 12 hrs hypoxic insults with or without 100 μM TPS. The degrees of L-glutamate-induced $[Ca^{2+}]i$ elevation were measured using fluorescence measurement systems 24 hrs after hypoxic insults. Data are expressed as survival ratio and height ratio of the mean and standard error of the mean. These ratios were compared to control, which were not exposed to TPS at normoxia.
Results: The survival ratio of the neurons in which TPS were administered shortly before the hypoxic insults was significantly higher than the neurons without TPS (63.1 ± 22.2 % vs 20.3 ± 22.1 %: *P* value = 0.015). However, the degrees of $[Ca^{2+}]i$ elevation in survival neurons were not significantly different (95.9 ± 35.2 % vs 81.5 ± 26.6 %: *P* value > 0.05, *Figure*). In addition, these two degrees of $[Ca^{2+}]i$ elevation in survival neurons were not significantly different from control (vs 100%, *P* value > 0.05).
Conclusion: There was no difference in L-glutamate-induced $[Ca^{2+}]i$ elevation in survival neurons after hypoxic insults when TPS offered neuroprotection in primary cultures.
Figure: Fluorescence change in $[Ca^{2+}]i$ imaging. The neurons in Group H and Group HT were exposed to hypoxic insults and TPS were administrated into those in Group HT and Group T.



[Figure]

6AP1-7

2-iminobiotin reduces hypoxia-induced neuronal cell damage *in-vitro*

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Introduction: Perinatal asphyxia is a major cause of neonatal morbidity and mortality. Studies in newborn piglets and rats suggest that the biotin analogue 2-iminobiotin (2-IB) is able to dose-dependently reduce neuronal cell damage and to increase survival with a normal outcome after birth asphyxia. Although 2-IB is a selective neuronal and inducible NOS inhibitor, there is a lack of knowledge concerning the 2-IB-mediated effects on cellular and molecular levels. Aim of this study was to validate the neuroprotective effects of 2-IB in vitro and to explore possible underlying mechanisms.
Materials and Methods: Human neuronal IMR-32 cells were exposed to 7 hours of enzymatically induced hypoxia and were thereafter incubated for 17 hours with a dose range of 0.01 μg/ml to 0.5 μg/ml of 2-IB. Cell morphology was evaluated by brightfield microscopy, cell damage was quantified using colorimetric LDH assays at 24h after hypoxia. In addition, caspase-3/7 activity assays as well as phospho-specific Western Blotting experiments were performed.
Results: Hypoxia led to cell rounding and detachment from the growth surface, and the release of LDH was significantly increased after hypoxia ($P < 0.01$). 2-IB significantly attenuated hypoxia-induced LDH release in the dose range of 0.03 to 0.05μg/ml ($P < 0.05$). Caspase-3/7 activity was unaltered at 12h after hypoxia, while phosphorylation of akt and erk1/2 was increased by 0.03μg/ml 2-IB.
Conclusion: Hypoxia-induced neuronal cell damage is inhibited by 2-IB and the associated mechanisms may also involve phosphorylation of akt and erk1/2. 2-IB is a potential drug for the treatment of perinatal asphyxia.

6AP1-8

Isoflurane attenuates cerebral ischemia-reperfusion injury induced blood brain barrier disruption

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Background: Recent studies have shown isoflurane attenuates cerebral ischemia-reperfusion (IR) injury. It is well known cerebral IR injury leads to blood-brain barrier (BBB) disruption and causes further endothelial and neuronal damage. However, the mechanism of isoflurane related neuroprotective effect remains to be clarified.

Objective: To investigate the role of isoflurane in protection of BBB integrity during cerebral IR injury
Method: A mouse model of transient meddle cerebral artery occlusion (tMCAO) was used. All animals underwent 2h transient right-side MCA ligation followed by 4h reperfusion then were randomly assigned to control (Air, N=14), 1% ISO (Air+1% ISO, N=14) and 2% ISO (Air+2% ISO, N=13) group. After MCA reperfusion, all mice were given Evans Blue Dye (EBD) intravenously as a tracer to evaluate the degree of BBB disruption. Then three groups of mice respectively breathed ambient air, 1% isoflurane, and 2% isoflurane for 1h. At the end of the experiment, all animals were sacrificed and their brains were harvested. Fluorescence spectroscopy was used to quantify extravasated EBD into right-side forebrain parenchyma.
Result: Extravasation of EBD due to IR induced BBB disruption was significantly decreased in Isofluran exposure animals in a dose-dependent manner. Mice in 1% ISO group had lower extravasated EBD in right-side forebrain parenchyma compared with control mice (43.8% of control group, $p< 0.05$). Animals in 2% ISO group had prominently lower value of EBD compared with control group animals (18.8% of control group, $p< 0.01$).
Conclusion: The result indicated BBB disruption was attenuated by isoflurane inhalation during cerebral IR injury. The possible mechanism of isoflurane related neuroprotection in cerebral IR injury may be rather an indirect influence by maintenance of BBB integrity than a direct effect on neurons.

6AP1-9

Time-dependent expressions for inflammatory cytokine mRNAs following intravenous injection of dental pulp cells and dental pulp-derived neurosphere cells after severe forebrain ischemic insult in rats

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Background and Goal of Study: We previously presented that brain-derived neurotrophic factor (BDNF) mRNA expression was not related to the histological outcome of severe forebrain ischemia, in which dental pulp-derived neurosphere cells (NCs) showed histological improvement. Because labeled cells were not found in the brain tissue, we postulated that the other humoral factors other than BDNF, would be responsible for neuronal amelioration by NCs. It is a well known fact that brain ischemic pathophysiology accompanies inflammation, and recent studies have suggested both protective and harmful properties of cytokines to ischemic neuron. Accordingly, we measured the post-ischemic time-dependent expressions for inflammatory cytokine mRNAs after severe forebrain ischemic insult, in which the dental pulp cells or NCs were intravenously injected after the insult.
Materials and Methods: Same samples of previous ischemia experiment were used in this study. The experimental protocol of previous experiment included 5 groups; control, sham-operated, normal saline, dental pulp cells, and NCs. Eight to ten week's fasted Sprague-Dawley rats underwent severe forebrain ischemia both by exsanguination as well as carotid clamping for 11mins, and vehicle was *administered intravenously* at 3 h post-ischemia. In dental pulp and NCs, 1×10^6 cells were administered. Animals in each group were sacrificed at 0, 3, 6, 12, 24 h after administration of vehicles (considering n= 3 at each time point). At the given time points, rats were euthanized and brain tissues were immediately collected. The hippocampus and cortical tissues were processed for Reverse transcription polymerase chain reaction. Then, the alterations in the mRNA content of Tumor necrosis factor alpha (TNF-α), Interleukin 6 (IL-6), and Interleukin 1 beta (IL-1β) were examined by using the sensitive and quantitative techniques.
Results and Discussion: Post-ischemia mRNA expressions for TNF-α, IL-1β, and IL-6 were not different among groups at any time points. However, pulp group had tendency to have higher expression for TNF-α mRNA in the cortex as compared to the sham group at 0 - 12h after the injection.
Conclusion(s): Combined with our previous study, it was concluded that neuroprotective property of NCs is not derived from direct cell migration to brain tissue or humoral factors, such as BDNF, TNF-α, IL-1β, and IL-6.

6AP1-10

Histamine H3 receptors modulate glutamate release through cAMP/PKA-dependent pathway in rat cerebral cortex nerve terminals

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Background and Goal of Study: Recent studies have shown that blockade of histamine H3 receptors have neuroprotective effect. Given that glutamate is the major excitatory neurotransmitter in the CNS and excessive glutamatergic synaptic transmission can cause neuronal excitotoxicity, the present study investigated whether H3 receptors activation could modulate glutamate release from isolated nerve terminals (synaptosomes).
Materials and Methods: Isolated nerve terminals (synaptosomes) purified from Sprague-Dawley rat cerebral cortex were used to examine the effect of immepip, an H3 agonist, on glutamate release evoked by 4-aminopyridine (4-AP). H3 antagonist thioperamide and several activators and inhibitors of protein kinase cascades were used to investigate the signaling pathway.
Results and Discussion: Results showed that immepip concentration-dependently facilitated 4-AP-evoked glutamate release. This facilitation of glutamate release could be prevented by H3 antagonist thioperamide. In addition, the enhancement of glutamate release by H3 activation could be abolished by sp-cAMP, a specific activator of cAMP-dependent protein kinases and by H89, an inhibitor of protein kinase A (PKA). However, the inhibitors of protein kinase C did not affect the facilitative effect of H3 activation on evoked glutamate release.
Conclusion(s): Our results indicate that H3 receptors can modulate glutamate release from rat cortical synaptosomes and this effect is mediated by the cAMP/PKA-dependent pathway.
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6AP1-11

Notch-1 signaling inhibition reduces inflammation damage after hypoxic-ischemic brain injury in neonatal rats

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Background: Neonatal hypoxic-ischemic encephalopathy (HIE) is a fetal cause leading to neuronal cell death, even leading to neurological defect. Neuron-inflammation has been proved involving in HI brain damage. Notch pathway activation can worsen adult ischemic brain damage through inflammation. Therefore, our purpose is to test whether Notch-1 pathway involves in neonatal hypoxic-ischemic injury and its inhibitor produces neuroprotection in immature brain.
Methods: HI model was established in seven-days-old rat pups by left common carotid ligation and then exposure in 8% oxygen environment for 2h. As pharmacological interventions, the Notch antagonist DAPT was administered half an hour before HI. The expression of notch-1, NF-κB, delta-1 and hes-1 was determined by real-time PCR and western blotting. Brain injury infraction and biomarkers of apoptosis was evaluated by 2,3,5-triphenyltetrazolium (TTC) and Tunel staining respectively 24h after HI model established. Proinflammatory cytokines was measured by real-time PCR.
Results: The mortality was 10% after low concentration oxygen exposure. DAPT did not affect the mortality. However, DAPT preconditioning attenuated HI-induced loss of neuron and brain infarct area where is cortex and hippocampus in survivors. Notch-1 pathway activation was found in HI model. The expression of notch-1, NF-κB, delta-1 and hes-1 was observed higher in HI group than control group. The increase was reduced by inhibitor of notch-1. Notch-1 inhibition can also reverse HI-induced brain damage.
Conclusion: Notch-1 pathway is involved in neonatal hypoxic-ischemic brain injury by amplifying the NF-κB induced inflammation. DAPT takes a neuroprotective role in neonatal hypoxia-ischemia.

6AP2-1

Posterior midline cortical changes associated to propofol LOC and ROC are mirrored in surface EEG

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Background: PET-fMRI have taught a great deal about brain dynamics associated with anesthetic unconsciousness(GA). However, this has not yet translated into EEG clinical applications.These work follows 2 objectives:
(a) determine a correspondence between EEG source analysis and changes described by imaging techniques during GA;
(b) search for a scalp EEG correlate that mirrors common electrical/imaging changes.
Methods: 9 volunteers were studied (Cl Tr regNCT01962285).Propofol TCI was administered in a stepwise manner of 0.5mg/mL increases every 7 minutes until loss of response to command (LOC), followed by two 0.5μg/mL steps up; emergence phase consisted of a 0.5μg/mL stepwise decrease until 0mg/mL. Propofol were sample at each step.EEG signals were obtained at 128 Hz acquisition rate using a 38 Ag/AgCl surface electrode cap . Recordings were analyzed off-line using custom scripts in Igor Pro (WaveMetrics Inc) and eLORETA (electrical source analysis)(2); all epochs for analysis were band-pass filtered (0.01-30 Hz) and artifact-free. Twenty epochs of 1sec duration were used for eLORETA analysis and one 60sec epoch was used to calculate Power Spectral Density (PSD) and Coefficient of Variation (CV)(2).
Results: Analysis were obtained for 19 common low impedance electrodes;all categories were compared to Basal condition. An evident β and (at higher Cp) α band "activation" in the precuneus, cuneus and posterior cingulate cortices is observed even before LOC; at the highest propofol Cp there is evident widespread δ waves. The process of step-wise reduction of propofol from Deep to return of command) did not follow the reverse order of induction. Both PSD and CV analysis of the 7 to 16 Hz band were able to differentiate preLOC from postLOC conditions, more evidently in posterior midline electrodes (Oz better than Pz or Cz).
Conclusions:
(a) EEG source analysis confirms the involvement of precuneus, cuneus and posterior cingulate cortices
(b) Two different signal analysis techniques allow to differentiate preLOC from postLOC conditions when using the occipital midline electrode (Oz).
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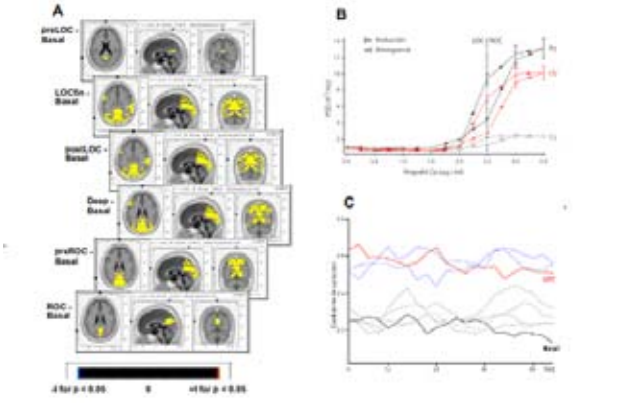

Figure 1: Analysis for 8 to 15 Hz EEG band. A) eLORETA source analysis (n=9) showing activation and deactivation of precuneus, cuneus and posterior cingulate cortices between anesthetic LOC and ROC (scale shows colors only for differences with p<0.05 between condition-Basal). B) PSD curves (n=1, example) for midline electrodes (Oz, Pz, Cz) showing a clearer differentiation between pre and post LOC conditions in posterior midline. C) CV analysis (n=1, example) shows a jump from approx. 0.3 to 0.5 once LOC occurs.

[Figure 1]

6AP2-2

Dynamic changes in serum levels of NSE and S-100 during brain tumor cryodestruction under anaesthesia with Xenon

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Background and Goal of Study: S-100 and NSE are markers for detection of intensity of ischemic brain damage. The analysis of their serum levels dynamic can show neuroprotective effect of Xenon, when Xe is used as an anaesthetic component during neurosurgery. Cryosurgery is appropriate as a clinical model of brain destruction. The aim of this study was to detect neuroprotective properties of Xenon.
Materials and Methods: The study was approved by LEC. 18 pts (M=8, F=10, age 47±17) with brain tumor cryodestruction were divided in 2 groups. Xe group (n=10) - anaesthesia during the main operation stage was maintained with 50% Xenon and 0.2 MAC sevoflurane and "C" control group (n=10) - sevoflurane anaesthesia. Mean duration of surgery and anaesthesia were 155±65 min and 230±77 min respectively. Anaesthesia was induced by thiopental with fentanyl and accompanied with cisatrcurium. Xenon anaesthesia was maintained using a closed-circuit anaesthesia system (Axeoma™, Alfa-Impex Oy, Finland). Blood samples were drawn at the following times:
1 - before dura mater incision,
2 - after cryodestruction,
3 - 24 h after operation.
Results and Discussion: The results are reported in Table 1 (Values as mean±SD; * - P<0.05 between groups (Mann — Whitney U-test). # - P<0.05 between stages (Newman-Keuls test)).

Group	S-100, ng/l	NSE, mcg/l
	Stage 1	
Xenon	57.7±50.92	4.3±1.83
Control	56.7±32.95	3.2±0.64
	Stage 2	
Xenon	941.4±758.22#	6.3±0.76#
Control	1162.6±313.51#	8.2±2.17#
	Stage 3	
Xenon	169.2±99.69#	6.0±1.55*
Control	243.6±148.80#	8.2±5.17

[Table 1]

Initial levels of markers were not statistically different. On the 2nd stage the concentrations were significantly increased as a result of their release from necrotic zone and brain infla-mation area. On the 3rd stage the markers concen-trations decreased, but they were still higher than the initial levels. In "Xe" group NSE levels on the 2nd and 3rd stages were significantly lower than in C-group. The S-100 levels had a tendency to be lower in the Xe-group during every stage.
Conclusion(s): The serum levels of S-100 and NSE after brain tumor cryodestruction in Xenon group were lower than in Control group. This could be the result of Xenon's neuroprotective properties.

6AP2-4

Blind epidural lumbar blood patch: a case series of treatment in spontaneous intracranial hypotension with occult spinal cerebrospinal fluid leak

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Background: Spontaneous intracranial hypotension (SIH) is caused by a spinal cerebrospinal fluid leak (CSFL). SIH is a rare but documented cause of intracranial hypotension with unknown incidence.[1] Postural headache is the most common symptom.[2] Treatment options range from conservative medical therapy to epidural blood patch (EBP), and when performed early, it appears to be effective.[1] Efficacy of blind EBP for SIH is near 90%, so when mag-

netic resonance imaging (MRI) is normal, additional diagnostic studies may postpone treatment and worsen patient's condition.[3] EBP may be associated with some risks such as compression of the spinal cord/nerve roots, chemical meningitis, intraspinal blood injection and neck stiffness.[2]
This case series reports five blind EBP performed after diagnosed SIH from occult CSFL with good outcomes in most cases.
Case report: This case series reports five patients with SIH in which a blind EBP was performed, most of them without complications. The presentation symptom in all cases was orthostatic hypotension (OH) and MRI was compatible with SIH, with occult CSFL. The general outcome at 24h and one month after the EBP was very promising. Clinical features of patients undergoing EBP are presented on table 1.

Gender	Age	Symptoms	Complications	Outcome 24h	Outcome <1m	Outcome >1m
F	30	Holocranial OH, kinesiophobia, diplopia	U	Immediate improvement. At 24h, development of low back pain with bilateral hip irradiation and right hypoesthesia in T8 - L2/L3 dermatomes (menyngeal syndrome)	A	1y later: severe recurrence of symptoms with pregnancy
F	31	OH, cervical back pain	U	Progressive headache relief. Discharge after 4d	Perception of cervical back pressure	3m: resolution of cervical pressure; no recurrence
F	41	Left hemicranial OH, nausea, phonophobia	U	Immediate headache relief. Discharge	A	A
M	54	Occipital, bifrontal OH	3 lumbar approaches with exit of low pressure CSF through the catheter	Slight clinical improvement, maintaining headache	2nd EBP 2 wks later. Mild frontal headache. MRI: no signs of IH	5m: mild frontal headache related to stress
M	45	Frontal OH, nausea, loss of memory, somnolence. Behavioral changes	U	Complete resolution of headache, frontal syndrome and memory changes. 2 wks later symptoms returned	1 wk after, somnolence and behavioral changes worsened. 2nd EBP without improvement. Trepanus surgery for drainage of subdural frontal hematoma. Assymptomatic after 3d	2m: occasional headache. Appropriate behavior

EBP- epidural blood patch; F- female; M- male; L- lumbar ; Vol- blood volume; CSF- cerebrospinal fluid; U- uneventful; A- assymptomatic; m- months; wks- weeks; d- days

[Clinical features of patients undergoing EBP]

Discussion: Diagnosis of SIH is often missed as it can result from an occult CSFL. In these cases a blind EBP was performed and the choice of a lumbar approach was the safer due to the wide space within the intraspinal canal.[2] EBP revealed to be a safe and successful treatment in SIH with occult CSFL.
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Learning points: This case series reports five blind EBPs performed after diagnosed SIH from occult CSFL, most of them were successful and safely performed using a lumbar level.

6AP2-5

Near-infrared spectroscopy at surgical interventions on the auditory system in extreme side

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Background and Goal of Study: In many surgical interventions an extreme lateral position of the skull is necessary. The influence of head positioning on regional cerebral oxygen saturation has already been described in neurosurgery and carotid surgery.[1] This study deals with the influence of an extreme lateral position of the scull to the cerebral oxygenation during surgical interventions on the auditory system.
Materials and Methods: In a prospective study 10 males and 9 females between 18 and 59 years, getting elective surgery of the auditory system (tympanoplasty, myringoplasty, mastoidectomy, plastic surgery of the stapes and plastic surgery of the auditory canal) were included. To measure the influence of the lateral position of the skull to the cerebral oxygen metabolism (rSO_2) we used near infrared spectroscopy (NIRS) bilateral at defined time points during general anaesthesia. Measurements of both hemispheres were analyzed with Kruskal-Wallis test to detect differences between male and female patients at time of determining the baseline level.
Results and Discussion: Comparing general data from bilateral NIRS-measurement in general anaesthesia, a significant (p=0,001) decline of rSO2 between orthograde (rSO2: 77,3 ± 9,3) and extreme lateral position (rSO2: 70,0 ± 9,1) of the head was detected. No patient presented any incidents while awakening from general anaesthesia or showed neurological deficits after surgery.
Conclusion(s): Our results show that even patients without neurovascular or other neuropathological processes of the brain suffer a significant decrease in regional cerebral oxygen saturation in extreme side location of the skull. Further studies in patients with vascular brain problems have to be performed to detect cerebral hypoperfusion in extreme side location of the skull.
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Acknowledgements: Dr. Larissa Halb, Department of Anesthesiology and Intensive Care Medicine, Medical University of Graz, larissa.halb@medunigraz.at

6AP2-6

The effect of hemofiltration on neurological outcome in patients with acute stroke

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Background: Stroke is the third most common cause of death and disability worldwide. A decrease in blood glutamate (G) is known to increase the concentration gradient of G between the brain's fluids and the blood, thereby accelerating the rate of the well-established brain-to-blood G efflux. A reduction in blood G levels was associated with an improved neurological outcome irrespective of how this reduction was achieved. Many extracorporeal methods, including hemodialysis (HD) and hemofiltration (HF), are effective in reducing blood G concentrations in rats and humans. This reduction in blood G was associated with an improved neurological outcome in a rat model of stroke. Here, we present the interim results of a phase II, prospective, interventional, randomized, double-blinded clinical control trial in which the neuroprotective effects of HF was examined in the setting of acute ischemic stroke.
Materials and Methods: The projected sample size is 150 patients in each group. All patients were randomly assigned to either a HF or control group. HF was initiated within 12hrs after the clinical presentation of stroke, and was utilized for 36hrs. Only patients with an NIHSS score of 5-21 were included. NIHSS was measured on admission, and then at 3d and 1mo after the initiation of HF. Blood samples for glutamate determinations were collected prior to HF and then at 3, 6, 9, 12, 24, 48 and 72hrs after HF initiation.
Results and Discussion: Currently, 31 patients have been enrolled in the study: 16 and 15 in the HF and control groups, respectively. The patients' ages in the HF (58±14 years) and control (53±17 years) groups were not significantly different. In the HF group, the treatment was initiated within 330±128 min after the clinical presentation of stroke. The NIHSS scores on admission were similar in the two groups. After 3 days, the NIHSS was non-significantly lower in the treatment group (Med = 3) vs. the control group (Mdn = 4, p = 0.273). The NIHSS at 1mo was non-significantly lower in the treatment group (Mdn = 2) vs. the control group (Mdn = 3, p = 0.522).
Conclusions: The interim results of the study demonstrated a positive trend (not statistically significant) in NIHSS improvement in the HF vs. the control group. With a larger sample size, this improvement may reach statistical significance. More research is warranted to study the role of extracorporeal glutamate reduction as a neuroprotective strategy.

6AP2-7

Implications of undiagnosed pseudocholinesterase deficiency for intraoperative neuromonitoring in elective spine surgery

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Background: The effects of undiagnosed pseudocholinesterase deficiency in general anesthesia are normally limited to failure to extubate at the end of a procedure. When this condition surfaces in the setting of intraoperative neuromonitoring, the surgical and anesthesia teams must agree on when the operation may proceed safely.
Case report: A 69-year-old male presented for posterior cervical laminectomy and fusion at levels C3 to C7 with intraoperative neuromonitoring. General endotracheal anesthesia was induced with Propofol and Succinylcholine. After prone positioning, the neuromonitoring technician informed the surgical and anesthesia teams that somatosensory potentials were intact, however motor evoked potentials were absent bilaterally. The anesthesia team confirmed ulnar nerve train-of-four measurements of 0/4. Approximately 110 minutes after induction, motor potentials began to return; a baseline was established and the surgeon proceeded with incision. Approximately 5 hours after induction, the technician reported motor capacities approaching normal in bilateral upper and lower extremities. Upon conclusion of the procedure, the patient moved all extremities spontaneously but remained intubated due to airway edema. He was extubated uneventfully on postoperative day 1. Laboratory tests revealed a Dibucaine Number of 37.6% inhibition (reference range 81.6-88.3).
Discussion: Motor evoked potentials elicited through intraoperative neuromonitoring provide important feedback for anesthesiologists and surgeons during complex spine surgeries. Prompt return of motor potentials requires induction with a short-acting neuromuscular blocking agent. In the United States, Succinylcholine is the only commercially available short-acting neuromuscular blocking agent.
An inability to evoke motor potentials that persists more than one hour after induction with Succinylcholine implies a diagnosis of pseudocholinesterase deficiency. Management of presumed pseudocholinesterase deficiency in this setting requires careful deliberation by the anesthesia and surgical teams, using the best information available at the time to decide whether to abort the procedure, to proceed with only somatosensory monitoring, or to await return of full motor potentials.
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6AP2-8

Anaesthetic management in a patient with McArdle's disease undergoing lumbar disc surgery

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Background: McArdle's disease is a rare skeletal muscle disorder affecting approximately 1 in 100.000 people and is about three times more common in males (1). It's also known as type V glycogen storage disease. It's an autosomal recessive inherited condition caused by a missing or non-functioning enzyme called myophosphorylase C. It has the potential of creating intraoperative anaesthesiological problems such as hypoglycaemia, rhabdomyolysis, myoglobinuria, acute renal failure, postoperative fatigue and possibly malignant hyperthermia (2).
Case report: We describe the case of a woman with a history of McArdle's disease who required lumbar disc surgery. Spinal anaesthesia and BIS guided propofol sedation was preferred for anaesthesia. Standard monitoring with ECG, blood pressure, SpO_2, BIS and core temperature were used. Diuresis and blood glucose levels were recorded every half an hour. Fluid management was supplied with %5 dextrose and %0.9 NaCl. By avoiding oliguria and hypoglycaemia the surgical procedure was successfully completed without having any anaesthesiological complications.
Discussion: In this unique patient population of McArdle's disease, careful attention to adequate fluid management, as well as maintaining normothermia and normoglycemia are critical to provide safe anaesthesia. Additionally, as postoperative fatigue, myoglobinuria and renal failure are potential complications of this disease, muscle ischemia and rhabdomyolysis should be prevented. Also, general anaesthesia and muscle relaxation increase the risk of malignant hyperthermia and postoperative fatigue. Therefore we believe that regional anaesthesia is a very good alternative in these patients.
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Learning Point: Besides preventive measures, regional anesthesia may be a safe alternative in patients with McArdle's disease.

6AP2-9

The effect of volume-controlled ventilation versus pressure-controlled ventilation on respiratory mechanic and hemodynamic changes in patients undergoing lumbar spine fusion surgery in the prone position

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Background: Hypotension was common on patients with mechanical ventilation during lumbar spine fusion surgery. Positive pressure ventilation reduced venous return in the prone position, which was considered the main reason for hypotension. Volume-controlled ventilation was conventionally applied by anesthetists in operating room. But volume settings have to be enlarged to maintain the adequate ventilation during prone position with the decrease of chest wall compliance which decreased the venous return further. Pressure-controlled ventilation has been proved to be better than volume-controlled ventilation with advantage of lower peak airway pressure (Ppeak) and higher dynamic compliance(Cyn) in the prone position. We proposed hypothesis that volume-controlled ventilation and pressure-controlled ventilation act differently to hemodynamic variables in the prone position. This double-blind, randomized clinical trial was focus on the hemodynamic variables caused by different ventilation mode in the prone position.
Methods: Forty patients scheduled for posterior lumbar spine surgery were randomly allocated to two groups (n=20 each), which would receive mechanical ventilation using either volume-controlled ventilation (VCV) mode or pressure-controlled ventilation (PCV) mode (VT 8ml/kg, PECO2 35-45mmHg). The respiratory mechanics (Ppeak and Cyn) and hemodynamic (cardiac output, mean blood pressure, central venous pressure, systemic vascular resistance index) changes every 10 minutes till 120 minutes were compared between the two groups. BIS value was maintained between 40-60.
Results: Cardiac output and central venous pressure was higher in the PCV group without any significant difference, while systemic vascular resistance index were comparable between the two groups. Mean blood pressure on PCV group was higher than VCV group from 90 minutes after turning to prone position till the endpoint, dynamic compliance and peak airway pressure on PCV group was higher than that in VCV group. Also, there was positive correlation between dynamic compliance and cardiac output ($r=0.744$, $p=0.006$).
Conclusion: With better respiratory mechanic and hemodynamic stability, PCV was superior to VCV as mechanical ventilation mode in the prone position for lumbar spine surgery.

6AP2-10

Sevoflurane-remifentanil anaesthesia for laparoscopic diaphragmatic pacer placement in patients with amyotrophic lateral sclerosis (ALS) - the first experience in Japan

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Background and Goal of Study: Patients with ALS gradually develop weakening of respiratory muscles and become dependent on mechanical ventilators. If respiratory muscles especially diaphragm are elecrically stimulated to assist ventilation it may also delay the onset of respiratory muscle paralysis.

Onders (1) successfuly developed the system of diaphragmatic elecrtical stimulation and implanted these pacers using laparoscopic technique. We performed this procedure for the first time in Japanese ALS patients.
Patients and methods: After obtaining IRB approval and the informed consent from 5 ALS patients (2 female and 3 male), we performed the laparascopic diaphragmatic pacer placement. All patients were not under ventilatory asssist before the surgery. During the procedure mapping of the diaphragm is necessary to find the places where pacers are implanted and no neuromuscular blocking agents can be used. For the induction of anaesthesia, propofol and sevoflurane were used with BIS monitoring, and when enough muscle relaxation is obtained with sevoflurane the trachea was intubated after topical anaesthesia of the larynx. Anaesthesia was maintained with sevoflurane and continuous remifentanil infusion. To maintain blood pressure, bolus injection of ephedrine and / or phenylefrine was given.
Results and Discussion: In all the patients pacer was succesfully placed and they were extubated in the oprating room and no ventilatory assist was necessary after the surgery(2). Diaphragmatic stimulation was started on the first postoperative day successfully.
Conclusion: In 5 ALS patients,laparoscopic diaphragmatic pacer implantaion was performed sucessfully under sevoflurane-remifentanil anaesthesia without using neuromuscular blocking agents.
Acknowledgement: We heartfully thank Dr Raymond Onders for his help and guidance throughout the study.
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Abstract 4087 Annual Meeting of the American Society of Anesthesiologists, October 14, 2014

6AP2-11

Combined minimally invasive techniques to cure spine surgery accidental dural tear

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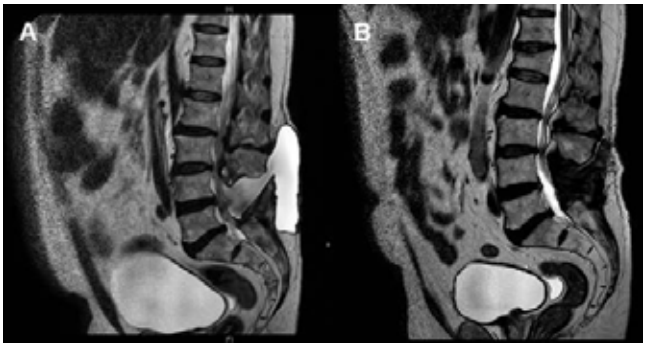
Background: Accidental dural tear (ADT) is a frequent complication of spinal surgery. We here describe possible ADT management when co-morbidities limit recourses to surgery.
Case report: An ADT occurred during lumbar laminarthrectomy in a patient with past medical history of COPD and ischemic cardiopathy. The tear was intra-operatively closed by suture, fat graft and fibrin glue. After 2 days, patient complained of back pain and orthostatic headache, and beneficiated from a CT-guided epidural blood patch (EBP). Following absence of improvement, MRI showed a large tubular cerebrospinal fluid collection (Fig 1A). A second surgery plugged the breach with Tachosil® and fibrin glue. Signs and symptoms reappeared, motivating a third surgical look with same treatment. After a few days at home, the leak recurred. Before embarking on a 4th surgical procedure in a patient with multiple co-morbidities, anesthesiologists and surgeons agreed on a second EBP associated with closed subarachnoid drainage and ventral bed rest. After epidural injection of 30mL of autologous blood, a catheter was inserted 5cm into the sub-arachnoid space. Ventral decubitus and continuous CSF drainage were maintained for 4 days. Symptoms rapidly resolved. A control MRI showed complete pseudo-meningocele resolution 5 months later (Fig 1B).
Discussion: First line treatment of surgical ADT remains intra-operative breach repair. Less invasive procedures have been proposed such as fluoroscopy, CT, or ultrasound-guided EBP, CSF derivation, and ventral bed rest[1]. Increased drainage length improves success rate but raises infection risk. Combined techniques may be more efficient than CSF diversion or EBP alone, concurring at dural healing.
References: 1. Couture D, Branch CL, Jr. Neurosurg Focus 2003; 15:E6
Learning points: Key treatment of ADT is surgical watertight closure. EBP and CSF diversion are considered intermediate steps between conservative measures and invasive surgery. These measures can still be considered an option after failure of surgery, and may be successful at curing the problem. The protocol we used maximizes the chances for dural healing and minimizes the risk of infection.



[Figure 1]

6AP2-12

S100B and neuron specific enolase (NSE) serum levels value for predicting outcome of patients with traumatic brain injury

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Background and Goal of Study: Neuromarkers are easy and fast diagnostic method. However, their values of predicting outcome for patients after traumatic brain injury (TBI) are not fully clear.[1,2] The aim of the study was to determine values of serum S100B and NSE for prediction of patient's outcome after TBI.
Materials and Methods: A prospective study was held in Anaesthesiology clinic of Lithuanian University of Health Sciences. Serum of 44 TBI patients was analyzed for S100B and NSE. Neuromarkers were measured 4 times:
1) at hospital admission;
2) after 24 hours;
3) after 48 hours;
4) after 72 hours.
Outcomes were assessed at hospital discharge and categorised according to the Glasgow Outcome Scale (GOS). Nonparametric tests were used for statistical analysis at $p \leq 0.05$. Approval of Regional bioethics committee was obtained before study initiation.
Results: 44 patients were involved into the study. There were 9 women and 35 men and average age of them was 52 ± 18 years. Types of TBI were as follow: 23 subdural haematoma, 8 intracerebral haematoma, 5 epidural and 7 had composite brain damage. Average size of haematoma was 2 ± 0.93 cm. S100B and NSE serum levels decreased each day, but not statistically significantly ($p \geq 0.05$). There was moderate statistically significant negative correlation between 24, 48 and 72 hours S100B serum levels and GOS (r_{s24} = 0.4; r_{s48} = 0.56; r_{s72} = 0.55, $p \leq 0.05$). S100B hospital admission serum level did not correlate to GOS. 24 and 48 hours NSE serum levels correlated statistically significantly to GOS (r_{s24} = 0.42; r_{s48} = 0.61, $p \leq 0.05$). NSE hospital admission and 72 hours serum levels did not correlate to GOS.
Conclusion: S100B and NSE serum levels are related to patient's outcome after TBI. However, only 24, 48, 72 hours S100B and 24, 48 hours NSE serum levels are valuable for predicting patient's outcome after TBI.
References:
1. Macas A, Bilskiene D, Gembickij A, Zarskus A, Vilke A, Rimaitis M, Suskeviciene I, Rugyte D, Tamasauskas A. Multimodal neuromonitoring. Acta Medica Lituanica. 2012; 19(3):180-186.
2. Vilke A, Juške M, Petkevicius P, Suskeviciene I, Bilskiene D, Macas A. Neuromarkers. Health Sciences. 2014; 24(2): 87-93.
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6AP3-1

Restrictive fluid management strategy during elective intracranial neurosurgery

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Background and Goal of Study: The necessity to maintain adequate level of cerebral perfusion pressure and reduce the severity of cerebral edema makes the choice of fluid strategy very important for patients with brain pathologies. The aim of this study was to estimate the possibility of restrictive infusion for intracranial neurosurgery.
Materials and Methods: The study was approved by LEC. 60 pts (M=33, F=27, ASA II-III) with elective brain surgery were allocated to three groups: Xenon-Isoflurane (n=20), Xenon-Sevoflurane (n=20) and Sevoflurane anaesthesia (n=20). The groups were comparable in regard to age, weight, sex, ASA status, duration of surgery and anaesthesia. The key points of anesthesia were: MBP 80-100 mmHg, surgical level of anesthesia, moderate hyperventilation, fluid therapy (Ringer's solution) 2 ml/kg/h with a bolus of 200 to 250 ml of fluid in case of hypotension.
Results and Discussion: Patients' characteristics and main results are reported in Table 1 (Data are M±σ. P>0.05 between groups. * - P<0.05 between clycemia levels before and after surgery).

	Xenon-isoflurane	Xenon-sevoflurane	sevoflurane
Age; years	47,1±13	47,6±12.4	49,8±12,5
Duration of surgery / anaesthesia; min	253±30,1 / 347±37,8	265±59,2 / 350,8±71,3	238,3±52,6 / 324,5±62,3
Transfusion volume; ml	1552±229	1565±397	1458±326
Rate of infusion; ml/kg/h	4,45±0,55	4,47±0,68	4,50±0,63
Diuresis; ml	413±122	380±164	345±137
Rate of dieresis; ml/h	1,20±0,38	1,07±0,35	1,08±0,28
Fluid balance; ml	+1140±281	+1185±296	+1113±216
Clycemia before / after surgery; mmol/l	5,5±0,9 / 6,8±1,2*	5,7±1,2 / 6,8±1,0*	5,5±0,8 / 6,4±1*
Blood lactate before / after surgery; mmol/l	1,7±0,5 / 1,7±0,5	1,8±0,5 / 2,0±0,3	1,7±0,4 / 2,0±0,4

[Table 1]

There were no significant differences in infusion volume, diuresis rate, total fluid balance. Blood loss was <200 ml in all pts. The mean rate of infusion was approximately 4.5 ml/kg/h, since there were fluid boluses. The vasopressor agents were administered in all groups with frequency of 30-40% and there was no significant difference between the groups (p>0.05) and also no complications were observed. Brain condition was assessed by surgeons as satisfactory (without swelling or prolapse). Serum values of glucose and lactate were increased at the end of surgery, but were clinical appropriate.
Conclusion(s): The relatively frequent vasopressor administration during restrictive fluid regime is safe and does not depend on the inhalation agent. Low fluid volumes can manage adequate tissue perfusion and are safe for elective transcranial neurosurgery.

6AP3-2

Beneficial effects of perioperative pregabalin in neurosurgery

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Background and Goal of Study: Perioperative anxiety and pain concern all patients and correlate with clinical outcome and satisfaction rates. Patients with brain tumor are extremely anxious and their sleep is poor before surgery. The study aimed at assessing preoperative anxiety and sleep quality and post-operative pain, in patients undergoing craniotomy and treated with pregabalin.
Materials and Methods: After the study had been approved by the institutional review board, patients undergoing supra- or infra-tentorial elective neurosurgery were prospectively, randomly, and double-blindly given pregabalin (PGL) 150mg or placebo the evening and 1.5h before surgery. Postoperatively, PGL was administered twice daily for 72h. All patients passed pre-surgery night in the hospital; no other premedication were given. NSAIDs were used postoperatively. Data are expressed as mean ± standard deviation (SD). Statistical analysis employed t-test; significance is established at P≤0.05.
Results and Discussion: ASA, age and body weight values, duration of surgery and anesthetic doses were similar in both groups (n=50/group).

Parameter	PGL	Placebo
Anxiety level at admission, prior to drug administration	4.9(2.9)	5.6(2.7)
Anxiety level prior to surgery, after drug administration	2.4(1.9)	4.4(3.1)*
Sleep quality prior to surgery, after drug administration	7.5(2.5)	4.5(3.1)*
Pain score POD-0 (ICU)	1.5(1.9)	2.9(2.0)*
Pain score POD-1	1.5(1.7)	2.3(1.6)*
NSAIDs dose-requests POD-2	0.4(0.7)	0.9(1.0)*

[Effects of Pregabalin]
*P< 0.01 vs. placebo. Anxiety, sleep & pain are patient self-rated, using numerical rating score (0-10 NRS). POD=postoperative day.

No PGL-associated adverse events were detected.
Neurosurgical patients are understandably anxious, but cannot be given sedatives preoperatively. The use of postoperative opiates is unfavorable as well, because they may mask neurological deterioration. Our findings highlight the beneficial effects of the described protocol of PGL in neurosurgical patients throughout the perioperative period.
Conclusion(s): Perioperative use of pregabalin 150mg twice daily attenuates anxiety, ameliorates sleep quality, and reduces postoperative pain scores and analgesics usage.

6AP3-3

The influence of bupivacaine-epinephrine scalp infiltration on acute postoperative pain after supratentorial craniotomy

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Background and Goal of Study: The objective of our study is to evaluate the impact of bupivacaine scalp infiltration before wound closure on the intensity of acute postoperative pain, in patients undergoing elective craniotomy procedures.
Materials and Methods: In this prospective randomized placebo-controlled, double-blind clinical trial, 56 patients (ASA I-III), scheduled for supratentorial craniotomy under standard general anesthesia, were enrolled. Patients were randomly assigned to receive 20 ml 0.25% bupivacaine associated to 5μg/ml epinephrine (group S, n=29), and 20 ml isotonic saline (group P, n=27), for scalp block performed before closure of the subcutaneous tissue. Acute postoperative analgesia protocol included paracetamol (1g/8h) and dexketoprofen (50mg/12h). For supplementary analgesia requirements iv morphine was provided.The following parameters were documented during first 24h postoperatively: the quality of pain control, measured by VAS, at the arrival to PCU and every six hours, the duration of pain-free interval, time to first additional analgesia request, rescue opioid consumption, the incidence of sedation and nausea/vomiting events and patient satisfaction. Mann-Whitney and Chi square testing were used for data analysis (p< 0.05).
Results and Discussion: Demographics, surgical technique and duration of procedures were similar in both groups.The study revealed significantly better postoperative analgesia in group S compared to group P, in terms of VAS scores (p<0.05) and duration of pain-free interval (p<0.05). Time to first additional analgesia intake was considerably prolonged in group S compared to group P (p<0.001). The consumption of rescue analgesia was significantly less in group S versus group P (p<0.05). Subjects in group S experienced lower incidence of sedation episodes and nausea/vomiting events than those in group P (p<0.05). The rate of patient satisfaction was statistically increased in group S versus group P (p<0.05).
Conclusion(s): Scalp block with 0.25% bupivacaine combined with epinephrine, performed immediately before wound closure, ensures a significantly better analgesia profile early, postoperatively, after supratentorial craniotomy than placebo, while reducing the morphine demand and opioid-related side-effects.

6AP3-4

Dexmedetomidine as adjust to general anesthesia in patients undergoing craniototmy

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Background: Neurosurgical procedures result in significant release of adrenaline. This cause hypertension and tachycardia and therefore require big amounts of anesthetics and analgesics. However all agents used in neurosurgery should have the minimal effect on brain function, not interfere with intraoperative neuromonitoring, and allow for a quick and smooth extubation and recovery. Dexmedetomidine (Dex) an a-2 adrenergic receptor agonist may ensure optimal intraoperative hemodynamic stability because of its sympathiticolytic and antinociceptive properties. This study aimed to evaluate the efficacy and safety of Dex as an anesthetic adjuvant for patients undergoing intracranial surgery.
Methods: Twenty patients scheduled for elective craniotomy for tumor resection were randomized to receive a bolus Dex 1γ/Kg over 10 minutes after induction in anesthesia following by continuous infusion of Dex 0.7γ/Kg (group D) or 0.9% saline (group C). Patients in both the groups were subjected to a standardized anesthesia comprising of induction with propofol, fentanyl, rocuronium, and positive pressure ventilation with O2/air (1:1)/sevoflurane. The response entropy target range during maintenance of anesthesia was 40 to 50. The hemodynamic variables at various stages of surgery (HR-heart rate, MAP-Mean arterial pressure), intraoperative anesthetic, and analgesic and recovery characteristics were recorded.
Results: Intraoperative HR and MAP was lower in the Group D than in Group C (p=0.000). Group D received less fentanyl than Group C (0.35mg vs 0.89±0.187mg, p=0.000) and MAC of sevoflurane was lower in the Group D than in the group C (0.35 vs 0.98±0.155, p=0.000). None of the patient of Group D received any antiemetic drug and only one experienced of vomity after extubation, where all patients of group C received antiemetic. Group D also had lower MAP and HR when extubated. None of the patient of Group D required any additional antihypertensive therapy, were all patients of group C received antihypertensive therapy before extubation.
Conclusion: The results showed that patients treated with Dex compared with placebo required less intraoperative additional fentanyl consumption, had lower MAC of sevoflurane and required less postoperative antihypertension and antiemetic treatment. Our data showed that Dex is a safe and efficacious anesthetic adjuvant in intracranial procedures.

6AP3-5

A comparison of 20% mannitol and 5 % hypertonic saline for brain relaxation during during craniotomy. Is hypertonic saline superior?

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Background: The hyperosmolar solutions are often used in anesthesia for neurosurgery in order to relax the brain and improve the surgical field. The available options are the solution of 20% mannitol and hypertonic saline. It is possible that hypertonic saline is superior in brain relaxation comparing to the use of mannitol.
Goal of Study: To evaluate the efficacy of hypertonic saline compared to mannitol in brain relaxation in patients undergoing craniotomies.
Materials and Methods: 38 patients undergoing craniotomies were randomized and allocated to receive 5 ml/kg 20% mannitol or 10 ml/kg 5% hypertonic saline during anesthesia. Two blinded surgeons evaluated relaxation conditions using a table 1-5 graded according to the degree of satisfaction with the surgical field. The frequency of excellent conditions was compared between treatment groups, using Fisher exact test.
Results and Discussion: 15% of subjects in mannitol group (n=20) against 55% in hypertonic saline group (n=18) (p=0,0156).
Conclusion(s): 5% hypertonic saline seems to be superior then 20% mannitol for brain relaxation during craniotomy.

6AP3-6

Postoperative levels of care for elective craniotomies

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Background and Goal of Study: There is no formal standard for postoperative care of patients undergoing elective craniotomies[1]. Overnight monitoring in the intensive care unit (ICU) is the protocol for most patients at our Institution. The goal of this study is to identify which group of patients could benefit of not requiring overnight ICU care.
Materials and Methods: An observational study was carried out for six months including all consecutive elective craniotomies. Demographic data, type of surgery, postoperative level of care: ICU or Post-Anaesthesia Care Unit (PACU), risk factors[2] and complications (Clavien-Dindo classification)[3] during the first 48 hours were collected. The incidence of complications related to postoperative level of care and risk factors was analysed.
Results and Discussion: Eighty-six patients (age 18-84 years, 52% female) were included. ICU group: 74 patients, PACU group: 12 patients. Surgeries in PACU group were: biopsy (n=1), neuroendoscopy (n=1), epilepsy surgery (n=2), functional surgery (n=3) and hypophysectomy (n=5). Complications were registered in 23/86 patients, all in the ICU group: grade 1=11, grade 2=5, grade 3b=7, grade 4=0 and grade 5=0. Twenty-four (32.4%) patients in the ICU group did not present complications nor risk factors: hypophysectomy (n=7), supratentorial tumor resection (n=7), epilepsy surgery (n=5), neuroendoscopy (n=2), vascular surgery (n=2) and functional surgery (n=1) (Figure 1). In ICU group, 5/8 (62.5%) epilepsy surgeries, 7/12 (58.3%) hypophysectomies and 7/21 (33.3%) supratentorial tumor resections did not present risk factors nor postoperative complications.

[Figure 1]

Conclusion: Patients scheduled for epilepsy surgery, hypophysectomy or supratentorial tumour resection could benefit of not requiring overnight monitoring in the ICU. More research is needed for proper selection of patients.
References:
1. Hanak BW et al. World Neurosurgery 2014; 81:165-72.
2. Wanderer JP et al. Anesthesiology 2013; 119:516-24.
3. Clavien PA et al. Ann Surg 2009; 250: 187-96.

6AP3-7

Focusing on genes to control cerebral oedema and invasion in glioblastoma as a perioperative treatment approach beyond standard practice

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Introduction: Despite extensive research, the therapy of Glioblastoma (GBM) remains demanding with a median survival of 12 to 14 months. Glioma stem cells (GSCs) have gained interest in neuro-oncology as they play a central role in GBM pathogenesis. Different genetic regulators have been introduced in GBM proliferation, invasion / oedema formation and bare potential as therapeutic targets. Previously we introduced Periostin (POSTN) as a key player in invasion and oedema formation. However, it is unlikely that invasion and oedema formation is regulated by a single gene. Thus, we hypothesized that

a network of genes in combination with POSTN controls oedema / invasion in GBM and can be targeted therapeutically in perioperative settings.
Methods: A POSTN correlated network was identified in "The Cancer Genome Atlas" (TCGA). Its clinical significance was validated in two independent patient cohorts (TCGA, "Repository for Molecular Brain Neoplasia Data" REMBRANDT). The endogenous status of the network was assessed in conventional GBM cell lines and GSCs, by qPCR and Western blotting. Lentiviral vectors provided gain of function-(GOF) and SMARTchoice inducible shRNA loss of function (LOF) experiments. Boyden chamber assays for invasion were performed with GOF and LOF cells. To identify FDA approved drugs to target the gene network, connectivity map (cmap) analysis was employed. All work was in accordance with IRB at MD Anderson Cancer Center.
Results: Down-regulation of the oedema / invasion related gene network lead to a significant decrease of invasion of GBM cells in vitro. Analysis of gene expression profiles of GOF cells suggested a network dependent switch from proneural to the more aggressive mesenchymal subtype of GBM. FDA approved drugs such as proxyphylline, canavanine etc., identified with cmap, inhibited GBM cell invasion.
Conclusion: This gene network could potentially regulate oedema and invasion of GBM. Once the tumour subgroup, respecting this network is identified, a network specific personalized perioperative therapy to manage oedema becomes a possibility. With an expanding role of our speciality in perioperative care, we call for a very active participation of anaesthesiologists in perioperative GBM therapy beyond standard practice.

6AP3-10

Venous air embolism as potentially life-threatening event

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Background: Venous air embolism (VAE) is a potentially life-threatening event that can occur in situations other than surgery performed in the classic sitting position.
Case report: Female, 34 years-old, obesity and type 1 diabetes, presented for elective excision of a cerebral falx meningioma in ventral decubitus. ASA standard monitoring, train of four ratio, invasive arterial and central venous pressure (CVP), multi-lumen catheter, precordial doppler ultrasound, BIS®, INVOS® and jugular bulb continuous oximetry. General anesthesia with remifentanil, propofol and rocuronium. The temporo-parieto-occipital craniotomy was hemorrhagic without evident venous sinus opening, but with clinical evidence of air entrainment into the venous system: precordial doppler positive, hypotension, desaturation and a decrement in the end-tidal carbon dioxide. The CVP didn't rise. The surgeon was informed and the multi-lumen catheter was aspirated (<5ml of air). Incremental oxygen and boluses of phenylephrine was instituted with partial recovery. Thereafter the patient evolved progressively with persistent hypoxemia, shock with increasing need of noradrenaline. During the reevaluation we identified a pulmonary atelectasis at left side that was solved with better gases. We had a hemorrhagic surgery with estimated blood loss of 4 liters that we promptly treated with fluids and blood products infusion. The shock persisted. A noninvasive hemodynamic monitoring was added: low cardiac output (CO), high peripheral resistance and an elevated stroke volume variation. Dobutamine was initiated. The surgery was concluded and the patient was transferred to the ICU sedated, in mechanical ventilation and with a reasonable stability with catecholamines. Postoperative echocardiography revealed right ventricular dilatation.
Discussion: This case describes a typical scenario of VAE that resulted in a situation of crisis management during anesthesia due to a severe cardiovascular collapse that may have been secondary to superimposed causes. Treatment of VAE is to prevent further entrainment of air, reduce the volume of air entrained and hemodynamic support. In high risk situations, prevention is better than cure.
Learning points: This case emphasizes the importance of a systematic evaluation in situations of crisis during anesthesia. Despite the established diagnosis of VAE, other causes may have contributed to cardiovascular collapse. Differential diagnosis is critical to guide therapeutic.

6AP4-2

Uncompleted Willis as a new admission predictor of vasospasm after anterior portion aneurismal subarachnoid hemorrhage

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Introduction: In the context of aneurismal subarachnoïd hemorrhage (aSAH), vasospasm is a major and frequent complication. Approximately 70% of aSAH patients develop an angiographic cerebral vasospasm with subsequent ischemic lesions. A third of cerebral aneurysms are located in the anterior portion of cerebral vascularization. Interestingly, the Willis circle present anatomical variations, especially agenesis and hypoplasia of the arterial anterior portion. The effect of this uncompleted Willis (UW) on SAH outcomes has been scarcely studied. UW impact cerebral blood flows and the local rheology. For these reasons, we hypothesized that anterior UW could increase the risk of radiological vasospasm (RV) and predict a 1-year unfavorable outcome in anterior portion aneurisms.
Methods: Based on a prospective aSAH database (2002-2012), we retrospectively included patients admitted in ICU for aSAH located on anterior communicating and or anterior cerebral arteries (anterior portion). Admission characteristics, ICU events including vasospasm and 1-year unfavorable outcome (Rankin 3-6) were compared in the normal and the uncompleted Willis groups (NW *vs.* UW). Univariate and multivariate analyses were performed in order to select predictors of radiological vasospasm, including UW.
Results: Out of 1000 aSAH patients admitted in ICU, 313 patients suffering from anterior portion aneurisms bleeding (27% older than 60 years old, n=86) were included and 11% presented UW (n=33), 68% with High Fisher score (III-V, n=213), 30% suffered from RV (n=93) and 21% with 1-y unfavorable outcome (n=65). UW and NW did not reach significant differences concerning the major admission characteristics whereas UW was significantly associated with RV (OR: 2.5 (CI95%: 1.2, 5.2), P=0.01) but not to 1-y unfavorable outcome (P=0.7). All admission characteristics associated with RV with univariate analyses were selected to generate the most parsimonious model to predict RV with multivariate stepwise analyses. UW (3.9 (1.5, 9.7), P=0.004), High Fisher score (3.0 (1.5, 5.9), P=0.002) and age older than 60 year old (0.36 (0.17, 0.74), P=0.006) were independent and robust RV predictors.
Conclusion: In this cohort study, we found that uncompleted Willis is a robust admission predictor of vasospasm after anterior portion aneurysmal subarachnoid hemorrhage. This new information could help for patients and family information. A validation study with other centers is warranted.

6AP4-3

Prognostic factors in early aneurysm surgery after subarachnoid hemorrhage

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Background and Goal of Study: The three main predictors of mortality and dependence after subarachnoid hemorrhage (SAH) are impaired level of consciousness on admission, advanced age, and a large volume of blood on initial cranial computed tomography (1).
The goal of this study was to evaluate predictors influencing prognosis and/or clinical outcome in patients with aneurysmal SAH, submitted to early clipping (3 days after the rupture).
Materials and Methods: We collected retrospectively data from 2011 to 2013. Clinical outcome was evaluated with the Glasgow Outcome Scale: scores of 4-5 indicate a good outcome, and scores of 1-3 indicate a poor outcome. Univariate analysis was done using IBM SPSS Statistics 21.0. Continuous variables were compared between groups using Mann-Whitney test. Continuous and ordinal variables association was tested with Spearman's correlation.
Results and Discussion: 95 patients were included in the statistical analysis. Aneurysms were mainly located in anterior communicating artery (42,1%). The mean age was 58,3 (±13,0). 70,5% were women. 61,1% were American Society of Anesthesiologists (ASA) physical status 2 and 46,3% were World Federation of Neurological Surgeons (WFNS) grade I.
The mean time between rupture and surgery was 28,1 hours (±14,5). The mean hospital stay was 21,6 days (±18,7). 66,3% had good outcome and 31,6% had poor outcome.

As predictors of poor outcome were identified: advanced age (ρ= -0,346; p=0,005), low Glasgow Coma Scale (GCS) grade at admission (ρ=0,424;p=0,001) and high WFNS grade (ρ=-0,405;p=0,049).
Various medical conditions were tested, including hypertension, diabetes, dyslipidemia, obesity, smoking and hypothyroidism, but none reached statistical significance, the nearest was hypothyroidism (p=0,063).
Advanced age (p=0,004), high ASA grade (p=0,017), low GCS at admission (p=0,046) and high hospital stay (p=0,002) were associated to the presence of motor or neurological deficits at discharge.
Regarding length of stay, postoperative complications (p< 0,001) and diabetes (p=0,014) were the only two factors that were statistically significant.
Conclusions: Advanced age, low GCS grade at admission, high WFNS grade were associated with worse clinical outcomes; hypothyroidism was nearly statistical significant. Diabetes and postoperative complications were associated with longer length of stay.
Reference: 1. Br J Anaesth 2007; 99: 102-18.

6AP4-4

The gender-specific prevalence of vasospasm after subarachnoid hemorrhage

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Background and Goal of Study: Vasospasm is the leading cause of mortality and morbidity after subarachnoid hemorrhage.[1]
Women are more susceptible than men, suffering this kind of cerebral hemorrhage.[2] The consideration and the effect of gender in medicine is to improve a mandatory need for therapy and the effectiveness of medical practice. In this study we investigate the incidence of vasospasm in men and women after subarachnoid hemorrhage associated with age and symptoms.
Materials and Methods: In this retrospective study data of vasospasm and symptomatic vasospasm after subarachnoid hemorrhage were analyzed. Measurements were carried out with Transcranial Doppler Ultrasound. From 2005 to 2013 382 patients between 18 and 88 years receiving either interventional or surgical therapy were included in the study. Menopause of Central European women in section begins at the age of 51,3 years being associated with hormonal changes.[3] Therefore we divided our patients in two age groups - under 52 years and over 52 years. We conducted a descriptive analysis and a calculation using Chi Square Test.
Results and Discussion: A total of 381 patients including more women (n=268) than men (n=113) with subarachnoid hemorrhage were treated at our clinic. 98 women and 39 men developed a vasospasm. The results show that there are significant differences in the occurrence of vasospasm in both age groups and women are more often affected than men (p< 0,05). 40% of women and 16% of men evolved delayed ischemic neurological deficits.
Conclusion(s): Our results confirm that a subarachnoid hemorrhage occurs more frequently in women. All in all women have a higher risk getting a vasospasm after subarachnoid hemorrhage than men. We do not know if hormonal changes play a role in developing a vasospasm yet. In further studies it is desirable to control the hormonal status of patients with special reference to estrogen and testosterone.
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Acknowledgements: Dr. Larissa Halb, Department of Anesthesiology and Intensive Care Medicine, Medical University of Graz, larissa.halb@medunigraz.at

6AP4-5

Changes in the transfusion practice in cerebral aneurysm clipping surgery: a center experience

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Background and Goal: The intraoperative transfusion of red blood cells (RBC) is a risk factor of poor outcome in cerebral aneurysm clipping surgery (CACS). The number of RBC units ordered in the past may not be an appropriate standard of practice and new guidelines are being proposed to direct future blood ordering in cerebrovascular surgery. In our institution until April 2012 all patients who underwent CACS had RBC units prepared before surgery and from then on only blood typing is done in this type of surgery. With this study our goal was to analyze the change in the transfusion practice in our institution and if there was any significant effect related with this change.
Material and methods: A retrospective observational study was conducted. From January 2011 to July 2014, 211 medical records of patients who underwent CACS were reviewed. A comparison was made between the group with RBC units prepared and the group with blood typing only. Several variables were studied: demographic characteristics, ASA classification, comorbidities, mental status before surgery (Glasgow Coma Scale - GCS), aneurysm location, time of surgical intervention, initial hemoglobin level, blood loss and amount and timing of RBC transfusion.
Microsoft Excel was used for statistical analysis.
Results and Discussion: The groups were similar demographics wise. We found that the number of patients transfused and the quantity of blood used were not correlated to the type of blood preparation, with a high degree of confidence.
However, there seems to be a tendency to decrease the number and quantity as we move from RBC unit preparation to blood typing (p=0,102 and p=0,116 respectively). There was a strong correlation between subarachnoid hemorrhage (SAH) and blood losses and between SAH and transfusion (p=0,09 and p=0,003 respectively). Those who were transfused had no statistical difference in the time of the transfusion (day 0 and 1st, 2nd, 3rd and 4th days after surgery). There was also no correlation between transfusion and death. Those who died, however, showed, on average, a lower initial GCS and a higher SAH incidence, relative to those who didn't die.
Conclusions: With this study it is safe to conclude that blood typing before CACS is a better approach, since it drastically reduces waste of blood, with no negative impact on the patients.
Reference: Br J Anaesth 2007;99 (1):102-18. *Stroke.* 2002;33:994-997

6AP4-6

Aneurysms of the posterior circulation - a review of fourteen years of practice in a reference hospital

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Background and Goal of Study: Posterior circulation aneurysms (PCA) are rare and often challenging to manage [1]. Both endovascular and surgical treatments are available, with comparable outcome [1]. Current literature suggests that associated mortality and morbidity ranges from 8,3 to 16,3% [2,3]. Our goal is compare the outcome of patients treated by either modality.
Materials and Methods: We did a retrospective analysis of the patients with PCA treated by surgical or endovascular methods in our centre between January 2000 and December 2013. We sourced clinical records of these patients on a 1 year follow-up for mortality, risk factors associated to a worse prognosis and re-bleeding rate. Data was analysed using descriptive methods and logistic regression.
Results and Discussion: There were 52 patients submitted to surgical or endovascular treatment for PCA. 34 patients (65,4%) received surgical treatment and 18 (34,6%) endovascular. In the surgical group mean age was 60 yo, with a predominance of males (73,5% vs 26,4%). The endovascular treatment group had a mean age of 56 yo, with a predominance of women (77,8% vs 22,2%). The neurological status, as per the World Federation Neurosurgical Societies (WFNS) scale, the number and dimension of aneurysms were similar across both samples.

On immediate post-op, by logistic regression, vasospasm, and consequent cerebral infarction, was the only factor associated with a worse prognosis. No other differences were found on this period, either in Glasgow Outcome Score (GOS), incidence of vasospasm (7 in surgery vs 2 in endovascular) or re-bleeding rate (surgery - 5,6% vs endovascular - 16,7%).
At the 1 year follow-up, no difference was found. 82,4% on surgery group had a GOS > 3 and 11,7% had died. The values for the endovascular group were 72,2% and 22,2%, respectively. The global mortality was 15,4%.
Conclusion(s): Our findings suggest that both treatment options have their merits, being unable to find significant differences between the two. However, this may be caused by the small sample size precluding any definitive conclusions. Further studies of a multicentre nature, with larger groups of patients, are necessary. Nonetheless, our results are in line with those available on the consulted literature.
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2. J Clin Neurosci.2011;18(1):85-9
3. Acta Neurochir.2009;151(12):1583-91

6AP4-7

Clinical outcome after early aneurysm surgery in subarachnoid hemorrhage

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Background and Goal of Study: The ideal timing for coiling or clipping after aneurysmal subarachnoid hemorrhage (ASH) is unknown. Many practitioners defend early surgery after aneurysmal rupture, but solid data supporting this practice are lacking (1).
The goal of this study was to characterize the population with ASH and compare the clinical outcome of early aneurysm surgery (days 0-3), performed in this institution, with data from the literature.
Materials and Methods: We retrospectively collected data, from 2011 to 2013, about patients submitted to clipping surgery after ASH. Based on World Federation of Neurological Surgeons scale, we defined good neurological condition at admission (NCA) grades 1-3, and poor neurological condition grades 4-5. Clinical outcome was evaluated with the Glasgow Outcome Scale, scores of 4-5 indicate good outcome, scores of 2-3 indicate poor outcome, and score of 1 indicates death.
Results and Discussion: A total of 95 patients surgically treated for cerebral aneurysm were identified. The mean age was 58,3 (±13,0). 70,5% were women. 61,1% were American Society of Anesthesiologists physical status 2. 76,8% had good NCA. The mean time between rupture and surgery was 28,1 hours (±14,5). The location of the aneurysm was manly in the anterior communicating artery (42,1%). 73,7% started nimodipine before or during the surgery, and 20% had a new rupture of the aneurysm during the surgery. The mean length of stay was 21,6 days (±18,7).
Globally a good outcome was achieved in 66,3%; 25,3% had poor outcome and 6,3% died.
Good outcome was achieved in 76,7% of good NCA patients, and in 40,1% of poor NCA patients.
Tan H. et al (2) report good outcome in 75% of good NCA patients, and in 73,3% of the poor NCA patients. In the same study, in the late surgery group (after third day), good outcome was achieved in 37.5% of good NCA patients, and in 25% of poor NCA patients. *Laidlaw J. et al* (3) in a group of 177 with surgery in the first 12 hours, report a good outcome in 40% of poor NCA patients, with 45% deaths.
Conclusions: In our institution the clinical outcome of early aneurysm surgery in good NCA patients is similar than those found in the literature, while in poor NCA patients is worst. The differences of the methodology used in the studies about this topic, makes comparison difficult.
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6AP4-8

Jugular anomaly secondary to cerebral arteriovenous malformation and it's ultrasonographic diagnose

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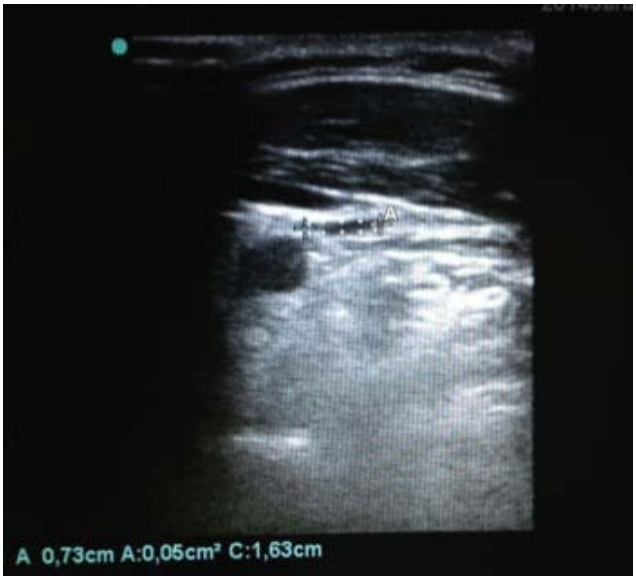
Background: Arteriovenous malformations (AVM) account for 11% of all vascular malformations of CNS and are of great importance for neuroanesthesiologists as they may need surgical repair. There are several considerations about anesthesia for these, but some are more expected than others. Herein we report a case of a patient with left internal jugular (IJ) hypotrophy suspected on jugular bulb cannulation and confirmed by ultrasonography (US), during AVM resection surgery.
Case report: A 36yo woman, diagnosed with left temporal AVM and proposed to surgical resection. General anesthesia was induced with propofol and remifentanil and left radial artery was cannulated. While attempting cannulation of left IJ vein for monitoring of the jugular bulb pressure and SvO2, technical difficulties were noticed as no vein was punctured after four attempts, despite the correct use of anatomical references. No US machine was available at the time. Right IJ vein was cannulated on first attempt. Surgery developed uneventfully. Before awakening, neutral head and neck position was confirmed and US of cervical vascular structures was performed. Examination revealed a significant left IJ hypotrophy (0.05cm² vs 0,26cm² from right IJ) (fig1).



[US showing hypotrophic left internal jugular vein]

Discussion: AVMs are the most frequent vascular malformations of the central nervous system presented to the OR. Associated vascular abnormalities are described in the literature but are rare and usually involving small vessels. However these may include major veins and can be associated with higher iatrogenic risk on their cannulation attempt, specially without US guidance.
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2. Speer AL, et al. Vascular surgery for arteriovenous malformations. http://emedicine.medscahypotrophype.com/article/459927-overview. Accessed February 10, 2014
Learning points: This report aims to advert anesthesiologists for the possibility of meeting vascular anatomical variations accompanying AVMs. US represents an important tool to guide invasive techniques as well as for bedside identification of anatomical variations.

6AP4-9

Assessment of the stroke neuronal damage by immunoassay

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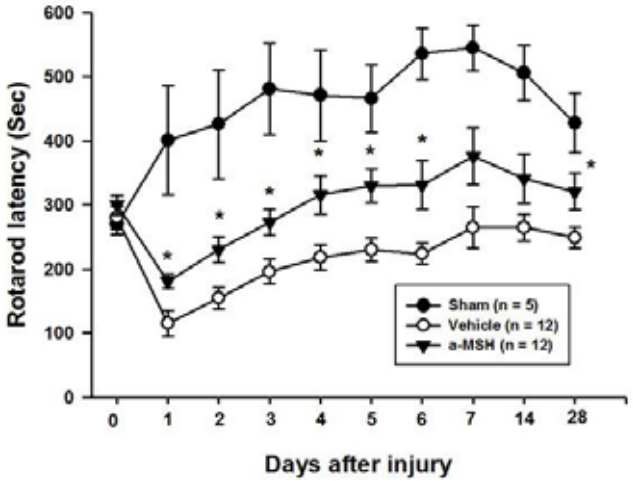
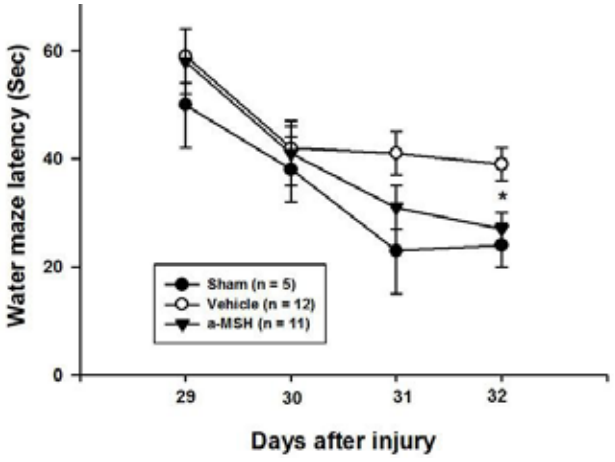
Background and Goal of Study: To date, the most promising markers of damage to the central nervous system and brain are **NSE** (neuron - specific enolase) and GFAP (glial fibrillary acidic protein). Create an antigenic complex followed by the determination of antibody titer to gray and white matter of the brain in acute ischemic stroke can be a real alternative to expensive and inaccessible markers of CNS injury.
Aim of the study: Examining levels of NSP, designing of brain antigen system, determination of antibody titer to the gray and white matter of the brain in the first 14 days of stroke.
Materials and Methods: Study included 116 patients with a diagnosis of stroke (4 groups). There were IgG and IgM dentified. Levels of NSE and GFAP were determined by immunoassay on 1st, 7th and 14th day. Groups 1 and 3 received neuroprotection. The primary neuroprotection were prescribed to restore rheology, microcirculation, endothelial dysfunction, state of glia and BBB: L-lysine aescinat, Lattren, HES. Secondary neuroprotection: drugs affecting the regenerative-reparative processes in neurocyte and glial cells: Tiocetam, Actovegin, Cerebrocurin, Gliatilin, Citicoline.
Results and Discussion: On the 7th day of treatment in patients who received neuroprotection significantly reduced the level of protein and antibody titer to the gray and white matter of the brain. Also, the assessment of neurological deficits using the scales showed that patients who did not receive a set of neuroprotection longer were treated and were more severe neurological deficit
Conclusion(s):
1. Test-system of brain antigen with a subsequent determination of the titer of brain tissue antibodies at ischemic stroke was designed.
2. Analysis of the dynamics of antibody showed that in the groups of neuroprotection immune response to brain damage was statistically significantly lower than in the groups of patients of standart therapy.
3. In patients with ischemic stroke severe receiving neurometabolic complex therapy, decrease ($p<0,05$) of neurological deficits SHKH, NIHSS and SSHI was recorded on the fourth day of treatment, those treated only protocol - the seventh day treatment.



[Rotarod]



[WMZ]

6AP4-10

Neuroprotective effect of c-terminal α-melanocyte stimulating hormone [11-13] on closed head injury in mice model

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Background and Goal of Study: Melanocortins showed neuroprotective effect against experimental ischemic stroke and traumatic brain injury model. c-terminal α-melanocyte stimulating hormone (MSH) [11-13] is analogue of α-MSH which showed little side effect.
We investigated the neuroprotective effect of α-MSH [11-13] in closed head injury model.
Materials and Methods: Closed head injury (CHI) model was induced by pneumatic impactor with intact skull. in C57BL/6J mice. The effect of α-MSH [11-13] on neuroinflammation, mitogen-activated protein kinases, and blood-brain barrier was assed, as well as vesibulomotor function (Rotarod test) and long-term neurocognitive impairment (Morris water maze).
Results and Discussion: α-MSH [11-13] significantly increased functional outcome assessed by rotarod test for 7 days after CHI, and this increasement was continued at 14 and 28 day after injury, and by Morris Water Maze task at 29 - 32 days after CHI.
These functional improvements were associated with histological improvement. α-MSH [11-13] decreased the number of cell staining for Iba1 at 48 h and 7 days after TBI. IL-6 production was increased after CHI and α-MSH [11-13] inhibited this increasement. There was no changes in the level of extracellular signal-regulated kinases, c-Jun N-terminal kinase, and p38 mitogen-activated protein kinase.
Conclusion(s): α-MSH [11-13] improved histologic and functional outcome through the modulation of neuroinflammation responses after closed head injury.

6AP5-1

Is it possible to use ketamine for analgosedation in patients with severe traumatic brain injury?

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Goal of Study: Evaluate the impact of ketamine on the intracranial pressure (ICP) in patients in the acute time of combined Traumatic brain injury (TBI) during mechanical ventilation.
Materials and Methods: A prospective study of 23 patients with severe TBI combined with unstable hemodynamics (the level of consciousness by Glasgow Coma Scale score was 6-8). The average age of of the patients was 35 ± 16 years. Patients received the standard intensive therapy according to the recommendations of Brain Trauma Foundation. All of them were on the mechanical ventilation. By the method analgosedation postoperative patients were divided into two groups: one group (12 patients) received infusion of 1% solution Propofol in a dose of 2-3 mg / kg / hr to morphine analgesia in a dose of 0.02-0.04 mg / kg / hr; 2nd group (11 patients) received the infusion dormicum (Midazolam) in a dose 0.1-0.3 mg / kg / h and a solution of ketamine in a dose 500 mg / day. The duration of Analgosedation was 48 ± 12 hours. Monitoring includes a permanent record of blood pressure (BP), heart rate, CPP Was performed the invasive intracranial pressure monitoring. Assessment of the adequacy of sedation assessment scale was carried by the Richmond agitation and sedation scale.
Results and Discussion: Patients of 1-st group 15 minutes after injection, showed a decrease ICP with 25.4 ± 5.1 mm Hg to 19.9 ± 5.3 mm Hg However, the mean blood pressure was also reduced after the start of sedation by 20%

, that required intravenous injection of vasopressors , It was also observed a decrease CPP to 58 ± 8 mm Hg to 54 ± 4 mm. Hg. These changes continued throughout the period of sedation. In 2-d group patients after 15 minutes from the initiation of the infusion of ketamine and dormicum, increasing of BP was noted with 10 ± 73 mm Hg to 78 ± 11 mm Hg CPP also increased from 56 ± 7 mm Hg to 61 ± mm. Hg. There was a slight a decrease ICP with 23.2 ± 2.4 mm. Hg to 20.6 ± 3.3 mm. Hg. This trend continued the whole period of sedation.
Conclusion(s): In patients with severe TBI and increased ICP, and mechanical ventilation, a combination of ketamine and midozalama safety and does not lead to an increase in ICP. In our study, there was a trend towards normalization of ICP and rising CPP. Thus, ketamine can be used for analgosedation in the acute period severe TBI.

6AP5-2

The neural, oscillatory, correlates of sedative ketamine infusion: a pharmaco-MEG (magnetoencephalographic) study

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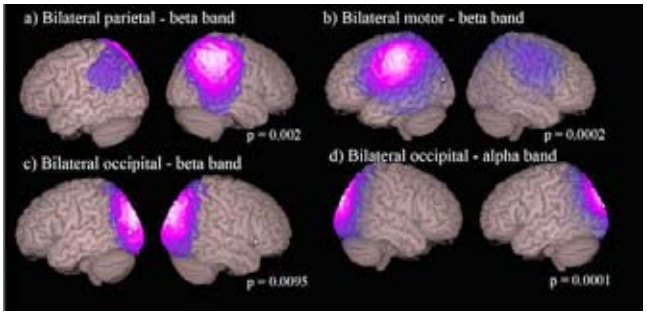
Background and Goal: There has been a resurgence in interest in the NMDA receptor antagonist ketamine in depression and pain management. Whilst animal models of the molecular mechanisms underlying ketamine's effects exist, there are few MEG/electroencephalography (EEG) studies examining the sedative effects of ketamine.
Methods: Nineteen ASA-1 volunteers underwent MEG recording during a ketamine or placebo infusion in a randomised single blinded placebo controlled study. During the ketamine infusion they received a bolus of 0.25 mg/kg ketamine followed by a 10 minute infusion (6.25 ug/kg/min). Subjects were instructed to relax, with closed eyes. The beamformer technique (synthetic aperture magnetometry) generated spatial filters for delta (1-4 Hz), theta (4-8 Hz), alpha (8-13 Hz), beta (13-30 Hz) and gamma (30-50 Hz) bands. Independent Component Analysis was used to identify 15 temporally independent components in each frequency band. Paired t-tests compared mean time-series of placebo versus ketamine components.
Results: Ketamine caused widespread decreases in delta (1-4 Hz), alpha (8-13 Hz) and beta (13-30 Hz) power but increased low (30-50 Hz) and high gamma (50-100 Hz) power, consistent with previous reports.[1]
MEG resting-state networks' functional connectivity (fc) was significantly altered by ketamine. Fc was reduced in the bilateral parietal, occipital and motor networks (fig. 1).
Unlike the effects of other sedative agents[2], functional connectivity of frontoparietal networks, identified in delta, theta, alpha and beta frequency bands was maintained during ketamine sedation.



[Figure 1. MEG resting state networks]

To our knowledge this is the first report on the use of MEG to identify resting state networks and their modulation by ketamine sedation.
Conclusions:

- Ketamine causes decreases in delta, alpha and beta band power but increases in gamma band power.
- Fc was decreased in bilateral parietal, occipital and motor networks but was maintained in frontoparietal networks.
- These MEG effects could potentially be used as biomarkers of ketamine's centrally mediated effects

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6AP5-3

Performance of a cheap BCI (brain computer interface) device as an EEG monitor

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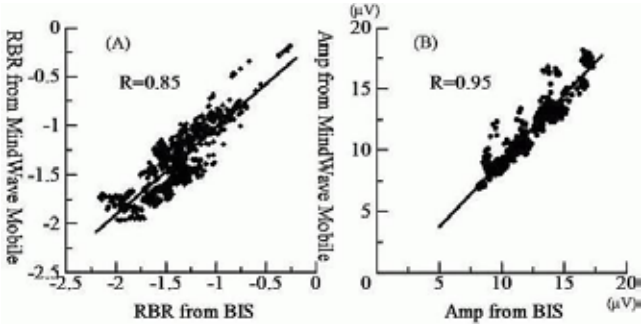
Background and Goal of Study: EEG monitors such as BIS™ monitors become popular in these twenty years. However, it is not yet used for every general anesthesia case. One reason would be the cost. Recently, several cheap BCI (Brain Computer Interface) devices can be available. BCI devices acquire EEG signals, analyze them, and translate them into commands to a computer. Then we tried to use one of those devices, MindWave Mobile headset (NeuroSky, USA), as a source of EEG. It costs only about $130. It can output 256 Hz sampled raw EEG data. Here we tested the performance of this device by comparing that of BIS-XP™ monitor.
Materials and Methods: After approval of the local ethical committee and obtained written informed consent from the participants, we enrolled 15 patients (ASA-PS I or II, aged 23-64) who were scheduled elective surgery in a supine position. After induction of anesthesia, we placed the headset besides the BIS-Quatro™ sensor on the left side. Anesthesia was maintained with propofol and remifentanil. We gathered raw EEG data into a computer using our original software "BSA", and analyzed those quality, robustness to artifacts, and compared some EEG derived parameters. As this device cuts the signals below 3 Hz, we selected RBR (relative β ratio) as a power-spectrum derived parameter. It is known as a sub-parameter of BIS calculation, and is the logarithm of the ratio of power in 30-47 Hz and power in 11-20 Hz. We also calculated the mean amplitude of EEG (Amp) by time-domain analysis. We compared RBRs and Amps obtained from those two devices. We adopted the variables when signal quality index was more than 0.75.
Results and Discussion: In 760 data pairs, RBR and Amp values were quite similar and correlation coefficients were 0.85, 0.95, respectively (Fig). EEG waveforms obtained from this device are quite clear during anesthesia when electric noise was not contaminated. However, this device was interfered by electro-surgical cautery just like the earlier version of BIS monitor (A-1050).
Conclusion(s): Our study revealed that it has good performance and can be used for an EEG monitor.



[Fig]

6AP5-4

Neuroanesthesia in an obstetric patient: when 2 worlds meet in one patient

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Background: A brain tumor was first described during pregnancy 100 years ago, and its incidence remains low. Neuroanaesthesia in the obstetric population is rare, and constitutes a challenge - considering that, besides the mother, one also has to attend to the needs the fetus. Literature is sparse on the subject, and the few available case reports represent an essential source of information(1,2). We present the anesthetic management of one such case.
Case report: We present a 38 year-old female pregnant patient (25-week gestation), 70kg, ASA III, with a tumor involving the bone and dura in the left parietal area, proposed for craniotomy. The patient was monitored with ASA

standard monitoring and BiS Index. Fetal heart rate monitoring was used during the whole procedure. Tilting the operating table 15º to the left was sought to allow lateroversion of the uterus. A rapid sequence induction was preformed with remifentanil perfusion(0,25 mcg.Kg^{-1}.min^{-1}), 375mg thiopental, and 100 mg succinylcholine. General anesthesia was maintained with sevoflurane, remifentanil and atracurium. After the craniotomy, a caesarean delivery was decided, to allow chemotherapy, which underwent without complications. The newborn presented with Apgar scores of 8 - 9 - 9 and was intubated by the neonatology team. While preparing the drapes for the caesarean a solid mass was identified in the left breast and at the end of the procedure, a biopsy was performed. After 5 hours and without major problems, a careful analgesic plan was established and the patient was transferred to the ICU. 4hrs after the arrival, she was extubated.

Discussion: This case presented us with many challenges: adequate monitoring for both mother and fetus; positioning allowing both adequate surgical exposure and preventing aortocaval compression; adequate approach to a potentially difficult airway; careful selection of drugs; the need to accommodate changes in the proposed procedure; the need for inter-specialty collaboration, namely Anesthesia, Neurosurgery, Obstetrics, Neonatology, General Surgery and Intensive Care; anticipating possible problems and having multiple plans to solve unanticipated but predictable problems.

References:

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Learning points: Careful planning and inter-specialty approach were instrumental for the positive outcome of this particular case.

6AP5-5

Passive leg raising effect on NIRS rSO_2 in an hemodynamic unstable patient

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Background: Hemodynamic instability may significantly affect brain perfusion. Near infrared spectroscopy (NIRS) is a method of evaluating regional cerebral oxygenation (rSO_2), thus reflecting blood flow, perfusion pressure and oxygen delivery to brain tissue. On hemodynamic unstable patients, rSO_2 may reflect this systemic hypoperfusion. Passive leg raising maneuver (PLR) is a simple method of transiently increasing systemic venous return and can be considered a self fluid-challenge[1]. With this report, we aim to evaluate the effect on NIRS from a PLR on an hypovolemic patient, during general anesthesia.

Case report: A 67 yo male presented to the OR for surgical resection of a right parietal lobe mass. The patient was monitorized with standard monitoring and invasive blood pressure, bispectral index (BIS) and simetrical frontal NIRS sensors (INVOS®).

After induction patient was mechanically ventilated with 8 ml kg^{-1} of tidal volume. We then observed that systolic pressure (SP) and pulse pressure (PP), and their variation with ventilation (ΔSP and ΔPP) were altered on the arterial waveform, despite no other clinical features of hypovolemia. We then performed a PLR and monitored SP, ΔSP, PP, ΔPP, NIRS rSO_2 and BIS values.

	Before PLR	After PLR
SP (mmHg)	86	103 (19.7% increase)
SPΔ (mmHg)	8	6
PP (mmHg)	36.5	46.5 (27.4% increase)
PPΔ (%)	13.7	10.8
NIRS rSO (%)	68	75
NIRS rSO (%)	66	70
BIS	35	37

[Changes in studied parameters with PLR maneuver]

Discussion: Changes on SP, ΔSP, PP and ΔPP with the PLR are well studied as parameters of hemodynamic instability and fluid responsiveness[1]. NIRS rSO_2 monitoring validation is challenged by the lack of a gold standard of cerebral oxygenation. However, there is some evidence that it's values reflect systemic haemodynamic changes, as also shown on this case.

References:

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Learning points: Relationship between SP, ΔSP, PP, ΔPP and NIRS rSO_2 values with PLR suggest the valuable importance of NIRS on evaluation cerebral blood flow on hemodynamic instability. It is our belief that continuous studying of these parameters should be done in order to validate their use in a wider spectrum of clinical situations.

6AP5-6

A non invasive intraoperatively ICP monitoring: a case report and review of literature

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Background: Non-invasive measurement of Intracranial Pressure (nICP) can be invaluable in the management of critically ill patients. In most of acute neurological and neurosurgical diseases Intracranial Pressure is elevated and needs to be actively managed.

Moreover, noninvasive estimation of ICP can be useful in patients at risk from intracranial hypertension for non primarily neurosurgical causes, ,when the insertion of invasive ICP is not indicated.

Increase of ICP during laparoscopic surgery has known to be associated with increased intrabdominal pressure and increased CO2.

Case report: We report a case of a 52 year old man affected by right high grade thalamic glioma not for neurosurgical indications who underwent surgery for laparoscopic cholecystectomy. Considering the high risk to develop intracranial hypertension during the surgery, the patient was monitored intraoperatively through simultaneous optic nerve sheath diameter (ONSD) ultrasound measurement and Transcranial Doppler (TCD).

Discussion: In this case, both ONSD and TCD measurements showed an increase of ICP after introducing pneumoperitoneum. This case and a complete review of literature suggest that these methods can be used as a possible alternative to assess nICP.

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Association between laparoscopic abdominal surgery and postoperative symptoms of raised intracranial pressure. Cooke SJ, Paterson-Brown S. Surg Endosc. 2001 Jul;15(7):723-5. Epub 2001 Apr 25.
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Citerio G, Vascotto E, Villa F, Celotti S, Pesenti A.

Learning points: In cases at high risk of developing intracranial hypertension, when invasive ICP monitoring is not indicated, simultaneous ONSD Ultrasound and TCD measurements can be useful to monitor non invasively ICP.

6AP5-7

Preoperative risk factors of severe blood pressure reduction following dural opening during traumatic brain injury

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Background and Goal of Study: Patients with severe traumatic brain injury often experience catastrophic blood pressure reduction following dural opening. The aim of our study is to investigate the risk factors for blood pressure reduction following dural opening among patients with traumatic brain injury.

Materials and Methods: A total of 41 patients underwent emergency craniotomy and required dural opening due to traumatic brain injury were divided into two groups: HT 70 group (systolic blood pressure < 70mmHg following dural opening) or non HT 70 group. Data concerning, age, gender, Glasgow Coma Scale on admission, hemodynamics on admission, preoperation, induction of anesthesia, pre and post dural opening, injury severity score, blood chemical analysis on admission, mechanism of injury (traumatic injury or other), multiple trauma, abnormality of the pupils, head computerized tomography findings, abonormality of preoperative ECG, method of anesthesia, use of preoperative use of catecholamine before dural opening were retrospectively collected.

Results and Discussion: HT 70 occurred in 19 patients. In HT 70 group, fibrin and fibrinogen degradation products (*FDP*) on admission was higher (median 165 μg/dl versus 65.7 μg/dl : $p < 0.05$) and plasma fibrinogen levels was lower (median 191 mg/dl versus 234 mg/dl: $p < 0.05$) than non HT 70 group.

Conclusion: This retrospective study showed that coagulopathy including abnormality of FDP and plasma fibrinogen levels may predict blood pressure reduction following dural opening.

6AP5-8

Spine surgery and blood loss: systematic review of clinical evidence

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Background and Goal of Study: Spine surgery has been rapidly growing as a neurosurgical operative procedure, with an increase of 220%. Unfortunately, intraoperative blood transfusion is a major outcome determinant of this procedure . Several therapeutic modalities to decrease intraoperative blood loss, pharmacological and non-pharmacological, have been reported. A comprehensive review of this related evidence is not available. The aim of this systematic review (SR) is to report available clinical evidence on the relationship between intraoperative blood loss (primary end point) & transfusions and postoperative complications (secondary end point) in patients undergoing spine surgery.
Materials and Methods: A literature search of PubMed database was carried out using 5 key words: spine surgery and transfusion, spine surgery and blood loss, spine surgery and blood complications, spine surgery and deep vein thrombosis, spine surgery and pulmonary embolism. The following filters were used: all full text clinical trials, written in the English language in the last ten years on the human genre. Prospective and Retrospective Observations were also included. Two authors (VS and FB) independently screened and assessed retrieved papers. Only clinical reports (RCTs, prospective and retrospective studies and case reports) were selected.
Results and Discussion: A total of 472 papers were examined, 445 were excluded and 31 were selected as suitable for the present SR. Selected papers were categorized into 3 subchapters:
1. drugs active on coagulation (12 studies): tranexamic acid, antifibrinolytics, aminocaproic acid, aproptin, recombinant activated factor VII and bemiparin;
2. drugs not active on coagulation (5 studies): ketorolac, epoetin, alpha Omega-3 and fish oil;
3. non-pharmacological approachs (14 studies): surgical tips, patient positioning, demographic, and general or spinal anesthesia.
These studies have shown a significant reduction in intraoperative bleeding during spine surgery and the requirement for blood transfusion.
Conclusion: Spine surgery is associated with significant blood loss and the need for intraoperative blood transfusion. There are several therapeutic modalities, pharmacological and non-pharmacological, that effectively reduce intraoperative blood loss and blood transfusion requirements.

6AP5-9

Chronic meningitis caused by amoebas. Neurociscticercosis (NCC)

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Background: The NCC is an infection of the central nervous system caused by the larval form of Taenia Solium and located most frequently in brain parenchyma. In recent years this infection has developed an increase in prevalence around developed countries.
Case report: 32 year old woman, with a history of dyslipidemia, from Ecuador and resident in Spain for 14 years; who came to the emergency department for migraine status since 6 months accompanied by constitutional symptoms. Multiple imaging studies were performed observing ventricular dilatation and thickening leptomeninges. A lumbar puncture (LP) was done with dominance lymphocytes, bacterial and viral serology negative; moreover a Mantoux test was negative.
The patient was diagnosed of chronic meningitis secondary to sarcoidosis and he started medical treatment with corticosteroids and amitriptyline and implementation of ventricular drainage. In the following months, the patient was admitted repeatedly in neurosurgery service for worsening neurological symptoms (instability up, incoherent language and nystagmus) concurring in studies with hydrocephalus .
DVP was replaced in many times by repeated dysfunction. Finally an external ventricular drainage and corticosteroid treatment got a good neurological response. Meningeal intraoperative biopsies were taken and informed as normal (pathology and microbiology).After eight months of torpid evolution, important neurological deterioration characterized by sphincter incontinence, impaired short-term memory, drowsiness and right retro-orbital pain caused her admission at hospital.
In imaging study, an arachnoid cyst in posterior fossa with compression on the trunk is evidenced, deciding laminectomy decompression and dural opening.
During intraoperative period, an increase in the cisterna magna, tension in cerebellum and arachnoid thickened with small cysts on the wall. Intraoperative samples were sent to pathologist, who informed of cyst from parasitic provenience. A LP was performed with positive serology for cysticercosis and free-living amoebas were observed.Subsequently she was treated with albendazole, praziquantel and metronidazole
Discussion and Learning Points: The increasing number of immigrants from endemic areas in developed countries is a scientific challenge. The cases whit isolated meningeal involvement often have nonspecific neurological symptoms and may delay in diagnosis and, consequently, increase morbidity and mortality.

6AP5-10

Trigeminal neuralgia - outcome following microvascular decompression surgery

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Background and Goal of Study: Trigeminal nerve neuralgia (NT) is a debilitating chronic pathological condition, due mainly to its associated painful symptomatology. Microvascular decompression (MVD) is a major neurosurgical procedure that provides the longest period of pain relief and aims to preserve function of the nerve [1]. Our hospital started a program for MVD in 1993. The purpose of the present study is to evaluate the incidence of complications and the clinical follow-up in this population.
Materials and Methods: We did a retrospective analysis of the patients (n=79) submitted to surgical MVD in our center between January 1993 and December 2012. Data was collected from clinical and hospital discharge reports and was processed by descriptive statistics.
Results and Discussion: 79 patients were submitted to surgical MVD for NT. Women (54,4%) were more affected than men (45,6%) and global mean age was 63 (29-84) years. The right side was more often affected (62%) than the left (38%). Surgery was performed an average of 7,1 years after the beginning of symptoms.
During the follow-up period, 10 patients (12,6%) developed complications: facial hyposthesia in one of V nerve rami (n=3), cerebrospinal fluid fistula (n=3), ipsilateral hypoacusia (n=1), hydrocephalus (n=1) and aseptic meningitis (n=2).
Pain relief was evaluated according to the Barrow Neurological Institute (BNI) Pain Intensity Scale, with 55 patients (69,6%) scoring I (no pain, no medications), 1 patient (1,3%) scoring II (occasional pain, not requiring mediation), 16 patiens (20,2%) scoring III (some pain, adequately controlled with medication), 4 patients (5,1%) scoring IV (some pain, not adequately controlled with medication) and 3 patients (3,8%) on score V (severe pain/no pain relief).
Conclusion(s): Surgical MVD is an effective treatment for NT, with low complication rates. In the majority of the patients (91,1%) there was improvement of the pain symptoms, which resulted in a better quality of life. The free pain rates are high even after several years of follow-up.
Reference: 1. BMJ. 2014;348:g474

6AP5-11

Patient satisfaction after trigeminal nerve microvascular decompression

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Background and Goal of Study: Patients' satisfaction is an important component of healthcare provided in modern era as it is considered a good quality indicator. Its audit gives useful data on patients' perception and satisfaction with care that may not be apparent on traditional audit measures, which focus more on a unit's efficiency.

The aim of this study is to determine the level of patient satisfaction after trigeminal nerve microvascular decompression (MVD), a major neurosurgical procedure that provides the longest period of trigeminal nerve neuralgia pain relief [1].
Materials and Methods: 79 patients were submitted to surgical MVD in our centre between January 1993 and December 2012. An adapted questionnaire [2] was given to the patient composed by five questions:
a) Looking back now, how would you consider the timing of your surgery?
b) How long did it take you to completely get over the operation?
c) How well did this operation meet your expectation?
d) Overall, how satisfied are you with your current situation?
e) If you needed treatment again, what treatment would you choose?
Only 34 patients answered the questionnaire. Data was processed by descriptive statistics.
Results and Discussion: 20 patients said that the surgery should have been earlier, 12 in the right time and 1 confessed that could have been delayed. The mean time to completely get over the surgery were 3,83 weeks. 18 patients confessed that de operation exceeds the expectations and 4 succumbed the expectations. 82% of patients are satisfied with the current situation. 62% would choose the same surgical treatment if they need treatment again, 15% would choose drug therapy.
Conclusion(s): This study reveals high levels of satisfaction after trigeminal nerve MVD in our centre. However, a high percentage of patients declined the questionnaire, which may skew the results. Nonetheless, despite requiring a craniotomy and having a fairly long recovery period, the majority of patients would undergo surgery again if needed. This suggests that the clinical benefits that arise from surgical treatment of trigeminal neuralgia justify its use in cases refractory to medical therapy alone.
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6AP6-1

Anesthetic complications of awake craniotomies: series of 160 interventions for brain tumor

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Background and Goal of Study: Awake craniotomy is one of the most challenging neurosurgical procedures for anesthesiologist. There are various anesthetic techniques described for awake craniotomy based on monitored anesthesia care (MAC) or asleep-awake-asleep (AAA) protocols. Each anesthetic approach can be accompanied by particular complications[1]. The aim of the study was to compare safety of different anesthetic techniques used in our clinic.
Materials and Methods: We analyzed 160 awake craniotomies for glial tumor. Patients were divided into 4 groups:
1. 76 patients were sedated with propofol without airway protection (*P-MAC*);
2. 10 patients were sedated with propofol with mechanical ventilation via LMA (*P-AAA*);
3. in 35 patients we used xenon anesthesia (*X-AAA*);
4. 39 patients were sedated with dexmedetomidine without airway protection (*D-MAC*).
We examined frequency of the following complications in each group: ventilation complications (SpO_2< 90%, $PaCO_2$>45 mm Hg, LMA leakage episodes), hemodynamic complications (hypertension (BP_{sys}>150 mmHg), hypotension (BP_{sys}< 90 mmHg), tachycardia (HR>150 bpm) or bradycardia (HR< 45 bpm) episodes), intraoperative seizures, vomiting, bleeding, local anesthetic toxicity, oversedation or agitation before mapping.
We also registered frequency and causes of failed brain mapping. Two-tailed Fisher exact test for data analysis was used. P value < 0.05 was considered statistically significant.
Results and Discussion: In *P-MAC* group ventilation disturbances were more frequent (SpO_2< 90% in 26% and $PaCO_2$>45 mmHg in 75% of patients) than in *AAA* groups and *D-MAC* group (no desaturation and hypercapnia in 2.6% of cases (p< 0.05)). LMA leakage was noted in 22.2% of cases of AAA protocol. Episodes of hyper- and hypotension were common to all groups. Bradycardia was more frequent in *D-MAC* group (17.9%, p<0.05).
Oversedation was noted in 5.7% of patients in *X-AAA* group, in 5.1% of patients in *D-MAC* group and in 11.8% of patients with propofol sedation (p>0.05). Vomiting, agitation, bleeding and LA toxicity were rare in all groups. Failed mapping was registered in 16 cases (10%): in 7 patients (4.4%) due to intraoperative seizures and in 7 patients (4.4%) due to oversedation.
Conclusions: Frequency and character of awake craniotomies' complications greatly depend on the type of anesthesia. Ventilation can be effectively preserved by dexmedetomidine sedation or LMA.
Reference: 1.Skucas A et al. *Anesth Analg.* 2006;102(3):882-887

6AP6-2

Efficacy and Safety of intravenous anesthetics for conscious sedation in awake craniotomies for cortical mapping: a systematic review of randomized clinical trials

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Background and Goal of Study: Awake craniotomy allows cortical brain stimulation to help surgeons locate and accurately map the eloquent areas, leading to larger resections with less surgical morbidity. Currently, the most frequently used intravenous anesthetics are dexmedetomidine and propofol, but various combinations and anesthetic techniques are possible and there is no consensus on the best agent for this procedure. The aim of the present study was to assess which intravenous anesthetic agents provide the best efficacy and safety during awake craniotomy.
Materials and Methods: A systematic review according to the recommendations of Cochrane was conducted. The primary outcomes were efficacy and safety of intravenous anesthetics used for conscious sedation during awake craniotomy. Safety parameters included incidence of adverse events during the awake period. Efficacy was evaluated by arousal time, recall of pain, patient cooperation during the awake period and degree of satisfaction of both patients and surgeons. Data from each trial were combined to calculate the pooled relative risk (RR) and 95% confidence intervals.
Results and Discussion: Of the 718 studies identified, 4 were randomized clinical trials and included in the final analysis, presenting a total of 147 patients. Propofol produced a significant reduction (RR 17.50, CI 95% 1.07-285.67, p=0.04) of the intraoperative seizures compared to fentanyl combined with droperidol (Figure 1). Also, dexmedetomidine associated with remifentanil was statistically better than propofol in relation to surgeon satisfaction (p< 0.001) and arousal time (11.0±2.3 versus 16.2±3.4 minutes). With respect to patient satisfaction, recall of pain, cooperativeness and adverse events, such as vomiting and nausea, tachycardia and respiratory depression, there were no statistical differences.
Conclusion: There is limited but reliable evidence that the use of dexmedetomidine with remifentanil may show promise as combined anesthetics for conscious sedation in awake craniotomies for cortical mapping, but we cannot rule out the possibility of propofol as a synergic agent for decreasing adverse effects.

6AP6-3

Patient's satisfaction during functional brain mapping

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Background and Goal of Study: Functional brain mapping allows accurate resection of brain tumors with preservation of language and motor functions. The role of the anaesthetist is key in carrying out a precise analgesia ensuring their tolerance and capacity to interact during the neurological tests. The objective of this study is to determine the level of comfort, analgesia and post-intervention satisfaction of the patient.
Materials and Methods: We have studied 21 craniotomies with functional brain mapping performed at Bellvitge Universitary Hospital from 2012 to 2014. Demographic variables, diagnosis, anaesthetic techniques used, duration of surgery, perioperative complications and patient's comfort and analgesia during the procedure have been analyzed. A 9-item questionnaire evaluating patient's post-intervention satisfaction was carried out 4 months after the surgery.
Results and Discussion: From the 21 patients studied, 14 (66%) were men and 7 (34%) were women, with an average age of 40 (range: 19-65 years old). The most frequent tumor lineage was oligoastrocytoma in 7 patients (33%),

followed by astrocytoma in 5 (23%) and glioblastoma in 4 (19%). The first group, composed of 14 patients (66%), underwent an asleep-awake-asleep technique, with propofol, remifentanil and laryngeal mask. Only two occasions intubation due to technical difficulties was necessary. The second group, composed of 7 patients (33%), underwent an asleep-awake technique until completion of the surgery, enabled by the patient's tolerance. The asleep-awake-asleep procedures were moderately longer (mean of 7.4 hours; range 5-11 hours) than the asleep-awake (mean of 6.8 hours; range: 5.5-8 hours) due to the longer last phase. No anaesthesia-related complications occurred. The level of acceptance of the proposed anaesthetic technique was positive in 12 of the total number of patients (65%). All of the patients from the first group and 6 (86%) from the second were satisfied with the anaesthetic technique employed. 2 patients (27%) from the first group felt mild pain during surgery and 1 (14%) from the second group felt moderate pain. All of the patients would recommend this anesthetic technique to other people with their disease.

Conclusion(s): Brain functional mapping using asleep-awake anaesthetic technique is positively perceived by patients. The choice of an asleep third phase is dependent on the patient's tolerance and the degree of potential complications of introducing a laryngeal mask.

6AP6-4

Bispectral index and propofol pharmacodynamics during awake craniotomy

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Background and Goal of Study: Anaesthesia for awake craniotomy aims for an unconscious patient at the beginning and end of surgery as well as a fast awakening and responsive patient during the awake period. The goal of this study was to determine depth of anaesthesia as well as propofol plasma (Cpl) and effect-site (Ce) concentrations at critical time points such as return of consciousness (ROC) and beginning of neurological testing.

Materials and Methods: Thirteen patients scheduled to undergo resection of brain tumours or epileptogenic areas were included in this prospective, observational study. Arterial blood samples were taken at different time points and plasma propofol concentration was determined by HPLC. In addition, the plasma and effect-site concentrations of propofol were simulated based on the pharmacokinetic/dynamic (pk/pd)-models proposed by Marsh et. al. and Schnider et al. as implemented in target controlled infusion (TCI) pumps.

Results and Discussion: Patients regained consciousness intraoperatively 13.8 ± 5.6 minutes (mean ± std dev.) after stopping the propofol infusion. At ROC, a BIS of 77 ± 7 as well as a Cpl of 1.2 ± 0.4 μg/ml was measured, and a Cpl of 1.4 ± 0.4 μg/ml was predicted according to the Schnider model. In contrast, the Marsh model predicted a significantly ($p<0.05$) higher Cpl of 1.9 ± 0.4 μg/ml at ROC. When neglecting interindividual variability, patients would be expected to regain consciousness at an identical propofol *effect-site* concentration (Ce). However, the Marsh model predicted a significantly ($p<0.05$) higher Ce of 2.3 ± 0.6 μg/ml as compared to the Schnider model (1.5 ± 0.4 μg/ml) at the time point of ROC. Neurological testing was not possible, until a measured Cpl of 0.8 ± 0.3 and a BIS of 92 ± 6 was reached.

Conclusions: Additionally to interindividual variability differences between pk/pd-models (Marsh versus Schnider) should be taken into account when tailoring patients to a certain propofol plasma- or effect-site concentration via TCI pumps.

6AP6-5

The effect of single low-dose dexamethasone on blood glucose concentrations during awake craniotomy

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Background and Goal of Study: Low-dose dexamethasone administered at induction is recognized as a potent antiemetic, which does not cause concern regarding postoperative hyperglycaemia. Intraoperative nausea/vomiting frequently occur and thus should be well managed during awake craniotomy. The aim of this study is to examine the effects of single low-dose dexamethasone on intraoperative blood glucose levels and the incidence of nausea/vomiting in awake craniotomies.

Material and methods: We reviewed anaesthetic charts and clinical records for awake craniotomy between January 2013 and November 2014. Exclusion criteria included:
(1) any history of diabetes or glucose intolerance;
(2) receiving glucose containing fluids during surgery; or
(3) converting to general anaesthesia with invasive airway managements due to intraoperative complications.
Perioperative blood glucose concentrations (before operation, after induction, during awake phase, at the end of operation), the number of patients who developed hyperglycaemia (blood glucose >180mg/dL), and the incidence of intraoperative nausea/vomiting were analysed.

Results and Discussion: Of the 60 patients 24 met the criteria. Twelve patients did not receive dexamethasone (Group C) and the other 12 patients received 4.95 mg of dexamethasone (Group D) at anaesthetic induction. The demographics and operative backgrounds of the patients were comparable. All patients received propofol/remifentanil/fentanyl general anaesthesia until the beginning of awake phase.
When tumour removal was accomplished, propofol sedation was resumed in all patients in Group D with only 4 of 12 patients in Group C receiving the same, with a greater amount of fentanyl being given to the patients in Group D ($p=0.001$). Baseline blood glucose concentrations obtained before operation, after induction, and at the end of operation did not differ between each group. The samples withdrawn during awake phase showed significantly higher glucose levels in Group D ($p=0.001$). Hyperglycaemia was observed in 1 patient in Group D from awake phase until the end of operation.
The number of patients who complained of nausea was comparable ($p=0.545$). None of the patients vomited during surgery in Group D, while 6 patients vomited in Group C ($p=0.032$). Delayed wound healing was not observed.

Conclusion: In patients undergoing awake craniotomy, low-dose dexamethasone is useful in preventing intraoperative vomiting with careful blood glucose monitoring.

6AP6-6

Awake craniotomy for resection of supratentorial brain tumors using an asleep-awake-asleep technique with scalp block, laryngeal mask airway and dexmedetomidine: a case series

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Background: There is a growing interest in the application of awake craniotomy (AC) for brain tumors that lie near eloquent and motor areas.The basic anaesthetic techniques for AC are the asleep-awake-asleep (AAA) and the monitored anaesthesia care (MAC) technique[1].

Case report: We present a standardized AAA technique, using IV anaesthesia with propofol, remifentanil and dexmedetomidine, LMA for controlled ventilation and scalp block. Twelve patients have undergone AC for tumor excision in our hospital in 1 year. No major signs of cardiovascular instability or major airway complications were recorded. No patient had to be intubated. There were no episodes of hypercapnia and only one episode of transient hypoxemia. None of the patients reported severe or unbearable pain.
All patients were calm and cooperative during the awake phase, receiving a constant infusion of dexmedetomidine. One patient showed signs of agitation and anaesthesia had to be induced sooner than planned. One patient experienced three brief seizures, which were managed with direct instillation of iced saline.
During the postoperative visit, none of the patients has described their experience as distressing or traumatic.

Discussion: We preferred an AAA technique because it allows for better control of ventilation and seems to be connected with less airway complications than a MAC technique[2].We consider it as less stressful, since the patient is under general anaesthesia during the most irritating parts of the operation.The mainstays were the performance of a scalp block for intraoperative analgesia, use of an LMA and dexmedetomidine infusion. LMAs seem to be the preferred airway device in AC[1]. Dexmedetomidine, an a-2 agonist drug with analgesic and sedating properties, seems to be an ideal adjunct for the anaesthetic management of these patients[3].

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3. Garavaglia MM, Das S, Cusimano M et al. Anesthetic approach to high-risk patients and prolonged awake craniotomy using dexmedetomidine and scalp block.J Neurosug Anesthesiol 2014;26(3):226-233
Learning Points: The significance of this case series lies in the fact that it shows the efficacy and safety of an AAA technique with scalp block, LMA and dexmedetomidine for excision of brain tumors.

6AP6-7

Anesthetic management and clinical implications of awake craniotomy

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Background and Goal of Study: Some tumors arise in functional areas of the brain like language or memory. Awake craniotomy can be advantageous, since it makes possible intraoperative functional testing. Anesthetic management implies use of drugs with rapid onset, easy tritration, minimal side effects, without neurologic interference. Intraoperative complications include agitation, seizures, cerebral edema, nausea, vomiting, respiratory depression and hemodynamic changes.
The aim of this study is to revise our experience in anesthetic management of awake craniotomy and its implications.
Materials and Methods: We retrospectively reviewed awake craniotomy cases in the last 3 years, and retrieved data concerning type of procedure, time the patient remained awake, anesthetic status when opening duramater, drug consumption, discharge day and ASA classification. Statistical analysis was carried out using the chi-square test.
Results and Discussion: 17 craniotomies were performed in 16 patients. 56% female, 44% male. Average age was 41,6. ASA classification was I in18,75%, II in 62,5%and III 18,75%. Pre-operative diagnosis was: Oligodendroglioma n=9, Astrocytoma n=3, Glioblastoma n=3, Gliosarcoma n=1 and PNET n=1. Functional localization was: motor n=3 (17,65%), speech n=11 (64,7%), both n=3 (17,65%). 11,76% remained awake through the entire procedure and 23,53% over 4h. Dura mater was opened with the patient awake in 13 patients (76,47%) - group A and with the patient under general anesthesia in 4 (23,53%) - group B. Average mannitol use in group A was 37,5g and 12,5g in group B ($p < 0,05$). 50% patients in group A and 25% in group B required labetalol ($p > 0,05$). Average ondasetron use in group A was 7,6mg and in group B was 4mg ($p < 0,05$).
Patients on group A were discharged on average on day 9 and in group B on day 7,5 ($p < 0.05$). ASA 1 patients were discharged on day 7,7, ASA 2 on day 7,9 and ASA3 on day 8,0. In our case series, surgical procedures occurred without major complications. When duramater was opened in a anesthetized patient no osmotic agent was required and less ondasetron was necessary. Also, in these patients discharge day (which was not associated with ASA classification) was earlier.
Conclusion(s): Awake cranial surgery is appealing and has known advantages; however we should be aware of its anesthetic implications. Further studies with larger population and follow up should be conducted to establish the most adequate approach.

6AP6-8

Anaesthesia for awake craniotomy - Croatian single center experience

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Background: Awake craniotomy is a surgical technique that allows optimal tumor resection in eloquent brain areas, using real-time patient feedback. There is no consensus about the best anaesthetic procedure; monitored anaesthesia care (MAC) is one of established protocol.
Clinical case-series: Since recent implementation (2013), we've performed awake craniotomy in five patients (age 43-64 yrs; 2M, 3F). All of them were ASA II and have brain tumor in motor area. Patient were carefully selected by neurosurgeons, anaesthesiologist, neurologist and psychologist. According to MAC, patients were sedated and remained to breath spontaneously during the procedure (1). They recived premedication - midazolam and anticonvulsant. Routine monitoring in the OR included ECG, invasive and non- invasive BP, SpO_2, RR, capnography, bispectral index and urinary output. We used target controlled infusion pumps for fine titration of remifentanil (C_e 0.5-3 ng/ml) and propofol (C_e 0.5-2 mcg/ml).For local infiltration at the site of pin insertion and skin incision mixture of bupivacaine 0.5% and lidocaine 2% with adrenalin 1:200.000 was used. Patients were respiratory and hemodynamic stabile during the procedure and cooperative for motor and language testing.
Discussion: Modern anaesthetic approach in awake craniotomy is moving toward awake-awake-awake technique (2). We have chosen MAC as a technique that stands in between asleep-awake-asleep and awake-awake-awake technique because it is most suitable for our clinical practice. Our results are in concordance with more experienced centers: combination of local infiltration and MAC ensures patient satisfaction (as evaluated by psychologist) and stability with optimal intraoperative monitoring and working conditions for neurosurgeons.
References:
1. Sacko O, Lauwers-Cances V, Brauge D, Sesay M, Brenner A, Roux FE. Awake craniotomy vs surgery under general anesthesia for resection of supratentorial lesions. Neurosurgery 2011;68:1192-9.
2. Hansen E, Seemann M, Zech N, Doenitz C, Luerding R, Brawanski A. Awake craniotomy without any sedation: the awake-awake-awake technique. Acta Neurochir (Wien) 2013;155:1417-24.
Learning points: With attention focused on patient selection, preoperative planning and multidisciplinary tasking, authors were able to successfully introduce an awake craniotomy in Croatia with satisfying results, including excellent patient tolerance, low anaesthetic complications, short surgical time and good patient outcome.

Cardiac, Thoracic and Vascular Anaesthesiology

7AP1-1

In use stability of levosimendan under different conditions

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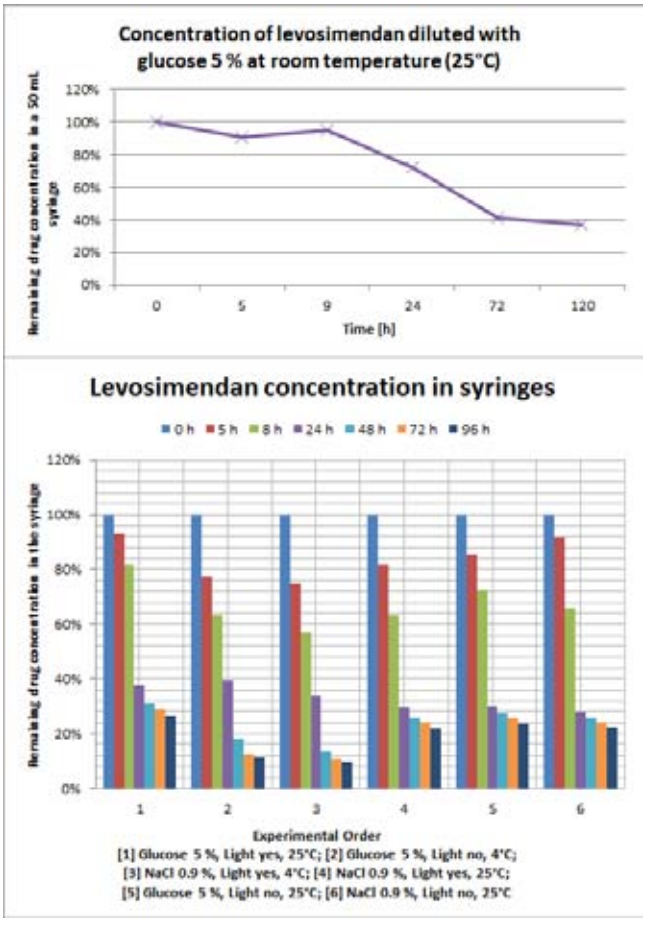
Background and Goal of Study: According to numerous publications in the literature,(1) adsorption of drugs to syringes and precipitation can be significant problems. We investigated the stability of levosimendan in a clinical setting in commonly used 50 mL syringes.
Materials and Methods: Levosimendan was obtained commercially, diluted with glucose 5 % in an Original-Perfusor® Syringe 50 mL (B. Braun Austria GmbH), labelled and stored at room temperature (25°C). Aliquots (500 µL) were taken 0, 5, 9, 24, 72, and 120 hours after preparation and analysed with high performance liquid chromatography with ultraviolet detection.
Subsequently, the effects of light, temperature, and type of solvent on adsorption and precipitation of levosimendan were investigated. For these experiments, six aliquots of an ampoule (12.5 mg/5 mL) were diluted with five millilitres of the respective solvent in 50 mL syringes (final concentration 0.25 mg/mL) and analysed after 0, 5, 8, 24, 48, 72, and 96 hours.
Results and Discussion: The initial drug concentration decreased to 72% and 37% after 24 and 120 hours, respectively (Figure 1 upper part). While variation of the solvent or exposure to light did not affect the decrease of levosimendan concentration over time, a reduction of the temperature to 4°C augmented the decline of the levosimendan concentration down to 10 % after 96 hours (Figure 1 lower part).
A split of an ampoule of levosimendan in a second experiment in general confirmed the results above, but resulted in a substantially lower remaining drug concentration. This might be explained by a larger relative surface of the syringe.



[Figure 1]

Conclusions: A freshly prepared syringe of levosimendan (0.25 mg/mL), which has not been used for 24 hours, should be discarded (as recommended by the manufacturer at lower concentrations) since the actual drug concentration may be substantially lower than the initial concentration. Storage at 4°C amplifies the precipitation process and thereby decreases drug concentration in the syringe.
Reference: 1. Trissel LA, Xu QA, Baker M. Am J Health Syst Pharm 2006; 63:2379-82.

7AP1-2

Assessment of right ventricular function using Navigator®

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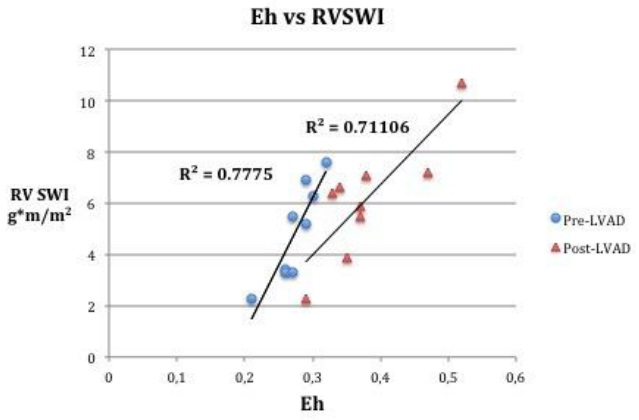
Background and Goal of Study: Right ventricular failure (RVF) complicates 30% of left ventricular assist device (LVAD) implantation cases and contributes to increased postoperative morbidity and mortality. Right ventricular Stroke Work Index (RV SWI) has been used to predict and to evaluate right ventricular dysfunction in LVAD patients, but it needs to be calculated. The Navigator software (Applied Physiology, Sydney, Australia) provides a continuous perioperative estimation for heart performance Eh.
The aim of this study was to evaluate whether Eh can be used to evaluate right ventricular performance in LVAD patients.
Materials and Methods: After ethical approval and informed consent 10 LVAD patients were included. In addition to standard ASA monitoring, a PAC was introduced for the measurement of cardiac output (CO) and calculation of RVSWI. Navigator was used to determine mean systemic filling pressure (Pms) and heart performance (Eh). Pms estimation is based on the equation : Pms= 0.96(CVP) + 0.04(MAP) + c(CO) where c has the dimensions of resistance and is a function of the patient's height, weight and age. Global cardiac pumping efficiency Eh was calculated as Eh = (Pms-CVP/Pms). RV SWI and Eh data were collected after induction of anaesthesia (pre-LVAD) and at the end of surgery (post-LVAD). Pearson correlation test was calculated to assess the relation between RV SWI and Eh. A Bland-Altman analysis was not considered valid because both parameters are measured in different units.
Results and Discussion: RV SWI increased from 4.91 ± 1.77 to 6.18 ± 2.19 g*m/m² after LVAD implantation, while Eh increased from 0.27 ± 0.03 to 0.38 ± 0.07. Correlation between both parameters was 0.89 before and 0.84 after implantation (Figure).



[Correlation between Eh and RV SWI]

Conclusion(s): Navigator can be used for the continuous evaluation of RV function in LVAD patients.
Reference:
1. Parkin and Leaning. Therapeutic control of the circulation. J Clin Monit Comput (2008) vol. 22 (6) pp. 391-400

7AP1-3

Neopterin predicts cardiac dysfunction following cardiac surgery

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Background and Goal of Study: Inflammation and oxidative stress after ischaemia are thought to be important for the development of cardiac dysfunction following cardiac surgery. Our main aim was to investigate whether the inflammatory biomarkers C-reactive protein (CRP), lactoferrin, neopterin and the terminal complement complex (TCC) were associated with cardiac dysfunction following cardiac surgery. Another aim was to assess whether the biomarkers could improve prediction of postoperative cardiac dysfunction compared with clinical variables only.
Materials and Methods: Blood samples and clinical data on 1018 consecutive patients undergoing cardiac surgery from 01.04.08 to 19.04.10 at St. Olavs University Hospital, Trondheim, Norway, were collected prospectively. The end-point was postoperative cardiac dysfunction, defined as the need for more than one inotropic agent or an intra-aortic balloon pump postoperatively. CRP, lactoferrin, neopterin and TCC were analysed in plasma, and we used logistic regression to evaluate the association of the biomarkers with cardiac dysfunction. We adjusted for the following clinical variables previously associated with the end-point: urgent operation, operation type, previous cardiac surgery, chronic cardiac insufficiency, pulmonary hypertension, previous myocardial infarction and preoperative haemoglobin. The likelihood ratio test, the integrated discrimination improvement (IDI) and receiver operating characteristic (ROC) curves were used to assess whether the biomarkers could improve prediction of postoperative cardiac dysfunction compared with clinical variables alone.
Results and Discussion: Neopterin was the only biomarker associated with postoperative cardiac dysfunction (odds ratio 2.73, 95% confidence interval 1.65 - 4.51) after adjustment for clinical variables. Compared with clinical variables alone neopterin improved risk prediction of cardiac dysfunction following heart surgery according to the likelihood ratio test ($p<0.0001$) and the IDI ($p = 0.02$), especially for patients with intermediate risks.
Conclusions: Neopterin was associated with cardiac dysfunction following cardiac surgery, and improved the accuracy of risk prediction of postoperative cardiac dysfunction. At present we do not suggest that neopterin should be measured routinely before heart surgery, but our findings support the role of oxidative stress and inflammation in development of cardiac dysfunction following heart surgery.

7AP1-4

Impact of increments of propofol-dosage on left ventricular systolic function during propofol-remifentanil anesthesia for cardiac surgery: a preliminary report

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Background and Goal of Study: We assumed that intraoperative peak systolic velocity of tissue Doppler imaging (TDI) of the lateral annulus (S') may be useful for determining propofol's dose-related impact on left ventricular (LV) systolic function during cardiac surgery.
Materials and Methods: In cardiac surgery (n=11) with LV-EF< 50% and S'>8.6 cm/s in preoperative TTE, following data were determined after the 10-min exposure to target-concentration of TCI-propofol at 1, 2, and 3 μg/ml (effect-site; T1, T2, and T3, respectively) with remifentnail 1 mcg/kg/min by using the recorded digital images as off-line analyses: peak TDI lateral mitral annular velocities in systole, early filling, and atrial contraction (S', e', and a'); peak mitral inflow Doppler velocities in early filling (E) and atrial contraction (A); E/A ratio; and deceleration time of early filling velocity (DT); and LV-EF. BIS, HR, BP, PAP, CVP, CI, SVR and SvO2 were also determined. BP was maintained within 80-120% of pre-induction values by adjusting phenylephrine-infusion rate. Patients with inability to maintain BIS< 60 at T1; inability to maintain BP 80-120% of the pre-induction value; and inability to achieve proper alignment for measuring appropriate S' during the study period were excluded. RM ANOVA or Friedman RM ANOVA on ranks with multiple pairwise comparisons were performed.
Results and Discussion: S' at T1, T2 and T3 significantly reduced (T1 vs. T2 and T1 vs. T3 were all P<0.001) and phenylephrine-infusion rate and BIS-value at T3 were significantly greater than those at T1 (P<0.05), while a', e', E, A, DT, LV-EF, BP and SVR at T1, T2 and T3 were not significantly changed (Table).
Conclusion(s): Increment of propofol-dosage within its dosage providing sufficient depth of hypnosis produces significant declines in systolic LV dysfunction in propofol-remifentanil anesthesia for patients undergoing cardiac surgery. Efforts for tittering propofol's dosage may be beneficial in avoiding propofol-induced decline of systolic function especially for patients with reduced LV function.
References: Yang et al. J Am Soc Echocardiogr 2013; 26: 727-35.

	T1	T2	T3	*P* value
S' (cm/s)	13.3 ± 3.8	11.4 ± 4.1*	10.7 ± 3.8*	<0.001
e' (cm/s)	11.6 ± 1.7	11.6 ± 2.7	11.1 ± 1.4	0.462
a' (cm/s)	12 (5-16)	10 (8-16)	13 (7-15)	0.148
E (cm/s)	58.8±11.4	55.8±13.7	55.9 ± 12.5	0.399
A (cm/s)	50.5 ± 24.8	48.0 ± 21.5	49.8 ± 25.5	0.782
DT (msec)	150 ± 53	149 ± 42	160 ± 49	0.732
LV-EF (%)	63 ± 10	61 ± 10	60 ± 10	0.370
LV-EDV (ml)	79 ± 26	76 ± 25	69 ± 19	0.089
LV-ESV (ml)	30 (22-34)	30 (20-30)	23 (20-34)	0.406
Phenylephrine (μg/kg/min)	0.10(0.10-0.28)	0.20(0.15-0.38)	0.30 (0.20-0.45)*	<0.001
BIS	47 (42 – 58)	39 (37-50)	35 (30– 41)*	0.002
mean BP (mmHg)	78 (78 – 87)	79 (75 – 90)	80 (72 – 90)	0.931
mean PAP (mmHg)	17 ± 3	17 ± 4	17 ± 4	0.691
CVP (mmHg)	7 (5 – 8)	6 (6 – 7)	7 (5 – 8)	0.401
HR (beats/min)	67 ± 3	67 ± 14	68 ± 12	0.873
SvO_2 (%)	81 (76-82)	80 (75-83)	80 (75-84)	0.590
CI (L/min/m^2)	2.6 (2.4-2.9)	2.5 (2.3-2.8)	2.3 (2.1-2.5)	0.139
SVRI (dyn•sec/cm^{-5})	912 (847-1058)	856(628-1049)	1048 (971-1420)	0.307

Vaues are mean ± SD or median (25-75%), as appropriate. LV-EF: left ventricle ejection fraction; DT: Decelertion time; EDV: enddiastolic volume; ESV: end-systolic volume
*: *P*<0.05 vs T1; †: *P*<0.05 vs T2

[Table. Changes in echocardiographic data and intraoperative monitoring variables]

7AP1-5

Anaesthetic management of a patient with a left ventricular assist device (VAD) for noncardiac surgery

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Background: Heart failure is one of the most prevalent, costly and lethal diseases in current clinical practice. Mechanical cardiac support devices could be used either as bridge to heart transplantation, as a bridge to recovery or as final therapy.
Perioperative management of VAD supported patients for non cardiac surgery is very important for the anaesthesiologist. The most important goals include: patient VAD history, knowledge about VAD, adequate intraoperative monitoring, management of fluids to avoid hypovolemia and special anticoagulation management.
Case report: A 36 year old patient diagnosed with dilated cardiomyopathy with 30% ejection fraction, severe pulmonary hypertension and an implantable cardioverterdesfibrillator (ICD). He was treated with a VAD as bridge to heart transplantation, when he started suffering abdominal pain, fever and leucocytosis. He was diagnosed with acute appendicitis. His blood showed an altered coagulation with an INR of 2.85, prothombin activity of 30%, hemoglobin 13gr/dl. He has been treated with acenocumarol and two different antiplatelet therapies. General anaesthesia was chosen and the patient was monitored with invasive blood pressure and BIS. 4 fresh frozen plasma units and 1 platelet pool were transfused.
Discussion:
- We recommend invasive blood pressure monitoring for all patients undergoing general anaesthesia but this depends on the type of blood flow generated by VAD.

- ICDs should be deactivated because of the risk associated with interference with electro cautery. External defibrillations pads are necessary.
- Antibiotic dosages should be adjusted to renal and hepatic function. The most usual microrganism were *Stap aureus* and *Ps aeruginosa.*
- For elective procedures, acenocumarol or warfarina must be replace by heparin. In emergent cases, fresh frozen plasma may be necessary. Full reversal of anticoagulation should be avoided.
- The most important issue is avoiding hypovolemia because it can cause inadequate VAD output with resulting in low cardiac output. Echocardiography is useful for monitoring right ventricular function.

References:

1. Management of Patients with implanted ventricular assist devices for noncardiac surgery: a clinical review. Semin Cardiothorac Vasc Anesth 2014 18(1) 57-70
2. Perioperative management of patients with left ventriular assist devices undergoing noncardiac surgery. J Cardiothorac Vasc Anesth 2013 Aug: 27(4) 752-9

7AP1-6

Goal directed therapy for coronary surgery on the beating heart

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Background and Goal of Study: Goal Directed Therapy (GDT) is the method that could optimize the oxygen delivery to the tissues tuning the cardiac output, mixed venous saturation as well. The objective of the study was to compare GDT for coronary surgery on the beating heart.
Materials and Methods: This is the observational, retrospective study including 60 patients. The coronary surgery on the beating heart (3 coronary shunts to every patient) were performed. The patients were assigned to 2 groups - GDT-group (n=30) and NoGDT-group (n=30).
The goals for GDT-group were SvjO2>70%, lactate level <2 mmol/l, hourly dieresis >1 ml/kg/h and MAP>70 mm Hg. All the operations were performed under the ventilator induction and maintenance anesthesia using sevoflurane. For the intraoperative infusions we used the Lactated Ringer's solution and didn't use any colloids in both groups.
Results and Discussion: The two groups were not different according to the age (58,6±5,9 vs 55,1±5,2 years), total operation time (3,6±0,46 vs 3,65±0,41 h) and EUROSCORE index (1,33±0,7 vs 1,1±0,3 %). The intraoperative volume of the infusion in the GDT-group was less (1688±230 ml vs 1990±546 ml, p<0,05). Intraoperative blood loss didn't depend on the method of the infusion therapy (480±133 ml vs 521±135 ml in GDT-group and NoGDT-group).
There were no difference in the volume of exudation for the first 24 hours postoperativly (455±112 ml vs 423±124 ml in GDT-group and NoGDT-group)/ There were 2 episods of atrial flutter in GDT-group and 2 episodes of atrial flatter in NoGDT-group). There were no difference in the time of postoperative ventilation (2,82 ± 1,01 vs 2,61±1,3 h).
Conclusion(s):
1. Goal directed infusion therapy is effective and safe for the coronary surgery on the beating heart.
2. Introperative blood loss doesn't depend on the method of crystalloid infusion usage.

7AP1-7

Microvascular reactivity and clinical outcomes in cardiac surgery

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Background and Goal of Study: Microvascular reactivity is decreased in septic shock patients; this is associated with worse clinical outcomes. The objective of the present study was to investigate microvascular reactivity in cardiac surgery patients and to assess any association with clinical outcomes.
Materials and Methods: 254 adult patients undergoing cardiac and thoracic aortic surgeries from January 2013 through May 2014 were recruited for the study. We performed a vascular occlusion test (VOT), as a measure of microvascular reactivity. VOT was performed three times per patient: prior to the induction of anesthesia, at the end of surgery, and at postoperative day 1.
Results and Discussion: The primary endpoint was a composite of major adverse complications, including death, myocardial infarction, arrhythmia, stroke, coma, acute kidney injury, respiratory failure, cardiogenic shock, gastrointestinal complications, and multiorgan failure. The VOT recovery slope decreased at the end of surgery (from 4.5±1.5 to 3.2±1.5, $p<0.001$) and recovered on postoperative day 1 (3.6±1.6, $p<0.001$). The VOT recovery slope at postoperative day 1 was significantly lower in patients with composite complications than those without (3.2±1.6 vs. 4.0±1.5 %/s, $p=0.001$), although conventional hemodynamic values, such as cardiac output and blood pressure, did not differ between the groups. On multivariable regression and linear analyses, low VOT recovery slope at postoperative day 1 was associated with increases of composite complications ($p=0.028$) and length of hospital stays ($p=0.010$).
Conclusion(s): Microvascular reactivity, assessed by VOT recovery slope, decreased during cardiac surgery. This decreased microvascular reactivity largely recovered on postoperative day 1 in the patients without composite complications, but this restoration was attenuated in patients with composite complications. Postoperative restoration of microvascular reactivity is related to clinical outcomes in cardiac surgery patients.

7AP1-8

Glucose-insulin-potassium reduces the incidence of major complications in patients undergoing open cardiac surgery

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Background and Goal of Study: Cardiac surgery with cardiopulmonary bypass (CPB) may result in myocardial injury associated with major adverse cardiac events (MACE) and non-cardiac complications. Besides the classic cardioplegic solution, pretreatment with intravenous glucose-insulin-potassium (GIK) is a potentially useful adjunct to myocardial protection. This study was designed to assess the effects of GIK infusion in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB) and aortic cross-clamping.
Materials and Methods: In this single-center, double-blind, randomised, placebo-controlled trial, patients undergoing valve replacement or coronary bypass surgery with evidence of left ventricular hypertrophy or with a Bernstein-Parsonnet score > 4 were randomly assigned to GIK or placebo. After anaesthesia induction and before the start of CPB, a 60 ml solution containing either 2 g of glucose, 10 UI of regular insulin and 40 mEq of potassium (GIK group) or normal saline (placebo group) was administered over 45-60 min. The primary outcome was incidence of MACE including low cardiac output syndrome, myocardial infarction and arrhythmias requiring treatment. Secondary endpoints were requirement for inotropic support, peak serum troponin-I concentration, incidence of non-cardiac complications, length of stay (LOS), and in-hospital mortality.
Results: Over a 6-year period, 225 patients were randomised to GIK solution (n=111) or placebo (n=114). Patient characteristics were similar in both groups, except for a lower preoperative left ventricular ejection fraction in the GIK group (43+9% vs. 47+10%, p=0.005). Pretreatment with GIK was associated with reduced incidence of MACE (52 patients [46.8%] vs. 100 patients [87.7%], p< 0.001), lower requirement for inotropic support during weaning from CPB (28.8% vs. 64.0%, p< 0.001) and in the intensive care unit (21.6% vs. 59.6%, p< 0.001), reduced peak serum troponin-I concentration (median 2.9 ng/L, [interquartile range 1.6 - 6.2] vs. 4.3 ng/L [2.4 - 8.4], p=0.038), reduced incidence of respiratory complications (42.3% vs. 70.2%, p< 0.001), reduced LOS (median 14 days [IQR 11 - 18] vs. 16 days [13-23], p=0.014), and lower in-hospital mortality (0.0% vs. 8.7%, p=0.002).
Conclusion: In patients undergoing cardiac surgery with CPB, addition of GIK solution to standard myocardial protective treatments results in improved clinical outcome.

7AP1-9

Echocardiographic assessment of the hemodynamic influence of fasting in healthy volunteers

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Background and Goal of Study: In the past, preoperative fasting was considered an important cause of fluid depletion, capable of contributing to increased hemodynamic instability during surgery should prompt fluid therapy not be instituted. More recently, however, a growing number of studies pointed to detrimental effects from a liberal approach to fluid therapy in the perioperative period. Considering the variation in results from different studies, doubt remains as to the true hemodynamic effects of preoperative fasting.
Materials and Methods: We designed and implemented and observational, analytic, longitudinal, prospective study where 31 ASA 1 and ASA 2 volunteers were submitted to an echocardiographic evaluation both before and after a fasting period of at least 6 hours, simulating a normal preoperative fasting. Data were collected regarding static and dynamic preload variables, and later analyzed to ascertain the degree of change produced by fasting.
Results and Discussion: We have found considerable variation in the behavior of different static preload indices with fasting, which provided conflicting results when compared to one another. Dynamic preload variables, on the other hand, presented a much more consistent evolution, showing no statistically significant change after a fasting period, even with significantly longer fasting durations than requested. Also, there was no evidence of increased responsiveness to a fluid challenge after fasting.
Aortic VTI variation with the passive leg raise maneuvre was found to be the most robust variable to ascertain fluid responsiveness in this setting.
Conclusion(s): Fasting was not found to cause a statistically significant change in preload indices nor on the individual's position in the Frank-Starling curve, which suggests an absence of hemodynamically significant effects consequent to it. Further studies should evaluate whether this relation holds true during anesthesia, after blunting of compensatory cardiovascular responses.
Acknowledgements: We would like to thank all the volunteers who participated in the study and all the members of the Echocardiography Laboratory of Hospital de Santa Cruz, Portugal, for their help fulfilling this investigation project.

7AP1-10

Influence of nutritional status on energy reserves in the rat heart

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Background and Goal of Study: Heart function is strongly dependent on energy derived from ATP generated during oxidative phosphorylation in mitochondria. The most important energy substrates in the heart are fatty acids and glucose. Because the heart has a rapid energy turnover and low energy storage capacity, myocardial functioning relies on energy substrate levels in plasma (1). A previous study showed that preoperative feeding preserves heart function (2).
The aim of this study was to determine the role of the nutritional status on energy reserves in the rat heart.
Materials and Methods: After University Animal Care Committee approval, female Wistar rats were randomly divided into two groups: one had free access to food; the other was fasted for 16 hours (n = 5 in each group). Animals were anaesthetised, a thoraco-laparotomy was performed and heparin administered via the inferior vena cava. The heart was removed. The proportion of glycogen and energy charge (EC= [ATP]+1:2[ADP]/ [ATP]+[ADP]+[AMP]) were determined in tissue samples. Mean ± SD. Student's *t*-test.
Results and Discussion: Glycogen level and EC were higher in hearts of fed rats when compared to fasting animals (Table 1). Results from the present experiment show that energy stores in the rat heart are higher after preoperative nutrition in contrast to fasting animals. A recent study indicates that feeding is protective against rat myocardial infarction (3). It remains to be established whether pre- or persurgical feeding could improve heart function.

Variable	Fasting	Fed	p-Value
Glycogen (%)	22.36 ± 0.08	34.59 ± 0.15	0.013
EC	0.15 ± 0.07	0.20 ± 0.07	0.041

[Table 1]

Conclusion(s): Nutritional status influences energy stores in rat heart.
References:
1. Opie LH. Cardiovasc Res 1992;26:721-33;
2. van Hoorn et al. Nutrition 2005;21:859-66;
3. Liepinsh et al. Metabolism 2014;63:127-36

7AP2-1

High frequency jet ventilation vs conventional ventilation for atrial ablation and appendage closure

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Background and Goal of Study: We have been performing for more than three years the process of atrial ablation and atrial appendage closure under general anesthesia. Due to the thoracic movements provoked by mechanical ventilation and his influence in the procedure we decide to perform it with High Frequency Jet Ventilation (HFJV) instead of conventional mechanical ventilation (CMV).
We have studied: Duration of the procedure, satisfaction of the cardiologist and recurrence of atrial fibrillation in the first year.
Materials and Methods: We carried out a retrospective observational study of patients who underwent atrial ablation and atrial appendage closure since January 1st 2011 to October 1st 2014.
Patients were assigned to the group depending on the type of mechanical ventilation they had during the procedure: Group A: CMV (VT 0.6 ml/kg; RR for Et CO2 of 30-35 cm H2O; FiO2 50%; inspiration-expiration I:E ratio 1:2); Group B: HFJV (FiO2 60%; PEEP 0.4 bar; I:E ratio 1:3; Flow 500l/min; revolutions: 1200).
Results and Discussion: We allocate 26 patients in group A and 8 in group B. Both groups are homogeneous in ASA 3-4, age, sex and body mass index. The average duration time in group A was 273 minutes while in groups B the duration was 187 minutes.
After the procedure, cardiologist fill up a satisfaction form (E. Cases Viedma et al/Arch Bronconemol. 2010 modified) and we found a worst average valuation (7.3) in Group A than in group B (8.8).
Finally, we also notice a decrease in the incidence of recurrences of atrial fibrillation in the first year in group B (12.5%) instead of 23% in Group A[1].
The reduction of movement in the left atrium, the intrathoracic pressure, pulmonary vein blood flow velocity, and posterior LA motility decreases the duration of the procedure and the incidence of recurrences; so we get a greater satisfaction of the cardiologist[2].
Conclusions: HFJV decreased the duration of the procedure; a greater satisfaction of the cardiologist and a less incidence of recurrence of atrial fibrillation in the first year.
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2. N.Elkassabany et al/Anesthetic Management of Patients Undergoing pulmonary vein isolation for treatment of atrial fibrillation using high-frecuency jet ventilation. Journal of Cardiovascular anesthesia; 2012 June; vol 26, pp 433-438.

7AP2-2

The immediate effect of transcatheter aortic valve implantation on left ventricular diastolic function assessed by transesophageal echocardiography

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Background and Goal of Study: Transcatheter Aortic Valve Implantation (TAVI) for patients with aortic stenosis is expected to the post-procedural rapid reduction in left ventricular after load and consequently improvement of

cardiac function. However, the effect of TAVI on perioperative left ventricular diastolic function (LVDF) has not drawn much attention. This retrospective observational study was aimed to investigate the intraoperative change of LVDF using transesophageal echocardiography (TEE) in TAVI patients.
Materials and Methods: 14 patients who underwent TAVI procedure using a transfemoral approach under general anaesthesia were recruited in this study. To evaluate LVDF by TEE, the early diastolic mitral annular velocity (e ') and E/e' ; the ratio along with mitral peak velocity of the early rapid filling (E) calculated by pulsed Doppler imaging, were examined just after anaesthetic induction and successful deployment of prosthetic valve. These datasets were analyzed using paired t-test. P value less than 0.05 was defined as significant difference.
Results: The e' before and after prosthetic valve deployment were 4.5±0.7 cm/s (mean±SD) and 4.7±0.8 cm/s, respectively. The E/e' before and after prosthetic valve deployment were 21.8±7.3 (mean±SD), and 22.7±7.5,respectively. These two LVDF results did not change during the operation.
Conclusion and Discussion: Our results indicated that prosthetic valve deployment by TAVI procedure did not produce the improvement of LVDF at intraoperative period. Even after a valve deployment was success, since LVDF does not improve immediately, the continuation of careful fluids management is still required.

7AP2-3

Preoperative volume optimization may improve cerebral oxygen saturation ($SctO_2$) in patients with transcatheter aortic valve implantation (TAVI)

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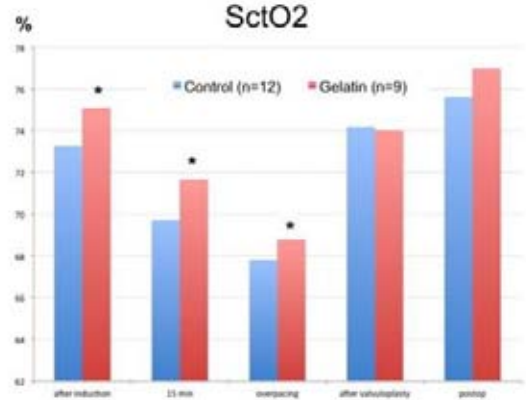
Introduction: Patients with severe aortic stenosis undergoing TAVI suffer from substantial hemodynamic challenges caused by rapid right ventricular pacing during ballon valvuloplasty, including a dangerous drop of stroke volume, blood pressure, cardiac Index (CI) and $SctO_2$ (1). However, the optimal anesthesiologic management and level of monitoring is not yet fully established. Therefore, we investigated if a standardized preoperative volume optimization may attenuate the potentially harmful hemodynamic side effects of this procedure.
Methods: In this retrospective observational study, 9 patients undergoing TAVI were equipped with stroke volume variation (SVV) monitoring (Vigileo™) and received gelatine infusions up to 20 ml/kg prior to induction to maintain SVV <12%. Bilateral $SctO_2$ was measured (ForeSight™) as well as CI and basic hemodynamic and respiratory parameters. Data were compared to patients without SVV monitoring and volume optimization (n=12) and analyzed by ANOVA.
Results: Demographics and risk profile of both groups were comparable. Patients of the gelatine group had consistently higher $SctO_2$ values until completion of valvuloplasty (graph 1; *P<0.01).
Moreover, CI was higher during most of the procedure, and the decrease induced by overpacing was markedly less pronounced (2.70 to 2.13 vs. 2.14 to 1.57 resp., P<0.05). Other hemodynamic and respiratory parameters were not different between the groups.



[Graph 1]

Conclusion: Patients with end-stage aortic stenosis scheduled for TAVI usually have a high incidence of cerebrovascular comorbidity, and even a transient decrease of perfusion pressure may cause severe cerebral or other damage. Our preliminary results suggest that standardized preoperative volume optimization in conjunction with continuous monitoring of cerebral oxygen saturation may provide more stable hemodynamic conditions and thus potentially a better postoperative outcome. Comprehensive studies are warranted to find the best anesthesiological strategy in these high-risk patients.
References: 1. Billings F.T. et al; Anesth Analg 2009;108:1453-62

7AP2-4

Left ventricular end diastolic pressure increases after prosthetic valve implantation in transcatheter aortic valve implantation procedure

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Background and Goal of Study: Transcatheter aortic valve implantation (TAVI) procedure for patients with aortic stenosis is expected to reduce left ventricular after load and following improvement of cardiac function. However, the effect of TAVI on perioperative diastolic function gets less attention. This retrospective observational study is aimed to investigate the intraoperative left ventricular end diastolic pressure (LVEDP) to assess the effect of TAVI on diastolic function.
Materials and Methods: 42 patients who underwent TAVI procedure using a transfemoral approach under general anaesthesia were recruited in this study. The patients with moderate or severe aortic regurgitation (AR) using preoperative transtharocic echocardiography and/or AR of Sellers classification grade 2 or more at post deployment period were excluded.
Intraoperative LVEDP measured using intracardiac catheter were collected retrospectively. Correlation between preoperative diastolic function and LVEDP change were calculated.
Statistical analysis were performed using paired t-test and regression analysis. P value less than 0.05 was defined as significant difference.
Results: The LVEDP just before prosthetic valve deployment were 18.5±5.0mmHg (mean±SD), and significantly increased to 25.1±7.2mmHg just after deployment (N=24, p< 0.01).
The regression analysis revealed no correlation between LVEDP change and the results of preoperative diastolic functions including E/e' and e' assessed by transthoracic echocardiography.
Conclusion(s): TAVI procedure induces significant increment of LVEDP just after prosthetic valve deployment regardless of preoperative diastolic function. Therefore, even after the success of valve implantation, careful monitoring is still needed to make the decision of the changes in dose of the inotropic drugs.

7AP2-5

The role of sedation in patients undergoing percutaneous atrial septal defect (ASD) closure

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Background and Goal of Study: During percutaneous atrial septal defect (ASD) closure, conscious sedation and analgesia is an effective method however, the airway control and hemodynamical stability at the desired level can be difficult to achieve. Our goal is to compare our experience of consious sedation and general anesthesia in patients undergoing ASD closure in the angiography unit.
Materials and Methods: A total of 49 adult patients were evaluated in a prospective observational study. During procedure all patients had monitoring of invasive arterial pressure, showing systolic, diastolic and mean arterial pressure, heart rate. Mean arterial pressure above 50 mmHg was targeted. During the procedure, intravenous midazolam at a dose of 0.01 mg/kg and propofol at a dose of 1 to 1.5 ml/kg was given. Transesophageal echocardiography (TEE) probe was placed under sedation with propofol. In all cases propofol infusion at a dose of 0.3-0.5 mg/kg/hour was started. If mean arterial pressure was recorded below 50 mmHg for more than five minutes, if cardiac rythm disturbances causing hemoynamical instability for more than five minutes in

spite of medical treatment was observed as well as signs of airway obtruction such as decreased pulse oximetry value below 90% and increased respiratory rate> 35/min for more than five minutes general anesthesia was performed. Patients were divided into two groups depending on continuance of sedo-analgesia (Group 1) or conversion to general anesthesia (Group 2). Time to achieve Aldrete recovery score above 9, adverse events and complications were recorded.
Results and Discussion: In comparison between 23 patients with sedo-analgesia (Group 1) and 26 patients with general anesthesia (Group 2), no diferences were observed regarding comparison of the mean arterial pressure, heart rate, and pulse oximetry values between groups (p>0.05). Regarding cardiovascular rythm related complications, twelve patients in Group 1 (46%) had various rythm disturbances including; atrial fibrillation, supraventricular or ventricular tachyarrythmias in comparison to 1 patient (4.3%) in Group 2 (p=0.02). Other adverse events were similar (p>0.05).
Conclusion(s): During consious sedation and analgesia for ASD closure in angiography unit, cardiovascular rythm related complications are the most observed adverse events and these cause conversion of sedo-analgesia anesthetic technique to general anesthesia to maintain the airway and hemodynamical stability.

7AP2-6

Can cerebral oxygen saturation (Foresight) predict early postoperative cognitive disfunction during single lung ventilation for esophageal surgery in left thoracotomy?

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Background and Goal of Study: Studies in cardiac surgery have shown that treating cerebral oxygen desaturation can improve postoperative cognitive disfunction. There is a growing evidence on the incidence of cerebral oxygen desaturation in non-cardiac surgery and on the similitude between cardiac surgery and lung surgery (in single lung ventilation) in the incidence of cerebral oxygen desaturation. The aim of this study was to evaluate the predictive role of oxygen desaturation on postoperative cognitive disfunction during esophageal surgery in single lung ventilation.
Materials and Methods: 90 patients undergoing single lung ventilation for distal esophageal surgery in left thoracotomy were enrolled after written informed consent and the adhesion the inclusion end exclusion criteria. Exclusion criteria: age < 18, ASA III, patients with cognitive disfunction. All were monitored with standard parameters for that surgery (iBP, HR, SpO2, BIS) and with the FORESIGHT cerebral oximiter for continuously brain oxygen saturation. The Mini-Mental State Exam (MMSE) was used as primary parameter for the evaluation of early postoperative cognitive disfunction a 3h and at 24h after operation. Data derived form intraoperative cerebral oximeter saturation in particular minimum absolute SctO2 value (average right and left side) were correlated with MMSE score in postoperative period.
Results and Discussion: SctO2 decreased to critical value of <65%, 60% and 55% in 40 pts (45%), 22 pts (25%) and 6 pts (7%). 27 pts (30%) presented a decrease of MMSE >2 a 3h after surgery and all of them presented SctO2 <60% while 2pts had a decrease of MMSE <2 at 24h and all of them present a SctO2 < 55%. There was also a correlation between time exposure to SctO2 <60% and postoperative cognitive disfunction.
Conclusion(s): The decrease of cerebral oxygen saturation <60% and the time spent at these cerebral saturation value during single lung ventilation for esophageal surgery correlates with the incidence of postoperative cognitive disfunction.
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7AP2-7

Depression and anxiety: identification of risk factors for postoperative cognitive dysfunction in cardiac surgery patients

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Background and Goal of Study: 5-80% of cardiac surgery patients have postoperative cognitive dysfunction (POCD). The study goal was to evaluate the role of depression and anxiety in POCD [1].
Materials and Methods: A retrospective study of 96 patients who underwent cardiac surgery in 2012-14. Cognitive function was evaluated with the Mini-Mental State Examination (MMSE), the Information-Memory-Concentration (IMC) tests and the Frontal Assessment Battery (FAB). Anxiety and depression were evaluated with the Hospital Anxiety and Depression Scale (HADS) and the Covy Anxiety Scale (CAS). The tests were performed prior to and 30 and 180 days after the surgery. The study was approved by the Institutional Review Board. The results were processed with SPSS 11 software. Student t-test, Friedman and Newman-Keuls tests were used for paired comparisons. Spearman correlation coefficient and Cramer's V were used for correlation analysis.
Results and Discussion: 61% of the patients were males. The patients' mean age was 49.8±9.7. Prior to the operation, the patients cognitive tests results were within normal limits. All the patients had anxiety: the mean HADS and CAS scores were 8.3±3.2 and 6.2±1.8, respectively. Depression was diagnosed in 44.2% (mean HADS score 6.8±2.5). 30 days after the surgery, we found a significant decrease in cognitive function (MMSE 26.1±6.8, p=0.03; IMCT 30.4±7.2, p=0.02; FAB 13.1±5.8, p=0.03) and in anxiety (mean CAS score 3.1±0.9, p=0.02), and an increase in depression (mean HADS score 8.6±2.7, p=0.04). 180 days after the surgery cognitive function was restored in 82.3% of the patients (MMSE 28.5±5.1, p=0.01; IMCT 34.3±5.2, p=0.02; FAB 14.3±3.8, p=0.03), anxiety and depression scores remained unchanged. The correlation analysis between depression and POCD (HADS and IMCT respectively) revealed the inverse correlation p=-0.387 (p=0.035) prior to surgery, no correlation 30 days after the surgery (p>0.05) and the inverse correlation 180 days after the surgery p=-0.593 (p=0.001). No correlation was found between FAB and HADS prior to and 30 days after the surgery, though the correlation 180 days after the surgery was inverse p=-0.485 (p=0.007), that demonstrates the negative impact of depression on cognitive functions.
Conclusion(s): Depressive disorders in cardiac surgery patients significantly increase the risk of POCD.
References: 1. Belov U. The neurocognitive and neuropsychological testing in cardiac surgery. J. Surgery. 2013;2:80-90

7AP2-8

Intraoperative cerebral oxygen saturation reduction may be related with delirium symptoms' development during the intensive care unit post-surgery staying after cardiac surgery

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Background and Goal of Study: Cerebral oximetry with the INVOS (IN Vivo Optical Spectroscopy) system provides the possibility of non-invasive, continuous measurement and assessment of regional cerebral oxygen saturation (rSO_2), which can improve patients' outcome. The aim of this study was to examine whether cerebral frontal cortex O_2 desaturation may be related with the development of delirium symptoms' and the incidence of cognitive function's decline after cardiac surgery.
Materials and Methods: A prospective, before and after, longitudinal study in II-IV ASA class patients scheduled for cardiac surgery and undergoing intravenous general anesthesia with remifentanil plus propofol was done. Clinical and surgical parameters, cardiopulmonary function, intraoperative cerebral oxygen saturation (rSO_2) and bispectral index were continuously recorded and corrected throughout the surgery. Standardized test measuring capacity of attention, language, verbal and visual memory, visual-spatial orientation, executive, psychomotor and motor capacity as well as independence in daily life and the perception of the patient of their psychological situation (by the

use of CAM ICU, WAIS III, Mini Mental Test, trail making test a/b y digit & symbol, WSM III list of words, digit span, Stroop test, STAIC, EPQ-R, Yesavage, QOLIE-31 and Barthel test) were used to assessed the cognitive function before and 7 days after surgery.
Results and Discussion: Patients (n=44, 77.3% male, aged 59.9±1.9 years old), scheduled to coronary (36.4%), aortic valve replacement (18.2%), mitral valve replacement (13.6%), coronary plus valve replacement (13.6%) and others (18.2%) surgery, on pump 98.4% were enrolled. A reduction of the rSO_2 higher than 10% at the end of the surgery compared with basal values was detected in a 46.5% of the patients. Reduction of rSO_2 higher than 10% at the end of the surgery was related with significantly higher values of delirium symptoms' development during the intensive care unit post-surgery staying (rSO_2 higher ≥10% 68.8 vs. rSO_2 higher < 10% 31.3%, p< 0.05). Patients with rSO_2 reduction higher than 10% also showed 7 days after surgery, a significant deficit (p< 0.05) at the Wechsler Memory Scale III list of words test (WSM III), mainly namely vocabulary remembering, and at the executive function L&N test.
Conclusion: Reduction of rSO_2 during cardiac surgery was related with delirium symptoms' development during the intensive care unit post-surgery staying.

7AP2-9

The comparison of total intravenous anesthesia (TIVA) and TIVA combined with inhalational anesthesia on incidence of postoperative delirium after coronary artery bypass graft (CABG) surgery

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Background and Goal of Study: The aim is to investigate the effects of total intravenous anesthesia (TIVA) and TIVA combined with inhalational anesthesia on the incidence of delirium in elderly patients undergoing coronary artery bypass graft (CABG) surgery with cardiopulmonary bypass (CPB).
Materials and Methods: In a prospective randomized study, after evaluation of 176 patients, 110 patients at age greater than 65 were divided into Group A; receiving only TIVA with propofol and fentanyl(n=57) and Group B; receiving TIVA combined with inhalational anesthesia of sevoflurane (n=54). Before and after surgery, diagnosis of delirium was determined using Mini Mental Test (MMT), Confusion Assessment Method and writing test.
Results and Discussion: The rate of overall delirium incidence was 8.1% (9/110). POD was seen in 5 cases in Group A and 4 cases in Group B. The mean age in patients that were diagnosed with POD was 69.3±3.9, showing and older age in comparison to the rest of the patients (p=0.001). The average time until the onset of delirium was 2.6±0.9 days and mean duration of delirium was 7.3±3.8 days however, there were no significant differences for comparison of these parameters in Group A and B (p>0.05). The risk factors for the development of delirium include; old age, previous chronic obstructive pulmonary disease, male sex, single status and over smoking (p< 0.001).
Conclusion(s): In the present study, old patients showed POD within the first 3 days after CABG surgery. In terms of development of delirium, no difference was detected between TIVA or TIVA method with inhalational anesthesia of sevoflurane after CABG with CPB.

7AP2-10

Is the percentage of burst suppression ratio as detected by NeuroSENSE® cerebral monitor a predictive factor of delirium after cardiac surgery?

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Background and Goal of Study: Delirium implicates an acute change in mental status and alterations in the level of consciousness that is reported in 10 to 40% of cardiothoracic surgical patients. Studies in noncardiac patients have found a decrease in delirium with BIS-guided anaesthesia.In cardiac population this association is less clear[1].We evaluated if the percentage of Burst Suppression Ratio (BSR) as detected by NeuroSENSE®, an EEG based cerebral monitor, is predictive of postoperative delirium after cardiac surgery.
Materials and Methods: All adult patients were prospectively included after informed consent (NCT02006212). Nurses and physicians in charge of the patients were sensitized to search for signs and symptoms of hypoactive, hyperactive and mixed delirium during the entire postoperative period. Bilateral cerebral oximetry and NeuroSENSE®, a depth of anaesthesia monitor which processes EEG from 4 noninvasive electrodes placed on the forehead, were applied in each patient. BSR was defined as the percentage of intraoperative time during which suppressed frontal EEG was detected at both hemishperes. Cerebral oximetry recorded the Area Under the Curve (AUC) of 25% decline of oximetry values as compared to the preinduction values. A binary logistic regression analysis was conducted to predict delirium. The included predictive variables were: EuroSCOREII, Left and Right BSR, Left and Right AUC.
Results and Discussion: 200 patients were analysed. Delirium occurred in 37(19%) patients. Table 1 shows the perioperative data.

Male/Female	140/60
Age; years	67(56-75)
EuroSCORE II	1.7(0.87-2.91)
CPB time;minutes	102(79-138)
Right BSR;%	1.6(0-12)
Left BSR;%	1.8(0-12)
Right AUC;%	0(0-0)
Left AUC;%	0(0-0)

[Perioperative data]

Data are expressed as median (P25-P75). No factor was predictive of postoperative delirium. The Hosmer and Lemeshow test showed a chi-square stat of 7.156 with P=0.520.
Conclusion(s): Although no objective tests have been used, the incidence of delirium in our study is similar to the literature. Our very preliminary results do not support the hypothesis that intraoperative suppressed EEG is a predictive factor of delirium in cardiac surgery.
References: Whitlock EL, et al. Anesth Analg 2014;118:809-17

7AP2-11

Is the percentage of burst suppression ratio as detected by NeuroSENSE® cerebral monitor a predictive factor of postoperative cognitive dysfunction after cardiac surgery?

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a common problem after cardiac surgery. Conflicting results exist as whether depth of anaesthesia influences the incidence of POCD. We evaluated if the percentage of Burst Suppression Ratio (BSR) as detected by NeuroSENSE®,an EEG based cerebral monitor, is predictive of POCD up to 6 months after cardiac surgery.
Materials and Methods: All adult patients were prospectively included after informed consent (NCT02006212). A Mini Mental State Examination (MMSE) was performed preoperatively and at postoperative day 5. A questionnaire was realized at 3 and 6 months. Exclusion criteria were patients unable to perform a preoperative MMSE. POCD was defined as Z-score ≤ -2 based on preoperative and postoperative MMSE or if the patient reported any cognitive decline. BSR was defined as the percentage of intraoperative time during which suppressed frontal EEG was detected at both hemispheres. A bilateral cerebral Oximetry recorded the Area Under the Curve (AUC) of 25% decline of oximetry values as compared to the preinduction values . A binary logistic regression analysis was conducted to predict POCD. The included predictive variables were:age, EuroSCORE II, Left and Right BSR, Left and Right AUC, cardiopulmonary bypass (CPB) time and surgery on left sided cavities.
Results: 200 patients have been analysed. POCD occurred in 35 (18%) patients. Table 1 shows the perioperative data.

Male/Female	140/60
EuroSCORE II	1.7(0.87-2.91)
CPB time;minutes	102(79-138)
Right BSR;%	1.6(0-12)
Left BSR;%	1.8(0-12)
Right AUC;%	0(0-0)
Left AUC;%	0(0-0)
Preoperative MMSE	29(27-30)
Postoperative MMSE	28(25-29)

[Perioperative data]

Data are expressed as median (P25-P75).The EuroSCORE II was the only predictive factor of POCD with Odds Ratio:1.180 and 95% CI for Odds Ratio: 1.039-1.340, P=0.011. The Hosmer and Lemeshow test showed a chi-square statistic of 2.899 with P=0.689.
Conclusion(s): The preliminary results of this prospectve study do not support the hypothesis that intraoperative suppressed EEG, as detected by the depth of anaesthesia monitor NeuroSENSE®, predicts POCD after cardiac surgery. POCD could neither be predicted by intraoperative cerebral oximetry desaturation.

7AP2-12

Regional cerebral oxygenation measured by noninvasive absolute cerebral oxymetry (Fore-Sight technology) during MitraClip procedure

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Background and Goal of Study: Following European Conformity in 2008, percutaneous mitral valve repair with MitraClip system® (Abbott Lab., IL, USA) has entered clinical practice in Europe, and is a less invasive option for the treatment of patients with both functional and degenerative mitral regurgitation (MR≥ 3+). To date, there are no data on PubMed considering noninvasive cerebral oxymetry during the MitraClip procedure. In this study, we investigated if there are any changes during the MitraClip procedure in the regional cerebral oxygenation (rScO2), measured by noninvasive absolute cerebral oxymetry.
Materials and Methods: In this retrospective observational study, there were 7 patients with severe symptomatic MR (ASA-PS III /57%/ and IV, age 78±8 yrs, female 43%, weight 69±12 kg, height 170±12 cm, median EuroSCORE II 5,1, range 2,9-28) underwent transcatether mitral valve repair with MitraClip System in a period between December 2013 and December 2014 at our hospital. The procedures were performed under general anesthesia with the goal of early extubation. The Fore-Sight Absolute Tissue Oxymeter® (CASMED, CT, USA) was utilized throughout the procedure. Right (R rScO2) and left (L rScO2) hemispheric rScO2 was measured 10 min. before the induction of anesthesia, 5 min. and 15 min. after the induction of anesthesia, at 15 min. and 30 min. after the insertion of MitraClip (MCi), and 10 min. after the extubation of the patient. rScO2 levels of both hemispheres were averaged for analysis (Bi rScO2). We used the median (M) and range (minimal-maximal value) as summary measures of the R rScO2, L rScO2 and Bi rScO2 measurements before and after the implantation of MitraClip. The patients acted as their own control. Statistical test used was Wilcoxon Signed Rank test. A P< 0,05 was considered statistically significant.
Results and Discussion: Median and range of Bi rScO2 before induction of anesthesia were 64,5%, 51-80%, respectively. After the implatation of MitraClip, there was statistically significant increase in R rScO2 (before MCi: M 68,0%, range 50-77%, after MCi: M 74,0%, range 60-83,5%, P=0,016), L rScO2 (before MCi: M 65,0%, range 51-80,0%, after MCi: M 73,0%, range 63-86,5%, P=0,014) and Bi rScO2 (before MCi: M 65,0%, range 50-80%, after MCi: M 73,5%, range 60-87,0%, P< 0,001).
Conclusion: The study suggests that after the implatation of MitraClip, there is a significantly improvement of rScO2.

7AP3-1

Preoperative cardiovascular medication and postoperative mortality from coronary artery bypass graft surgery

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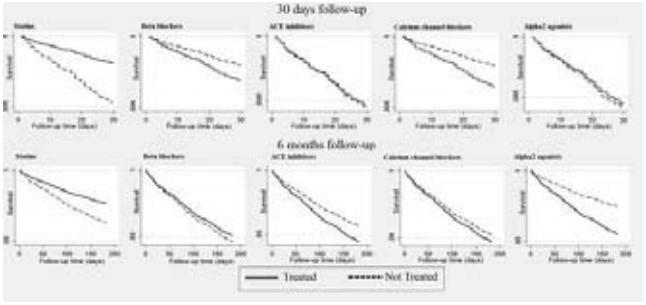
Background and Goals of Study: Preoperative cardiovascular medication can influence perioperative risk. Statins reduce perioperative risk from coronary bypass graft (CABG) surgery[1] however the influence of other medication including angiotensin converting enzyme inhibitors, calcium channel antagonists, alpha2 adrenergic agonists and beta blockers is less clear[2-4]. Herein we evaluated the influence of each of these medications on perioperative risk and the long term and class protective effect of statins.
Materials and Methods: United Kingdom Clinical Practice Research Datalink data from 16,192 patients aged 40 years or older that underwent CABG surgery were obtained. Five multivariable logistic regression models, including propensity scores and further Cox Regression analysis, were employed to probe the robustness of the effect on perioperative mortality.
Results and Discussion: Exposure to statins was most prevalent (85.1% of patients), followed by beta-blockers (72.8%), ACE inhibitors (60.5%), calcium channel blockers (42.8%) and alpha-2 agonists (1.2%). Statins were associated with a statistically significant protective effect against perioperative mortality in all five logistic regression models with adjusted ORs (95% CI) ranging from 0.26 (0.13 to 0.54) to 0.35 (0.18 to 0.67). Cox regression for perioperative mortality [adjusted HR (95% CI): 0.40 (0.20 to 0.80)] and six-month mortality [HR (95% CI): 0.63 (0.42 to 0.92)] produced similar results. Of the statins tested, only simvastatin exerted protective effects (adjusted OR 0.33 (0.14 - 0.78). Consistent effects on perioperative mortality, for the other medications, were not observed.
Conclusions: Statins exerted a significant protective effect on perioperative mortality from CABG surgery that was not shared by the other cardiovascular medications. Further data are needed on whether all statins exert similar effects.



[Figure 1]

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Acknowledgments: Association of Anaesthetists of Great Britain and Ireland.

7AP3-2

Adverse pulmonary consequences of sternal closure after cardiopulmonary bypass

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Background and Goal of Study: Cardiopulmonary bypass (CPB) can cause temporary deleterious changes in pulmonary function, which affect patients with pre-existing respiratory disorders more severely. Delayed sternal closure (DSC) is an adjunct in the management of the haemodynamic instability, bleeding and arrhythmias after cardiac surgery. Our goal was to estimate the possible pulmonary benefits of DSC by investigating the effects of sternal closure on the respiratory system after CPB.
Materials and Methods: Anaesthetized, mechanically ventilated (7 ml/kg tidal volume, PEEP 4 cmH_2O) patients (n=22) undergoing elective coronary heart or valvular surgery were studied in open-chest condition after CPB and 5 min after sternal closure. Forced oscillation technique was applied to measure the airway resistance (R_{aw}), tissue damping (G) and elastance (H). The third phase slope of the expired CO_2 concentration (S_{III}) and the respiratory dead space indices were determined by using mainstream capnography. Bohr's dead space (V_{DB}) reflecting the volume of the conductive airways and the unperfused alveoli, and Enghoff's dead space (V_{DE}) comprising additionally the volume of the perfused but not ventilated alveoli were assessed. The intrapulmonary shunt was estimated by calculating the V_{DE}-V_{DB} difference. Arterial blood gas was evaluated under both conditions to assess Horowitz-coefficient.
Results and Discussion: Sternal closure resulted in increased R_{aw}, G and H (88±18[SE]%, 76±21% and 37±13%; p< 0.03) respectively. S_{III} elevated after closure (588±240%, p< 0.001), reflecting the development of ventilation heterogeneity. Sternal closure induced lowering in V_{DB} (-7±2%, p< 0.002), which was associated with increased V_{DE}-V_{DB} (22±5%, p< 0.001), suggest-

ing an elevation in pulmonary shunt. Horowitz-coefficient exhibited slight but significant deterioration after closure (5.6±3.2%, p< 0.05).
Conclusions: Sternal closure causes narrowing of the conductive airways and worsens peripheral respiratory mechanics. It increases ventilation heterogeneity and shunt circulation, resulting in deteriorated gas exchange. According to these findings, beyond its well-described beneficial cardiovascular effects, DSC may also alleviate the adverse pulmonary consequences of CPB, which may be vital for patients in critical condition.
Acknowledgements: TÁMOP 4.2.4.B/2-11/1-2012-0001

7AP3-3

Comparison between mixed venous and regional tissue oxygen saturation during off-pump coronary artery bypass grafting surgery

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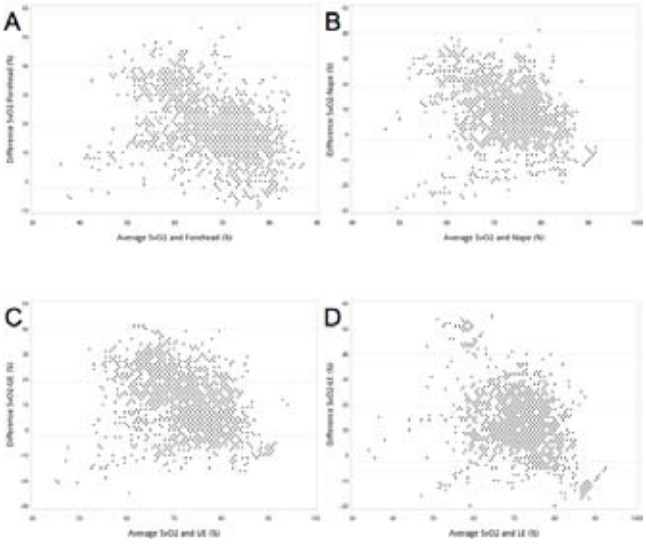
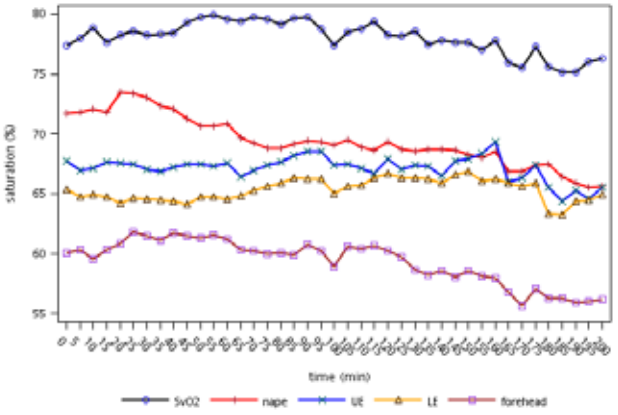
Background and Goal of Study: Mixed venous oxygen saturation measured by pulmonary artery catheter (PAC) provides crucial information of global perfusion and cardiac output. However, PAC is both invasive and time-consuming. Near-infrared spectroscopy (NIRS) is a noninvasive monitor that offers real-time measurement of regional tissue oxygen saturation (S_tO_2); but its use in global tissue perfusion is unknown. The aim of this study is to assess the reliability of S_tO_2 using NIRS at different body parts in comparison with mixed venous oxygen saturation (S_vO_2) measured by PAC.
Materials and Methods: Patients receiving elective off-pump coronary artery bypass grafting were recruited. After the induction of anesthesia, NIRS patches were attached to forehead, nape, forearm (upper extremities, UE) and lower leg (lower extremities, LE). Tissue oxygen saturation in all four body parts and S_vO_2 were recorded every five minutes till the end of surgery. Data were analyzed using Bland-Altman method and mixed model analysis.
Results and Discussion: A total 1658 datasets were recorded from 35 patients. Figure 1 shows Bland-Altman plots; table 1 shows data. Figure 2 shows changes in oxygen saturation over time. According to mixed model, the trend of forehead and UE oxygen saturation were not significantly different from the SvO2 changes.



[Figure 1]

	Bias (%)	Limit of agreement (%)	Percentage error (%)
Forehead vs SvO2	18.9	-2.2 ~ 40	27.2
Nape vs SvO2	8.6	-13.5 ~ 30.7	28.5
UE vs SvO2	10.5	-13.1 ~ 34.1	30.4
LE vs SvO2	12.6	-11 ~ 36.2	30.4

[Table 1 Results of Bland-Altman analysis]



[Figure 2]

Conclusion(s): This study shows similar trending ability of S_vO_2 measured by PAC and forehead and UE S_tO_2 measured by NIRS. Anesthesiologists may consider the use of NIRS as a non-invasive alternative to estimate the trend of global perfusion and cardiac output in high-risk patients not suitable for PAC.

7AP3-4

Trend of troponin concentrations after on-pump surgery and its association with cardiac morbidity and mortality

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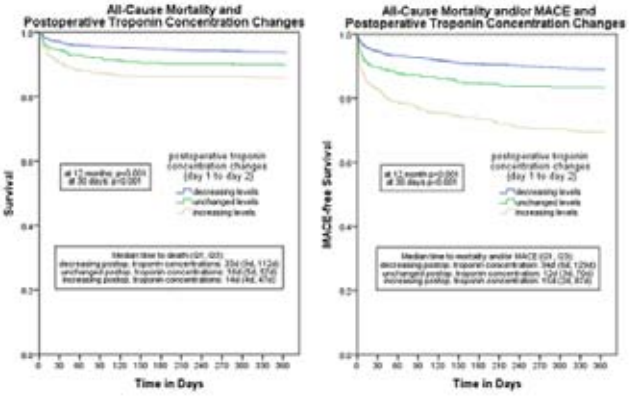
Background: Troponin is a predictor of cardiac morbidity and mortality after cardiac surgery. We hypothesize that both increasing as well as unchanged troponin concentrations from the first to the second postoperative day are associated with poorer survival outcomes than decreasing concentrations in patients undergoing on-pump cardiac surgery.
Methods: In this secondary analysis of prospectively collected data, we included all patients undergoing on-pump cardiac surgery from 2007 to 2012 with measurements of troponin T (TnT) by either 4th or 5th generation assays. TnT was recorded at 6am of both the first and second postoperative day. Our primary and secondary endpoints were all-cause mortality and mortality and/or major adverse cardiac events (MACE) defined as acute coronary syndrome, cardiac arrest, congestive heart failure, or revascularization at 12 months. Patients were classified as having decreasing (2nd day <90% of 1st day), unchanged (2nd day ≥90% and ≤110% of 1st day) and increasing (2nd day >110% of 1st day) TnT concentrations. Using a Cox regression model, we adjusted the effect of the TnT trend for the EuroSCORE II, a validated preoperative risk stratification tool.



[Kaplan Meier Curve: Survival & MACE-free Survival]

Results: We analyzed 2,512 patients (75% male; mean age 66 ± 11 years) of whom 1,859 had decreasing, 353 had unchanged, and 300 had increasing TnT concentrations. Both increasing as well as unchanged TnT levels were associated with a significantly lower overall survival and lower MACE-free sur-

vival at 12 months. After adjusting for the EuroSCORE II, increasing TnT concentrations had a hazard ratio (HR) of 2.71 (95% CI: 1.90 - 3.88) for 12-month mortality and a HR of 3.29 (95% CI: 2.56 - 4.21) for mortality and/or MACE at 12 months compared to decreasing concentrations. Unchanged TnT concentrations were associated with a HR of 1.60 (95% CI: 1.07 - 2.40) for mortality and a HR of 1.47 (95% CI: 1.09 - 2.00) for mortality and/or MACE at 12 months compared to decreasing concentrations.
Conclusion: This preliminary analysis suggests that the postoperative trend of TnT concentrations has prognostic relevance independent of the EuroSCORE II and may further help to identify at-risk patients.

7AP3-5

High-sensitive troponin thresholds values associated with mortality risk after cardiac surgery

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Background and Goal of Study: Increased cardiac troponin (cTn) after cardiac surgery is independently associated with a higher risk of early and 1-year all cause mortality.
Cut-off values of cTn that define a higher risk were derived by maximizing sensitivity and specificity (AUC ROC) and depend on cTn assays and type of surgery.
Since the introduction of high-sensitivity (hs) troponin assays, only few data on the prognostic value of hs-cTn are available.
The goal of this study was to determine the peak hs-cTnI concentration thresholds associated with post-operative mortality in two groups : Coronary Artery Bypass Graft (CABG) procedures and non-CABG procedures.
Materials and Methods: 3427 patients [CABG: 1309 (38.2%) and non-CABG: 2118 (61.8%)] were included between December 2008 and December 2012.
The contemporary sensitive cTnI assay was performed on a Dimension Vista 1500 analyser, Siemens Healthcare Diagnostics.
The ability of peak postoperative cTnI to discriminate in-hospital survivors from in-hospital non-survivors used the area under the receiver operator characteristic curve (AUC ROC). The cTnI threshold value with a specificity ≥80, 85, 90, and 95% was the lowest observed value of cTnI in the dataset yielding a specificity ≥80, 85, 90, and 95%, respectively.
Results and Discussion: Median age was 66 (55; 75); 2348 (68.5%) were male. In-hospital mortality rate, (and mean EuroSCORE II) significantly differed between the two groups: 2.7% [1.9; 3.7], (2.4%± 2.8) in the CABG group versus 5.3% [4.4; 6.4], (5.0% ±5.4) in the non-CABG group (p<0.0001). The peak cTnI concentration thresholds (ng/ml) with ≥90 %specificity associated with in-hospital mortality in the two groups of patients was 6.7 (5.8-7.4) in the CABG group and 15.8 (14.4-17.3) in the non-CABG group.
Conclusion(s): Post operative hs-cTnI threshold values associated with an increased risk of post-operative mortality are not very different from the less recent assays and depend on type of surgical procedure. Hs-cTnI threshold values associated with specificities ≥90 % were higher than those obtained with the AUC ROC method. Given the lack of validated interventions capable of improving outcome, we propose the use of hs-cTnI threshold values associated with specificities ≥90 % of post-operative death to design prospective studies for interventions.

7AP3-6

Permissive hypercapnia with low tidal volume ventilation during cardiac surgery adds little benefit

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Background and Goal of Study: Permissive hypercapnia with mechanical ventilation (MV) at low tidal volume (≤ 6 ml/kg predicted body weight (PBW)) with adequate PEEP appears to be the best measures in patients with ARDS and that extends to all patients with potential for lung injury. Cardiopulmonary bypass (CPB) may cause systemic inflammation which is aggravated by injurious ventilation. We hypothesized that MV with low tidal volume during cardiac surgery with CPB can prevent lung injury and organ failures.
Patients and methods: After obtaining IRB approval and written informed consent, 36 adult patients undergoing scheduled cardiac surgery with CPB were enrolled. Patients were randomly allocated to LVt or Control group. Patients were ventilated with tidal volume (Vt) at 6 ml/kg PBW in LVt group and Vt at 10 ml/kg PBW in Control group. Ventilator setting except Vt were adjusted to avoid hypoxia but hypercapnia was tolerated. At the arrival in ICU, all patients were ventilated with Vt = 10 ml/kg PBW at 12 bpm and then adjusted to normocapnia. Arterial blood gas analysis was done at the arrival in OR, at heparinization, at the conclusion of surgery and 15 minutes after arrival in ICU. PaO_2/FiO_2 ratio, estimated glomerular filtration rate (eGFR) and urine output (UO) were recorded and compared using Student's t-test. A *p*-value <0.05 was considered statistically significant.
Results and Discussion: Demographic data and data in table showed no significant difference. Only UO in LVt group on the third postoperative day is significantly larger. Organ function is affected by MV within the first few hours of surgery. Our study showed no significant results except UO. Duration of MV in OR was about quarter of that in ICU. The effect of MV with low Vt in OR might be hidden by MV with traditional Vt (10ml/kg PBW) in ICU. But larger UO suggests low Vt has favorable effects during cardiac surgery.
Conclusion: Organ protection by MV with low Vt during cardiac surgery is minimal.

		LVt	Control	p
PaO_2/FiO_2 (mmHg)	arrival in OR	330 ± 33	353 ± 53	0.082
	heparinazation	331 ± 103	328 ± 132	0.919
	conclusion of surgery	279 ± 145	302 ± 125	0.517
	15 min after arrival in ICU	206 ± 101	230 ± 92	0.311
eGRF (ml/min/1.73m^2)	Preoperative	57.6 ± 18.0	62.6 ± 22.7	0.814
	arrival in ICU	51.5 ± 13.4	60.0 ± 29.7	0.233
	POD1	39.0 ± 11.3	45.7 ± 17.6	0.119
	POD2	45.6 ± 20.1	48.9 ± 22.0	0.540
	POD3	47.3 ± 20.9	53.3 ± 23.3	0.311

[Respiratory and Renal Function]

7AP3-7

Persistent postoperative pain after cardiac surgery and its implication in health related quality of life

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Background and Goal of Study: Persistent postoperative pain (PPP) is defined as persistent pain after surgery of greater than 3 months' duration, according to IASP definition [1]. After cardiac surgery, the reported incidence of PPP varies from 11 to 56% [2]. The goals of our study were: to identify the incidence of PPP in our hospital and assess its impact in Heath Related Quality of Life (HRQoL).
Materials and Methods: We conducted an observational prospective study which included adults proposed to cardiac surgery between July and December 2013, after ethics committee approval. Age, gender, weight and type of surgery were registered. We applied the validated Portuguese version of Brief Pain Inventory Short Form preoperatively (T0) and 3 months later (T3). If the patient had pain at T3 and other causes of pain excluded, he was considered as having PPP. HRQoL was measured with the Portuguese version of Duke Health Profile questionnaire (DUKE) at T0 and T3 for all patients. The DUKE is a cross-culturally adapted, valid and useful tool which consists of 17-item short questionnaire, developed and validated in primary care to measure patient-reported HRQoL [3]. Non-parametric tests were performed for comparisons between numerical variables. Statistical significance was assumed at $p<0.05$.
Results and Discussion: A total of 288 patients completed the study and the incidence of PPP after cardiac surgery was 43%. Cardiac surgery has improved all DUKE scales in our patients. However patients with PPP presented lower DUKE scores three months after surgery.
Conclusion(s): The incidence of PPP after cardiac surgery is according with the current literature and these patients reported lower HRQoL. These results should constitute a warning to health professionals and authorities involved in the treatment of postoperative pain.

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7AP3-8

Is it possible the fast track in the cardiac surgery of the octogenarians?

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Background and Goal of Study: A fast-track protocol is used routinely in our centre in cardiac surgery. However, little has been published about its clinical application in elderly patients undergoing heart surgery. We intend to evaluate the application of fast track in the cardiac surgery of the octogenarian.
Material and methods: In a two-year period, 100 patients aged 80 years or more underwent cardiac surgery at our centre. Without any exclusion criteria, in all patients ultra fast- track protocols were applied. The main goal was extubation in the operating room and early mobilization in intensive care unit. The criteria used for early extubation were recovering the level of consciousness, arterial blood PO2> 60 mmHg with fraction of inspired oxygen (FiO2) < 0.5 and positive end-expiratory pressure (PEEP) < 5, arterial blood PCO2 < 50 mmHg, core temperature > 36 °C, and no surgical complications. All data were collected prospectively.
Results and Discussion: A total of 100 octogenarian patients underwent cardiac surgery. The types of surgery were valve surgery in 51 patients (51%), coronary bypass surgery in 23 (23%), combined valvular and coronary surgery in 20 (20%) and other types of surgery in 6 patients. The EuroSCORE II was 4.83 (range 0.79-17.6). 100% of patients were extubated in the operating room, all of them in the first 15 minutes after skin closure. 13 of these patients (13%) were reintubated within the first 48 hours. The causes of premature reintubation were respiratory failure (5 patients), postoperative bleeding at the intensive care unit (5 patients), and hemodynamic instability (3 patients). The hospital mortality was 12% (12 patients). Among the 13 patients reintubated, 10 died. The mean ICU stay was 77.5 hours (range 16-987 hours). Re-intubation was a significant predictor of prolonged mechanical ventilation and mortality.
Conclusion: Immediate extubation in octogenarian patients undergoing cardiac surgery is feasible and safe in most cases. The fast track facilitates early mobilization and decreases the length of stay in intensive care unit. The need for re-intubation is an independent predictor of prolonged mechanical ventilation and mortality.

7AP3-9

High postoperative arginase activity is associated with respiratory failure after cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Cardiopulmonary bypass (CPB) during cardiac surgery is associated with the development of an excessive systemic inflammatory response.The expression of arginase following ischaemia/reperfusion injury (I/R) has been investigated in various experimental models.This study analyzed the relationship between CPB-aortic cross clamp times with arginase activity in patients undergoing cardiac surgery and the incidence of postoperative respiratory complications.
Materials and Methods: Fifty patients undergoing cardiac surgery with CPB were enrolled in the study. Arginase activity, levels of c protein reactive (CRP), leucocytes and limphocytes were determined preoperatively and 24 h, 48 h and 72 h after surgery termination.In addition, we recorded CPB time, aortic cross-clamp time and duration of mechanical ventilation. Data were analyzed by non-parametric U Mann-Whitney and a linear regression model.
Results and Discussion: We observed postoperative respiratory failure in six (12%) patients. In these patients, we found a significant increased in arginase activity ($p < 0.05$) at 24 and 48 h after surgery as well as a significant increased levels of CRP ($p < 0.05$) from 48h to 72 h after surgery and total number of leucocytes ($p < 0.05$) from 24h to 72 h after surgery; whereas the number of limphocytes ($p < 0.05$) decreased from 24h to 48h after surgery.
We found a significant correlation ($p < 0.05$) between an increase in arginase activity and CBP-aortic cross clamp times in those patients with postoperative respiratory failure. Arginase is expressed in different cell types (polymorphonuclear neutrophils, endothelial cells…) and its expression is stimulated by a variety of pro-inflammatory factors. A plethora of pro-inflammatory cytokines are released during the acute inflammatory response that follows CPB.
Our results suggest that an increased postoperative arginase expression after CPB is associated to complications after cardiac surgery like respiratory failure.
Conclusion(s): These data suggest that cardiac surgery with CPB leads to an increased postoperative arginase activity that is correlated with CPB and aortic cross clamping duration.
In addition we observed that patients who suffered postoperative respiratory failure had high levels of arginase activity after surgery.
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7AP3-10

Comparison of the Doppler renal resistivity index with urinary biomarkers for early detection of acute kidney injury after cardiac surgery

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Background and Goal: Cardiac surgery-associated acute kidney injury (CSA-AKI) is a very common postoperative complication developing in up to 30% of patients. When it occurs it significantly increases the incidence of death[1]. Thus, early diagnosis of CSA-AKI to guide strategies to preserve renal function is of critical importance. Most of the available predictors of CSA-AKI are detectable only when severe tubular necrosis occurs.
Thus, being too late to be helpful in reducing the incidence of CSA-AKI. According to recent studies it seems that ultrasonic criteria, such as the Renal Resistivity Index (RRI)[2] and a specific urinary test for renal injury, NephroCheck, could predict CSA-AKI at an earlier stage[3].
The goal of this study is to compare their accuracy in predicting CSA-AKI.
Materials and Methods: After obtaining ethics committee approval, we studied 50 patients scheduled for elective on-pump heart surgery at high risk for AKI. AKI was assessed during the first 24 postoperative hours based on the RIFLE score. The RRI and the NephroCheck were obtained concomitantly at several time points: before surgery, 1 hour (H1), 4 hours (H4), 12 hours (H12), and 24 hours (H24) after surgery. Data are presented as mean(SD) and analyzed using Mann-Whitney U test.
Results and Discussion: Thirty-five (70%) patients developed CSA-AKI. None required dialysis. RRI increased significantly at H12 in the AKI group (fig.1-A), whereas NephroCheck increased significantly at both H4 and H12 in the AKI group (fig.1-B). Finally, RRI seems to predict AKI at H12 with a fair accuracy.
However, NephroCheck seems to be more effective in predicting AKI at an earlier stage (H4), though with a poor accuracy. Figure 1-C and 1-D show the area under the receiver-operating characteristic curve of the RRI at H12 and the Nephrocheck at H4, respectively.
Conclusion: In a population at risk of developing CSA-AKI, neither RRI nor NephroCheck seem to offer a good accuracy in predicting AKI at an early stage. However, further trials should be performed on a larger cohort of patients before drawing final conclusions.
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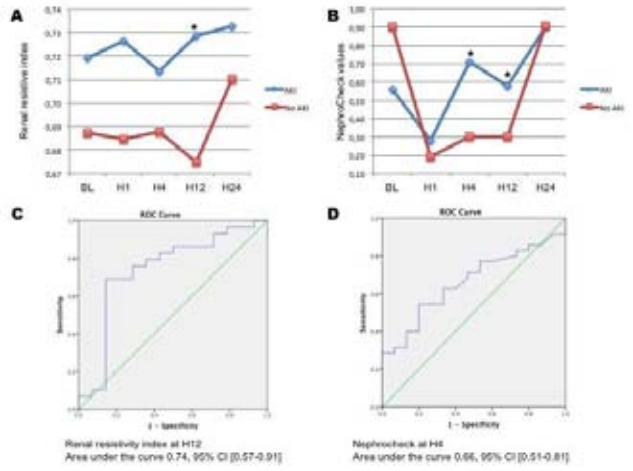

[Outcome data]

7AP3-11

Ultrasound-guided paravertebral block in cardiac surgery: is it safe and effective for internal mammary artery grafting via left thoracotomy?

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Background and Goal of Study: The contribution of regional blockade to anesthesia in cardiac surgery remains unclear. The aim of this work was to study the effectiveness and safety of ultrasound-guided paravertebral block in patients undergoing internal mammary artery grafting via left thoracotomy and compare two types of anesthesia: combining paravertebral block with general anesthesia and general anesthesia with sevofluran and fentanil.
Materials and Methods: 22 patients were randomized into two groups depending on type of anesthesia: combination of thoracic paravertebral block with general anesthesia for group A and sefofluran-fentanyl anesthesia for group B. The following parametrs were compared: opioid consumption; pain outcomes at rest and during coughing (on a 0-10 numeric rating scale [NRS]) after extubation, at 6-10 and 24-28 hours postoperatively; intraoperative blood pressure; length of postoperative ventilator support.
Results and Discussion: 14 patients on the group A and 8 patients on the group B were studied. Patients of both groups were similar in age and nosological characteristics. Anesthetic effects of paravertebral blockade were achieved in all cases. Manipulations were performed without any complications. Intraoperative fentanyl use was significantly reduced with paravertebral block compared to the general anesthesia group ($U=1$ $p \leq 0.01$), elevations in blood pressure at incision and thoracotomy were also significantly lower in the A group ($U=1$ $p \leq 0.01$). Statistically significant differences ($p \leq 0.01$) were found in favor of group A for both cough and rest pain control after extubation and at 6-10 h after surgery, though there were no statistically significant differences in these parameters at 24-28 hours postoperatively. Length of postoperative ventilator support was significantly lower in the A group ($U=0,5$ $p \leq 0.01$). Collateral effects such as vomiting and nausea were observed only in the B group (4 patients), no collateral effects were recorded in the paravertebral group. Paravertebral blocks have been used successfully to provide pain relief and more effective cough after surgery.
Conclusions: According to our data, ultrasound helps to perform effective paravertebral block and reduce risk of complications or failed blockade. Paravertebral block may be effective for post-thoracotomy pain relief in cardiac surgery, is associated with fewer complications and may improve the quality of the postoperative period compared to general anesthesia.

7AP3-12

Neurotoxicity of anesthetics in cardiac surgery by analysis of biomarkers S100β and neuron-specific enolase: a systematic review and meta-analysis

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Background and Goal of Study: Neurologic complications after cardiac surgery remain a challenge. Given the relevance of postoperative cognitive impairment, several methods for risk stratification have been developed; notable amongst these are the biomarkers. The aim of the present study was to assess which anesthetic agents provide lower neurotoxicity and then optimize patient's safety in cardiac surgery, by analysis of biomarkers S100β and neuron-specific enolase (NSE).
Materials and Methods: A systematic review according to the recommendations of Cochrane was conducted. The primary outcome considered was the neuronal injury measured by the change of biomarkers S100β and NSE. Among the secondary outcomes were evaluated neuropsychological disorders measured by cognitive tests (Mini-Mental State Examination). Data from each trial were combined to calculate the pooled mean and 95% confidence intervals.
Results and Discussion: Of the 2211 studies identified, 6 were randomized clinical trials and included in the final analysis, presenting a total of 479 patients. Overall, right after cardiopulmonary bypass (CPB), isoflurane had lower mean values of S100β compared with other anesthetics, with the mean difference of -0.70 (-1.18 to -0.22 CI 95%). Sevoflurane on the other hand, only tended toward lower values of S100β, after CPB, comparing with other anesthetics (-0.78 - 0.05 CI 95%), whereas, on POD 1, had significant lower values of this protein with a mean difference of -0.30 (-0.48 to -0.11 CI 95%). Only one randomized clinical trial included in this study evaluated NSE, hampering comparisons and precluding the meta-analysis. There was no statistical difference regarding cognitive impairment evaluated by Mini-Mental State Examination in both first and third postoperative days.
Conclusions: This systematic review shows that isoflurane and sevoflurane appear to be less neurotoxic, with patients presenting lower S100β values than others anesthetics, right after CPB and on first postoperative day, respectively.

7AP4-1

Extra corporeal membrane oxygenator (ECMO) indications, mortality and causes of death. A two year retrospective review

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Background: Harefield Hospital provides care for critically ill patients requiring ECMO support. The aim of this review was to identify the total number of patients who received the above support in the last two calendar years, to examine the indications for insertion and present mortality and cause of death data in the intensive care unit.
Methods: Patient details and demographics were identified from the Perfusion Department Records. Further information which included indication of insertion, outcomes and related complications which led to death were extracted from the intensive care clinical database. These and related data were extracted and used to compile a database designed for this project and then processed.
Results and Discussion: Thirty ECMO insertions took place in our hospital the last two calendar years. Indications are shown in table 1.

Indication	Number
Dilated cardiomyopathy – end stage	2
Ischaemic cardiomyopathy	1
Support post bilateral sequential lung Tx	6
Support pre single lung Tx	1
Bridge pre bilateral sequential lung Tx	2
Support post heart Tx	4
Bridge pre heart Tx	1
Post primary coronary intervention	4
LVAD thrombus	2
Postpartum dilated cardiomyopathy	1
Peripartum myocarditis	1
Post CABG	1
Post redo redo AVR	1
Post LVAD insertion	1
TOTAL	30

[Table 1. Indications for ECMO insertion]

Six cases were combined with implantation of ventricular assist devices. Two cases were initially planned as VVECMO insertion, which needed to be upgraded to VAECMO. Sixteen out of thirty patients did not survive, which led to a mortality rate of 53.3%. Causes of death are shown in table 2.

Causes of Deaths	Number
Sepsis	1
Retroperitoneal bleed	2
Ischaemic lower limb	2
Multiorgan failure (MOF)	2
MOF & sepsis	2
MOF & bleeding	1
Cardiac failure	4
Withdrawal of treatment	2
TOTAL	16

[Table 2. Causes of death]

Conclusion(s): A wide range of indications for ECMO insertion was identified. The majority of cases were for cardiovascular support pre or post heart or lung transplantation. Despite this advanced intervention and intensive level 3 critical care management, mortality remained high, as perhaps may be expected in this group of critically ill patients. Deaths were predominantly due to multi organ failure with or without sepsis, heart failure or bleeding from the systemic anticoagulation.

7AP4-2

Extra corporeal membrane oxygenator (ECMO) and ventricular assist device (VAD) activity of a tertiary cardiothoracic centre. Survival rates and length of ITU stay

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Background: Harefield Hospital accepts patients as a tertiary centre for end stage heart and respiratory failure for the south of England. Interventions include VA-ECMO, VV-ECMO as a bridge to Lung Transplantation, Left Ventricular Assist Devices (LVAD) as a bridge for Heart Transplantation, Right Ventricular Assist Devices (RVAD) and BIVADs.
The aim of this review was to identify the total number of such patients, analyse individual length of ITU stay and calculate survival and mortality rates for each intervention.

Methods: Patients consisted of six groups:
Group 1: VA ECMO,
Group 2: VV-ECMO,
Group 3: LVAD,
Group 4: RVAD,
Group 5: BIVAD,
Group 6: Combination of devices.
Data were extracted from the Perfusion Department records and the intensive care dataset from 2011-13. Data included: length of ITU stay, outcome, indication for device insertion and device related major complications.
Results: Forty patients were identified. Twenty nine were male and eleven female.
Group 1: included twenty two patients,
Group 2: two patients,
Group 3: four patients,
Group 4: four patients,
Group 5: zero,
Group 6: eight patients treated with various combinations of ECMO or Ventricular assist devices.
ITU stay varied from 1 day to a maximum of six months intermittently for one patient. Duration of ITU stay for all forty patients was 1052 days with an average of 26.3 days per patient. Sixteen patients survived and were discharged to the Transplant Unit. Twenty four died putting the survival rate at 40% for this group.
Conclusion(s): This review demonstrates that the majority of these patients occupied intensive care beds for a prolonged period of time and despite the use of advanced support devices survival rates were significantly lower than mortality rates.

7AP4-4

Extracorporeal membrane oxygenation for arrested lung ablative radiation therapy

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Background and Goal of Study: Due to breathing movements, radiotherapy of primary lung cancer requires sophisticated methods to ensure accuracy of the high-precision treatment applied. The aim of this study was to show the use of extra-corporeal membrane oxygenation for ablative radiotherapy while the lung is totally arrested.
Materials and Methods: A portable extracorporeal membrane oxygenation device was employed on three separate days without mechanical ventilation to apply stereotactic hypofractionated radiotherapy in three fractions (18 Gy x 3 = 54 Gy total) to a 68 year old male with a primary tumor (T1N0M0) in the right upper lobe (of the remaining lung). Linear accelerator quality controls (matched isocenter lasers), patient immobilization monitoring (stereotactic infrared system) and image controls (in cinema mode to observe movements) were made during treatment, and a computed tomography comparison was carried out between pre and post treatment for image verification.
Results and Discussion: Total extra-corporeal membrane oxygenation time was 270, 283 and 380 minutes for each session respectively. Total administered nominal dose was 54 Gy and it was not necessary to discontinue the treatment since neither lung nor tumor movement was observed during this time. During the second and third treatment days, atelectasis appeared, involving the rear of the lower lobe and it was necessary to increase FiO2 to 0,5. The only post-procedure complication has been a seroma in the groin which was resolved with local wound care.
Conclusion(s): The described technique of veno-arterial extra-corporeal membrane oxygenation allows the safe arrest of the lung, the immobilization of the tumor and provides enough time for highly accurate ablative radiation therapy.

7AP4-6

Esmolol improves SvO2 and SpO2 by improving left ventricular function in a patient with systolic anterior motion of the mitral valve and dynamic left ventricle outflow tract obstruction under peripheral venoarterial ECMO: a case report

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Background: The few case reports available in literature regarding beta blockers administration during ECMO refer to the use of esmolol during veno-venous ECMO[1, 2]. The effects of beta-blockers during venoarterial ECMO are not well described.
Case report: We present the case of a patient who underwent bipulmonary transplantation for chronical respiratory failure. Transesophageal echocardiography performed after induction revealed normal left ventricular function, concentric left ventricular hypertrophy with septal subaortic bulge and mild mitral regurgitation. In order to avoid hemodynamic instability, the patient was assisted with a peripheral venoarterial ECMO with 2 l/minute output. Transplantation was uneventful. After declamping the pulmonary arteries, the values recorded were: HR 104/min, BP 124/104 mmHg (right radial artery), PAP 46/22 mmHg, SpO2 85% (right index) and SvO2 49%. Echocardiographic assessment revealed optimized volemia, normal left ventricular function, moderate mitral regurgitation and mitral systolic anterior motion with dynamic left ventricle outflow tract obstruction. In order to improve the stroke volume and limit the dynamic obstruction, 0.5 mg/kg esmolol was administered. Two minutes later, the values recorded were: HR 88/min, BP 144/90 mmHg, SpO2 91% and SvO2 55%. Amelioration of mitral regurgitation, mitral systolic anterior motion and dynamic obstruction were documented. Ten minutes later, the parameters returned to pre-esmolol injection values.
Discussion: The SvO2 value raised before the change in the SpO2, suggesting that improvement of left ventricular function corrected firstly the low SvO2. A possible decrease of VO2 could have also contributed to the increase in SvO2.
References:
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Learning points: Hypoxaemia during femoral venoarterial ECMO may be related to the competition between forward desaturated blood from the lungs,alterations of left ventricle systolic/diastolic function and retrograde fully oxygenated blood from the ECMO. In this case, improvement of left ventricular function following injection of esmolol could be the mechanism explaining the increase in SpO2.

7AP4-7

Bivalirudin, an alternative anticoagulant for cardiac surgery in a protamine allergy case

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Background: An uncomplicated use of bivalirudin as anticoagulant in a protamine allergic patient who underwent cardiac surgery.
Case report: A 58-year-old woman with rheumatic valvulopathy and protamine allergy was transferred for aortic and mitral valve replacement.
We used bivalirudin as anticoagulant for cardiopulmonary bypass (CPB) and we monitorized it with activated clotting time (ACT).
50mg of bivalidurin was added to the priming solution of the CPB and a bolus of 1,5mg/kg was administered to the patient, followed by an infusion of 2.5mg/kg/h. Once off-pump, we stopped it and after 50min, ACT was 259 sec, taking longer time than expected to normalize.
Surgery was uneventful, but patient bled for 2 hours with a progressive normalization of the coagulation. She was discharged 11 days after surgery with no morbidity.
Discussion: Since the inception of CPB, the standard anticoagulant has been unfractionated heparin (UFH) due, in part, to its immediate reversibility with protamine(1). Protamine allergy represents a dilema because of the lack of alternatives for anticoagulation(2).
Bivalirudin, is a reversible direct thrombin inhibitor. It causes no hemodynamic side effects nor anaphylaxis; its pharmacokinetic is predictable, rapid onset of effect and a short half-life. Its elimination is largely independent of organ function, it can be removed by ultrafiltration and monitorized with ACT(3). The main clinical drawback is that it has no known antidote, excessive bleeding being the main risk(1).
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Learning Points:
- Main anticoagulant strategy in cardiac surgery is heparin-protamine combination, but there are exceptions where it should be avoided
- Qualities of bivalirudin render it a potential alternative
- Clinical evidence suggests bivalirudin can be an anticoagulant during cardiac surgery for patients with protamine allergy

7AP4-8

Influence of aspirin to postoperative bleeding depending on fibrinogen plasma levels after on-pump cardiac surgery

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Background and Goal of Study: Perioperative evaluation of the influence of aspirin continuation or cessation on bleeding still has disclosed controversial results. We speculate if higher fibrinogen plasma levels may improve platelet aggregation, consequently, decrease amount of blood loss in patients on an aspirin regimen. Goal of study was to determinated influence of fibrinogen plasma level to postoperative bleeding in patients on an aspirin therapy after on-pump cardiac surgery.
Materials and Methods: In the prospective study 56 patients undergoing first time on-pump cardiac surgery, with EuroSCORE II < 10% where included. The patients were stratified according whether they received 100 mg aspirin till the surgery (aspirin group, n = 21) or they were not taking aspirin at least five days prior surgery (non-aspirin group, n = 35). Fibrinogen plasma level was detected preoperatively and immediately after surgery. Blood loss in ml was measured from chest tube drainage (CTD) system 12, 24 hours (h) postoperatively. Comperation analysis was performed between both groups, regarding to fibrinogen level in association with postoperative bleeding.
Results and Discussion: Greater bleeding tendency was observed in an aspirin group 518 ± 294 vs. 432 ± 244 ml/24h compared to non-aspirin group without significant difference. Fibrinogen plasma level on baseline was consistent in both groups 3.3 ± 0.6 g/L in aspirin, 3.3 ± 0.7 g/L in non-aspirin group. After cardiopulmonary bypass cryoprecipitate (CRIO) received 11 (31%) in non-aspirin and 11 (52%) in aspirin group. The latters who received CRIO demonstrated statistically lower bleeding volume after surgery 246 ± 99 vs. 457 ± 266 ml/12h; p = 0.02. Only in aspirin group postoperative fibrinogen showed significant correlation with 24 h blood loss (r = - 0.5; p = 0.02). Moreover, greater blood loss was noticed in non-aspirin group for those who had fibrinogen level ≤ 3 g/L after surgery, 510 ± 288 vs 265 ± 119;
p = 0.002, respectively.
Conclusion(s): Patients on an aspirin regimen could benefit from higher fibrinogen plasma levels, especially, undergoing on-pump cardiac surgery, where fibrinogen plays a pivotal role.

7AP4-9

Thromboelastometry-guided administration of fresh frozen plasma during cardiopulmonary surgery is associated with decreased perioperative allogeneic blood transfusion and postoperative blood loss

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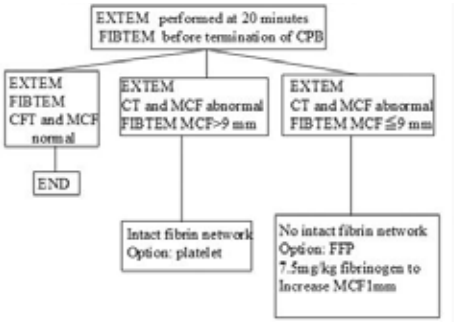
Background: In cardiac surgery with cardiopulmonary bypass (CPB), excessive blood loss is associated with increased morbidity and mortality. We aimed to compare blood loss, transfusion requirements, and postoperative complications before and after introduction of ROTEM-based coagulation management.
Methods: A total of 66 patients undergoing cardiac surgery with CPB were managed by fresh frozen plasma (FFP) administration based on ROTEM. Maximum clot firmness (MCF) < 9 mm was set as the threshold for FFP transfusion. Administration of 7.5 mg/kg fibrinogen increased MCF by 1 mm (Fig. 1). Previously, FFP were transfused based on visual assessment of empirical microvascular bleeding. Packed red blood cell (PRBC) transfusion was indicated when the hematocrit (Ht) dropped below 20% during CPB and 30% after CPB. Platelet transfusion was performed in case of preoperative thrombocytopenia and/or clinically relevant diffuse bleeding. Allogeneic blood product use, blood loss in first 24 postoperative hours and postoperative complications) were compared with a retrospective matched group of 68 patients before introduction of ROTEM.
Results and Discussion: Although patients received less packed red blood cells (PRBC) and FFP after implementation of ROTEM, intraoperative blood loss and hemoglobin (Hb) levels were similar in both groups (Table 1). In the ROTEM group, 39/66 patients had impaired fibrin polymerization and received FFP, increasing median MCF from 9.5 to 11.5 mm. After coagulation therapy, fibrinogen concentration, Hb, and hematocrit were significantly greater than at the end of CPB (Table 2). After introduction of ROTEM, there was significantly less blood loss and transfusion of PRBC and FFP during the first 24 postoperative hours and hospital stay was significantly shorter (Table 3).
Conclusions: ROTEM-based coagulation management during cardiac surgery has the potential to reduce overall blood product use, blood loss, and duration of hospitalization as compared with "blind" that can be associated with delayed identification of hemostatic defects, resulting in massive bleeding and transfusion.



[Figure 1. ROTEM and diagnostic chart]

	ROTEM	blind	p value
Surgery performed	66	68	
Valve surgery	45	45	0.805
Combined valve/bypass surgery	8	7	0.737
Aortic surgery	10	10	0.842
Others	3	6	0.261
CPB time(min)	132.1 ± 53.6	142.8 ± 56.6	0.359
Aortic cross clamp time(min)	98.1 ± 43.0	100.9 ± 44.3	0.82
Autologous blood product transfusion (n,%)	13(19.7)	18(26.5)	0.353
Patients transfused with PRBC s(n,%)	47(71.2)	48(70.6)	0.937
Volume PRBCs transfused (ml)	840(560)	1120(880)	0.031
Patients transfused with FFPs (n,%)	39(59.1)	48(70.6)	0.163
Volume FFP transfused (ml)	480(540)	720(480)	0.007
Patients transfused with platelets(n,%)	8(12.1)	11(16.2)	0.501
Platelets transfused(units)	20(20)	20(0)	0.904
Discharge Hb (g dL^{-1})	10.4 ± 1.3	10.1 ± 1.4	0.435
Intraoperative blood loss (ml)	695.5 ± 638.4	956.3 ± 1053.2	0.108

[Table 1. Relevant surgical and transfusion-related data before and after introduction of ROTEM]

	End of CPB	After coagulation therapy	p value
EXTEM			
CT(s; normal range,38-79s)	68.5(26.5)	74.0(22.5)	0.759
CFT(s; normal range,34-159s)	121.5(59.3)	131.5(49.3)	0.663
MCF(mm;noramal range,50-72mm)	54.5(11)	55.5(9.8)	0.956
Alpha angle(° ; normal range,63-83°)	67.0(13.0)	66.0(10.5)	0.391
Maximum lysis(%,normal range ≦15%/hour)	8.0(7.0)	10(5.0)	0.006
FIBTEM			
MCF(mm;noramal range,9-25mm)	9.5(7.3)	11.5(5.0)	0.284
Hematocrit (%)	26.8 ± 2.9	30.1 ± 3.1	0
Hemoglobin(g/dl)	8.9 ± 0.94	9.9 ± 1.1	0
PT(s)		14.6 ± 1.4	
APTT(s)		40.3 ± 13.8	
Platelet count(10.0/μ l)	9.8(4.6)	9.9 ± 3.4	0.861
Fibrinogen(g/L)	190.5(237)	296.1 ± 62.5	0.006

[Table 2. ROTEM parameters and laboratory results before weaning from CPB. and at the end of surgery in ROTEM group]

	ROTEM	Blind	p value
Patients who did not receive any allogenic blood on first day ICU (n,%)	40(60.6)	25(36.8)	0.006
Patients transfused with PRBC (n,%)	21(31.8)	43(63.2)	0
PRBC tranfused(ml)	315(280)	840(560)	0
Patients transfused with FFPs (n,%)	17(25.8)	39(57.4)	0
FFP transfused(ml)	480(450)	840(720)	0.001
Patients transfused with platelets (n,%)	5(7.6)	3(4.4)	0.489
Platelets transfused(units)	20(8)	20(0)	0.77
Drain volume(ml) during the first 24h in ICU	369.5 ± 261.6	706.4 ± 444.0	0
Re-exploration for bleeding (n,%)	2(3.0)	2(2.9)	1
Prolonged ventillatory support (n,%)	1(1.5)	2(2.9)	1
Stroke (n,%)	3(1.0)	2(2.9)	0.68
Postoperative atrial fibrillation (n,%)	19(28.8)	12(17.6)	0.125
Renal failure (n,%)	2(3.0)	3(4.4)	1
Postoperative hospitalization(days)	11 (3)	14(8)	0.002
30-day mortality (n,%)	2(3.0)	1(1.5)	0.619

[Table 3. Postoperative course and transfusion requirements before and after the introduction of ROTEM]

7AP4-10

A case of heparin rebound that could not be diagnosed with the Hepcon® hemostasis measurement system or ROTEM® (EXTEM, FIBTEM)

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Background: The Hepcon® Hemostasis Management System (HMS) facilitates administration of higher heparin and lower protamine doses, which affect the bleeding due to heparin rebound[1]. ROTEM® also helps to manage bleeding after cardiac surgery[2].
We experienced a patient whose heparin rebound could not be diagnosed by HMS or ROTEM® (EXTEM, FIBTEM).
Case report: A 76-year-old man with a 7-year history of haemodialysis (HD) developed heart dilation. TEE revealed severe AS, an aortic valve area of 0.55 cm^2, max/mean pressure gradient of 97/62 mmHg, LVDd/s of 46/26 mm, EF of 76% with intact coronary arteries. He thus underwent artificial aortic valve replacement. During cardiopulmonary bypass (CPB), his ACT was controlled at 456-519 s. Heparin was administered as determined by the HMS. Red cell concentrate and fresh frozen plasma were transfused according to the ROTEM®. The residual heparin was neutrolized by protamine IV calculated by HMS. The final ACT, platelet count, haemoglobin, and AT III level in the operating room were 167 s, 93 × 10^9/L, 9.6 g/dl, and 56%, respectively. The drain haemorrhage increased in the ICU; therefore, we remeasured the ACT, EXTEM, and FIBTEM. The ACT was 146 s, and CT of EXTEM was 92 s (Figure A). We suspected heparin rebound and measured the CT of INTEM (507 s) and HEPTEM (302 s; ratio, 1.68) (Figure B). A ratio of >1 indicates residual heparin or rebound[1]. We then readministered protamine and remeasured the CT of INTEM (260 s) and HEPTEM (287 s; ratio, <1) (Figure C). The patient's bleeding decreased and he was discharged from the ICU 5 days after surgery.
Discussion: Heparin rebound was not identified with either HMS or ROTEM (EXTEM, FIBTEM), but was identified with INTEM and HEPTEM. The main causes of the heparin rebound may have been the long history of HD with heparin, the low AT III level (56%), or the heparin stored inside the reticuloendothelial system.

References:
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2. Br J Anaesth. 2014 Oct 10. [in press]

Learning Point: Patients on HD should undergo measurement of not only HMS values, EXTEM, and FIBTEM, but also INTEM and HEPTEM to detect heparin rebound.

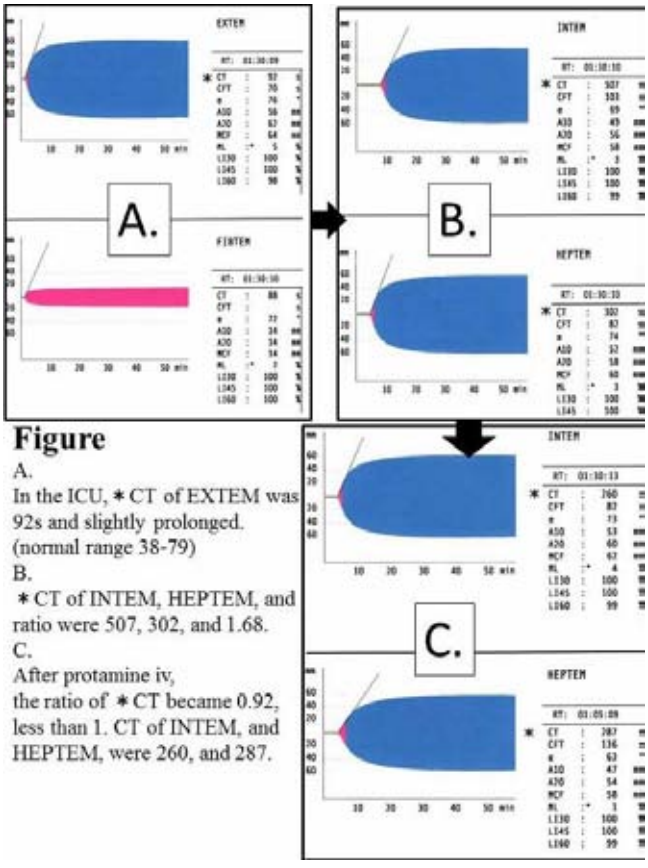

Figure
A.
In the ICU, * CT of EXTEM was 92s and slightly prolonged. (normal range 38-79)
B.
* CT of INTEM, HEPTEM, and ratio were 507, 302, and 1.68.
C.
After protamine iv, the ratio of * CT became 0.92, less than 1. CT of INTEM, and HEPTEM, were 260, and 287.

[Figure A-C]

7AP4-11

Fibrinolytic activity and anti-xa activity of blood plasma of patients undergoing lung resection

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Background and Goal of Study: One of the ways to reduce intraoperative bleeding while we have background pharmacological VTE prevention by using LMWH is a fibrinolysis inhibitor tranexamic acid. The purpose of this study was to find the influence of anesthesia and surgery on the fibrinolytic activity of blood plasma of patients undergoing lung resection with using of LMWH and tranexamic acid, and without.
Materials and Methods: There was provided open randomized controlled clinical study in 26 patients undergoing lung resection aged from 26 to 79 years old. General anesthesia during thoracotomy performed under standard technique of inhalation anesthesia with sevoflurane. The first group (12 patients) with moderate to high risk of VTE who underwent VTE prophylaxis (2500 or 3500 IU/day bemiparin sodium) 12 hours prior to surgery and after that every 24 hours until complete recovery of activity of the patient (3 - 5 days). Second group (14 patiens) had the same management but there was tranexam acid 10mg/kg i/v once included directed for reduction of perioperative blood loos. In control group (14 patients) was provided mechanical bandaging only. The level of fibrynolytic activity was determined by measure of XIIa factor. After that, data was statistically analized.
Results and Discussion: In our previous works it was shown that during thoracotomy and lung resection anti-Xa activity of heparin reducing significantly. Also it was revealed that bemaparin management 12 hours before operation helps exclude intraoperative reduction of anti-Xa activity. At the control group we've found reduction of lysis of fybrin clot, then its correct to use inhibitors fo fibrinolysis.
Conclusion(s):
1. Patients under going lung resection shows strengthening of fibrinolytic activity during surgery.
2. Preoperative use of bemiparin safely and effectively eliminates intraoperative reduction of anti- Xa activity and increased plasma fibrinolytic activity during lung resection.
3. Use of 10 mg / kg intravenously tranexamic acid 30 minutes before the operation, together with the pre-launch of bemiparin does not reduce the anti-Xa activity in the plasma and gives a clear trend towards XIIa -dependent inhibition of fibrinolysis, which indicate the appropriateness of such a combination of drugs.

7AP5-1

Influence of mechanical ventilation on the incidence of pneumothorax during infraclavicular subclavian vein catheterization: a prospective randomized non-inferiority trial

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Background and Goal of Study: It remains controversial whether we have to interrupt mechanical ventilation during infraclavicular subclavian catheterization. Intuitively, lung deflation may decrease the lung volume minimizing the incidence of pneumothorax by increasing the distance between the subclavian vein and the lung. We hypothesized that, during infraclavicular subclavian catheterization, maintenance of mechanical ventilation would not be inferior to lung deflation with regard to the incidence of pneumothorax.
Materials and Methods: A total of 332 patients who were scheduled for elective surgery were randomly assigned into one of the two groups: Subclavian catheterizations were performed with the patients' lungs under mechanical ventilation (Ventilation group, n=165) or without mechanical ventilation (Control group, n=167). The incidences of pneumothorax and other complications such as arterial puncture, haemothorax, or catheter misplacements and the success rate of catheterization were recorded.
Results and Discussion: The incidences of pneumothorax were 0% (0/165) in the Ventilation group and 0.6% (1/167) in the Control group. The difference of 0.6% was within the prespecified non-inferiority margin of 3% with a *P*-value < 0.001 [two-sided 95% confidence interval (CI), -0.0178 to 0.0058; upper limit of the 95% CI, 0.0040]. Other complication rates were also comparable between two groups. There was no significant difference in the success rate between two groups (97.6% in the Ventilation group *vs*. 98.2% in the Control group).
Conclusion(s): The success and the complication rates during infraclavicular subclavian catheterization were similar with/without mechanical ventilation. During infraclavicular subclavian catheterization, interruption of mechanical ventilation does not seem to be necessary especially for prevention of pneumothorax.
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7AP5-2

Effectiveness and complications of ultrasound-guided subclavian vein cannulation in children and neonates

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Background and Goal of Study: Ultrasound-guided supraclavicular approach to the subclavian vein (US-guided Sup-SCV) catheterization in children has recently been described and evaluated on small collective. The aim of this study was to assess this technique on a large paediatric cohort including neonates.
Materials and Methods: We conducted a prospective observational study (approval by the local ethics committee), between November 2010 and December 2013. Children were divided into two groups (G) according to their weight: G1 ≤ 5kg , G2 > 5kg. All procedures were performed under general anaesthesia by a consultant or a resident supervised. The success rates of catheter insertion, the number of punctures needed, the procedural time, and the complication rates were analysed. Data are presented as median [IQR] for continuous variables and as number (percentage) for qualitative variables. Comparisons between the two groups were performed using the U-test and the Fisher exact test as appropriate with statistical significance defined as $p<0.05$. The relative risk (RR) was then calculated.
Results and Discussion: 615 procedures were recorded. There were 124 patients in G1 (median weight : 3.3 [2.7-4] kg) and 491 patients in G2 (median weight : 17 [10-32] kg). Study endpoints are summarized in table 1. Overall, the Sup-SCV approach was successful in 98% of cases and was higher in G2 (RR, 11.9, 95% CI [3.3 ; 43.2], $p< 0.001$). The success rate was similar between right and left cannulation (97.6% vs 98.6%, $p=0.404$), and according to the experience of the physician (98.1% for resident vs 98.0% for consultant, $p=1.000$). The procedural time was fast in the two groups with a median time for all procedures of 40 [30,90] seconds. Among the complications, arterial punctures tended to be more frequent in G1 (RR, 5.6, 95% CI [1.0 ; 35.2], $p=0.058$). No pneumothorax were observed.

	Group 1 (≤5 kg) n = 124	Group 2 (>5 kg) n = 491	p
Success of the procedure	115(92.7)	488(99.4)	<0.001
Success at first attempt	80(64.5)	411(84.2)	<0.001
Multiples attempts ≥ 3	24(19.4)	22(4.5)	<0.001
Cannulation times (sec)	45[30-180]	40[30-90]	0.007
Arterial puncture	3(2.4)	2(0.4)	0.058
Hematoma	1(0.8)	1(0.2)	0.363
Guide wire wrong way	3(1.4)	8(2.6)	0.470

[Comparisons of the study endpoints]

Conclusion(s): US-guided Sup-SCV catheterization appears to be fast and safe in children and neonate even if it remains a little more difficult to achieve in small weight patients.

7AP5-3

Assessing the need for ultrasound guided catheterization of the internal jugular vein

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Background and Goal of Study: Internal jugular vein line placement it's a common procedure when a central venous line it's needed. There's evidence to support the use of ultrasound to reduce the rate of complications[1]. Different methods are routinely used to increase the size of the vein and maximize the success rate[2]. We choose as the main outcome manoeuvres that increased vein size. As a secondary outcome, we evaluated the different positions of the vein in reference to the carotid artery.
Materials and Methods: 38 patients under intradural anaesthesia were recruited between may-november/2013.All patients were at least 18 years old, informed consent was obtained in all cases. We recorded images of both jugular veins with the head of the patient turned at 30º, at the cricoid cartilage level, during inspiration and expiration, in Trendelemburg and supine position. We measured different distances and recorded the position of the vein in reference to the carotid artery. We applied T test and T paired test for statistical analysis.
Results and Discussion: 25 were male (65,8%) and 13 female (34,2%), age was 66,6 ±15,6 years. The predominant position of the right vein in reference to the carotid artery was anterior and external (47,4%) and external (42,1%); on the left side was external (39,5%) and anterior and external (36,8%). Table 1 and 2 show distance vein-skin, area and circumference.

	Right Jugular Vein		Left Jugular Vein	
	Inspiration	Expiration	Inspiration	Expiration
Distance vein-skin (cm)	1,18 ± 0,3	1,23 ± 0,3	1,26 ± 0,3	1,27 ± 0,3
Vein Area (cm^2)	1,85 ± 0,8*	1,65 ± 0,9	1,49± 0,9*	1,26 ± 0,7
Vein circumference (cm)	4,90 ± 1,2*	4,59 ± 1,2	4,37 ± 1,3*	4.13 ± 1,3

[Trendelemburg]

	Right Jugular Vein		Left Jugular Vein	
	Inspiration	Expiration	Inspiration	Expiration
Distance vein-skin (cm)	1,24 ± 0,3	1,32 ± 0,3*	1,35 ± 0,2	1,40 ± 0,2*
Vein Area (cm^2)	1,48 ± 0,83*	1,07 ± 0,7	1,24 ± 0,7*	0,94 ± 0,63
Vein Circumference (cm)	4,14 ± 1,4*	3,6 ± 1,5	3,7 ± 1,2*	3,4 ± 1,5

[Supine]
* Statistically significant ($p<0.05$)

Conclusion(s): The jugular vein position varies frequently in reference to the carotid artery, making ultrasonography a great tool to improve the success rate during central vein line placement. The right jugular vein it's larger. The best methods to increase its size are inspiration and Trendelemburg, being the first the one that showed a greater difference. Giving this findings, we consider that it should be used routinely if available to improve patient safety.
References:
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7AP5-4

Defining the limitations of a microconvex ultrasound probe for the central venous access

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Background and Goal of Study: Ultrasound confirmation of central venous catheter (CVC) tip position in the superior vena cava (SVC) has been previously published for access of the right internal jugular vein using a microconvex ultrasound probe via a right supraclavicular view (1). General availability of this probe is limited. Thus, we compared the microconvex and the linear probe for visualization of the SVC on the one hand, and the feasibility to access the right subclavian vein (RSCL) from a supraclavicular position on the other hand to further define the limitations of the microconvex probe.
Materials and Methods: This study was approved by the IRB. For ultrasound probe comparison for visualization of the SCV, 30 healthy persons were randomly chosen, and images of the SVC and right pulmonary artery (RPA), respectively were obtained and further analyzed for visibility. To evaluate the feasibilty to access the RSCL with a microconvex probe, 20 patients scheduled for elective surgery were included after informed consent.
Results and Discussion: Visualization of the lower SVC and RPA from the right supraclavicular view using a micro-convex and a linear probe were assessed. Pulse wave Doppler was performed to confirm the SVC and ascending aorta. The SVC and RPA were seen in all proposituses using the microconvex probe. The RPA was seen only in 16.7% with the linear probe. In all patients for central venous access, SVC, RSCL and RPA were visualized in the prescan. Guidewire positioning and final ultrasound CVC tip confirmation in the distal SVC was successful in all patients. In two patients needle insertion of the RSCL failed and insertion site was converted to a right internal jugular vein insertion. No misplacement, arterial puncture, pneumo- or hematothorax occured. Time for prescan to venipuncture was 09 min 25 sec ± 1 min 07 sec and 1 min 05 sec ± 13 sec from venipuncture until guidewire positioning (n = 18).
Conclusion(s): The success rate for visualization of the SVC and RPA with a microconvex probe is significantly higher than with a linear probe. CVC tip position confirmation following venipuncture of the RSCL is feasible and safe using a micronconvex probe. With this study we have further defined the limitations of a microconvex probe used for central venous access.
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7AP5-5

Ultrasound validation of trendelenburg positioning to increase internal jugular vein cross-sectional area in chronic dialysis patients

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Background and Goal of Study: Hemodialysis is the most frequently utilized therapy and the right internal jugular vein (IJV) is a commonly used cannulation site for central venous access in chronically dialyzed patients. The safe and successful placement of the central venous line correlates with the cross-sectional area (CSA) of the veins and the degree of overlap between the carotid artery (CA) and the IJV. Trendelenburg positioning (TP) is a common approach used during internal jugular vein (IJV) cannulation. No evidence indicates that TP significantly increases the cross-sectional area (CSA) of the IJV or decreases the overlap between the carotid artery (CA) and the IJV in dialysis patients. The primary aim of this study was to investigate the effects of the Trendelenburg position on the CSA of the right IJV and on its relationship to the CA in dialysis patients.
Materials and Methods: The study protocol was approved by the Institutional Review Board of the Medical Faculty Hospital, Selcuk University, and written informed consents were obtained from all participants prior to the start of the study. Thirty seven consecutive hemodialysis patients older than 18 years of age were enrolled. We measured the CSA of the right IJV and overlap rate (at end-expiration at the level of the cricoid cartilage) between the CA and the IJV in two positions: State 0, table flat (no tilt), with the patient in the supine position; State T, in which the operating table was tilted to 15° of TP. The paired sample t-test was used to compare the diameters and CSA changes between the State 0 and the State T in all patients. Categorical data were analyzed using the McNemar test. A p-value <0.05 was considered statistically significant.
Results and Discussion: The change in CSA and overlap between the CA and the IJV from the supine to the Trendelenburg position was not significantly different. The CSA was paradoxically decreased in 11 of 37 patients when changed from State 0 to State T.
Conclusion(s): TP does not significantly increase the CSA of the right IJV or decrease the overlap between the CA and the IJV in dialysis patients. In fact, in some patients, it reduces the CSA. Therefore, the use of the TP for IJV cannulation in dialysis patients can no longer be supported.

7AP5-6

The effectiveness of Trendelenburg positioning on the cross-sectional area of the right internal jugular vein in obese patients

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Background and Goal of Study: A central venous catheter may be necessary if there is difficulty finding viable peripheral venous access in the operative setting in obese patients. Trendelenburg positioning is a common approach used during internal jugular vein (IJV) cannulation. No evidence indicates that Trendelenburg positioning significantly increases the cross-sectional area (CSA) of the IJV in obese patients.
The primary aim of this study was to determine the effectiveness of Trendelenburg positioning on the CSA of the right internal jugular vein assessed with ultrasound measurement in obese patients.
Materials and Methods: The prospective, controlled study protocol was approved by the Institutional Review Board of the Medical Faculty Hospital, Selcuk University, and written informed consent was obtained from all participants. Forty American Society of Anesthesiologists II patients with body mass index ≥ 30 kg/m^2 undergoing various elective surgeries under general endotracheal anesthesia were enrolled. Ultrasound images of the right IJV were obtained in a transverse orientation at the cricoid level. We measured the CSA of the right IJV two different conditions in a sealed envelope were applied in random order: State 0, table flat (no tilt), with the patients in the supine position, and State T, in which the operating table was tilted 20° to the Trendelenburg position. The paired sample t-test was used to compare the diameters and CSA changes between State 0 and State T in all patients. We used the Mann-Whitney U test to evaluate the relationships among age, sex, BMI, and CSA regarding changes in CSA. A p-value <0.05 was considered statistically significant.
Results and Discussion: The change in the CSA of the IJV from the supine to the Trendelenburg position (1.80 cm^2 vs 2.08 cm^2) was not significantly different. Trendelenburg positioning more than >20% increased (responders) in the CSA of the IJV in only 10 of 36 obese patients. Twenty-one of 26 female patients were determined as nonresponders ($p=0.019$). The CSA was paradoxically decreased in 10 of 36 patients when the position changed from State 0 to State T.
Conclusion(s): Trendelenburg positioning does not significantly increase the mean CSA of the right IJV in obese patients. In fact, in some patients, this position decreases the CSA. The use of the Trendelenburg position for IJV cannulation in obese patients can no longer be supported.

7AP5-7

ECG central venous catheter insertion and correlation of the P Wave amplitide with the positioning of the tip evaluated through transesophageal echocardiography

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Background: The aim of the study is to demonstrate the validity of ECG guided CVC insertion. The amplitude of the P wave at ECG increases as we approach the atrio-caval junction (ACJ) and this method is more sensitive than the RX control.
Materials and Methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 64 adult patients, ASA I-II, mean age 62 ± 8 were enrolled. All CVC were placed into the internal jugular vein (VGI) or subclavian vein (VS) with ultrasound-guided puncture. The CVC 20 cm the maximum length was introduced with Seldinger technique. The clamp present on the connection cable for intra-cavity ECG derivation kit was connected to the same guide and then connected to the adapter kit for ECG. We observed the amplitude of the P wave at ECG increasing as we approached the atrio-caval junction (ACJ) to confirn the correct positioning of the CVC tip. A transesophageal echocardiogram (TEE) was performed to obtain a further confirmation of the correct positioning of the CVC between the AVJ and the tipo of CVC.
Results: 55 CVC were positioned in right IGV while 9 in right SV. All CVC produced an increase in the amplitude of the P wave. Where the amplitude of the P wave has increased by 25% than normal, TEE scanning showed that the CVC tip was 2.4 ± 1.2 cm from the ACJ. Where the amplitude of the P wave has increased by 33%, the TEE scanning showed that the tip of CVC was 1.8 ± 1.0 cm from the ACJ. Where the amplitude of the P wave has increased by 50%, the tip of CVC was 1.2 ± 0.4 cm from the ACJ (Tab. 1). The thoracic RX described only summarily the presence of the catheter in the superior vena cava but not not explained the exact position relative to the gap.
Discussion: We demonstrated that the increase of the amplitude of the P wave detected by ECG, showed more precision about the correct position of the CVC tip without the need of the RX control.
References:
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INCREASED P WAVE AMPLITUDE (%)	CVC TIP/ACJ DISTANCE (cm.)
25%	2.4±1.2 cm.
33%	1.8±1.0 cm.
50%	1.2±0.4 cm.

[Table 1. ECG increased P wave amplitude vs CVC tip distance from ACJ]

7AP5-8

A randomized controlled trial comparing the Accuvein AV400 device to standard technique for peripheral intravenous cannulation in obese patients

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Background: Obesity is a predictive factor of difficulty in peripheral intravenous insertion. The Accuvein AV400 device was developed to assist in peripheral vein identification and venipuncture. It can identify peripheral veins which lie deep to 10 mm. from skin. It uses near infrared light to highlight hemoglobin.
Goal of Study: To evaluate the efficacy of the Accuvein AV400 device in improving the first-time success rate of peripheral intravenous cannulation of obese patients.
Materials and Methods: Obese patients were randomized to peripheral intravenous cannulation with the Accuvein AV400 device or standard technique by three experienced nurse anesthetists. An observer recorded the number of attempts to successful cannulation and the time between tourniquet application and successful cannulation or failure for cannulation.More than four cannulation attempts is defined as failure for each technique.
Results and Discussion: There were 72 obese patients with mean body mass index (BMI) 40.9±1.7 kilograms.The difference in first attempt success rate and the time to insertion between the two treatment groups were not significant. When we analysed the subgroup as the obese (BMI between 30 to less than 35) and the morbid obese (BMI ≥ 35), we also found no statistical difference between subgroups in each treatment group. Although the Accuvein AV 400 device was easy to use and improved the visualization of the peripheral veins, there are some possible reasons for this result.The device provides 2-dimentional image of the veins so we cannot evaluate the depth of the veins. The size of veins is not accurate because it depends on the distance between the device and the patient's skin.The benefit of the device that we found in this study is it act as a guidance to find a vein when we cannot identify any veins with naked eyes.
Conclusion(s): Although the Accuvein AV400 improved visualization of the peripheral veins,we found it was not superior to standard technique for intravenous cannulation in unselected obese patients.

7AP5-9

The use of long peripheral venous catheters (100 mm) compared to standard models

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Background and Goal of Study: Millions of patients worldwide need peripheral venous catheters (PVC). Standard PVC are frequently associated with local complications including obstruction and phlebitis. This randomized controlled trial compared the duration of standard (short) PVC with long PVC until catheter removal.
Materials and Methods: With informed consent and approval from the National Committee for Medical and Health Research Ethics, patients were randomized to peripheral vein cannulation with either standard (short) PVC (BD Venflon Pro™ 20G (length: 32 mm)) or long PVC (Arrow® 22G (length: 100 mm), which usually is used as a paediatric central venous catheter).
Adult patients with scheduled intravenous treatment for more than five days were included into the study. Ultrasound was used to identify the basilic vein for long PVC, while veins on the forearm and back of the hand were used for short PVC (without ultrasound).
Primary endpoint was the time duration until the PVC had to be removed due to a complication (e.g. obstruction or infection) or due to completed treatment. Secondary endpoints were patient and nurse satisfaction (5- point scale).
Results and Discussion: A total of 40 patients were included into the study and randomized. Six patients were withdrawn from the study because intravenous treatment was finished after less than five days.
Long PVC could be used significantly longer than short PVC (median duration 8 days (SD 8.2 days) vs. 3 days (SD 2.8 days), $p<0.01$). The main reason for early catheter removal in patients with short PVC was obstruction (7 patients). Nurse satisfaction was significantly higher in patients with long PVC ($p = 0.02$), while there was no difference in patient satisfaction ($p=0.06$).
In the present study we used paediatric central venous catheters as long PVC. The catheters are long (100 mm) and can be placed into deeper veins (basilic vein). Moreover, these catheters are flexible and this reduces the possibility for dislocation and tissue damage. Commercial available long catheters (e.g. BD Secalon-T™) are stiff and may cause tissue damage.
Conclusion: Long peripheral venous catheters can be used longer than short PVC and can save patients for multiple vein cannulations.

7AP5-10

Ultrasound guided central venous line introduction comparing anatomical orientation, concerning time frame and time consuming

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Background and Goal of Study: One of the topics in vogue last 10 years in Anesthesiologie and Intensive Care was ultrasound-guided techniques for positioning the central venous line. In our University clinics we raised the question about the time frame for inserting the guide wire via classical Seldinger technique ultrasound guided and anatomical orientation, and the time frame from punction up to final fixation of the Central Venous Line (CVL), and how much time one Anaesthesiologist approximately spend for positioning of CVL intraoperatively.
Materials and Methods: Right internal jugular vein punction Out of plane ultrasound guided technique was used and the main anatomical orientation was crycoid cartilage and the triangle of Sedillot.Including criteria for CVL catheterisation was parenteral nutrition, multimedication, intravenous cardiac pacing. Classical Seldinger technique preformed by Anaesthesiologists in the clinic with average experience five years or more was a must. Time frame from punction to insertion of the guide wire was measured as well as time frame from punction up to final fixation. Standard complication as pneumo/haemothorax, haematoma, malposition, arterial punction, supraventricular arrhythmias were measured.
Results and Discussion: We preformed a total of 120 patients; two didn't meet the criteria because of the malposition of the catheter and arterial puncture. Total of 64 in the groupe ultrasound and 54 in the anatomical orientation were included. Time frame for the ultrasound groupe was (15 sec±9 sec) and for the anatomical orientation grouped (30 sec±5 sec) concerning insertion of the guide wire .The second statistic was continuing the time measurement up to final fixation of the catheter, time frame here was (3,30 min ±25 sec) for the goupe ultrasound and (4,39min ±34sec) for the group of anatomical orientation. SPSS statistics will be preformed for final results.
Conclusion(s): Ultrasound guided CVL catheterisation is not just a safe technique but a better time performing technique which has less complication and it is less time consuming.

7AP5-11

Sonoguided catheterization of superficial temporal artery for correction of aortic arch hypoplasia in neonates

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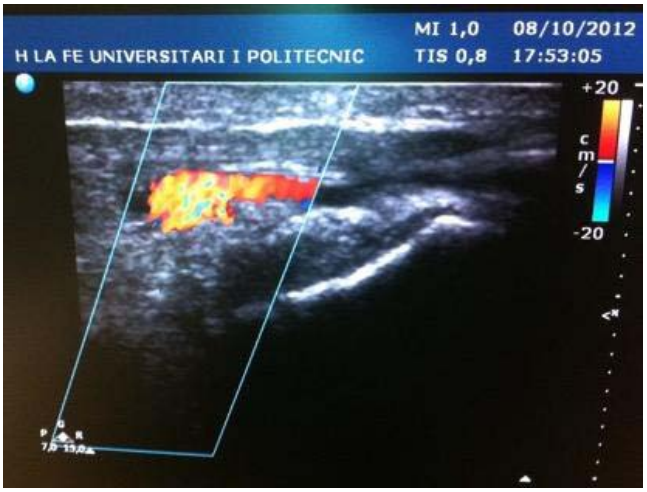
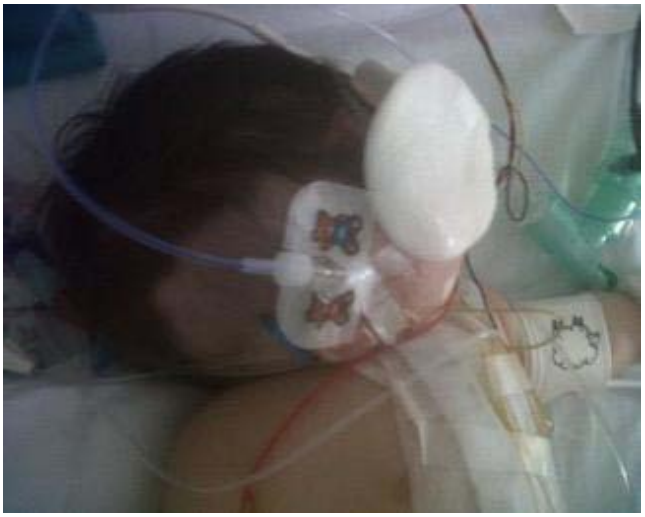
Background: Based in our experience in pediatric cardiac surgery we show catheterization of the superficial temporal artery as an alternative to the classic catheterization of the right radial artery as reference of invasive arterial monitoring during the phase of cerebral selective perfusion in the surgical correction of aortic arch hypoplasia.
Case report: We approach to the arterial and venous vascular access with an echo-guided technique (fig.1), which allows us to gain security, to minimize the number of attempts and to improve the anesthetic preparation time, especially in neonates (Central venous catheter, Femoral and Right temporal arterial catheterization).
The right temporal artery as well as the right radial artery offers an indirect monitoring of the patient during the clamping phase in this kind of surgery. Right temporal artery has an easy access and is supported by an important collateral blood flow so this technique presents as a less risky procedure and a great alternative of arterial monitoring when necessary (fig.2).
In a cerebral selective perfusion with cannulation through the brachiocephalic trunk, the blood pressure measurement of the pressure in right temporal artery will always be a closer measure of cerebral perfusion than the right radial artery measure.
Temporal catheterization provides a reliable wave to interpret other data like

the cardiac output measurement through PRAM or the gradient assessment between the temporal and femoral artery, pre and post correction remaining as post operative surgery control measurement in ICU that gives support to the permanent viability of the surgery by means of the absence of gradient.
Discussion: From our point of view the temporal artery catheterization is an advisable method to evaluate the suitable selective cerebral perfusion surgery of aortic advancement for the correction of transverse aortic arch hypoplasia. If the right temporal access would not be possible we always respect the right upper limb for catheterization by arteriotomy and dissection in a safer way. It is a safe, reliable and worthwhile technique.
References: Bowdle TA. Complications of invasive monitoring. Anesthesiol Clin North America. 2002;20:571-88. ; Mark JB, Slaughter TF. Cardiovascular monitoring. En: Miller RD, editor. Anesthesia. 6.a ed. Filadelfia: Churchill Livingstone Inc; 2005. p. 1272-4.
Learning points: Alternative arterial monitoring access for correction of aortic arch hypoplasiain neonates.



[Figure 1]


[Figure 2]

7AP6-1

Asymmetric dimethylarginine / dimethylarginine dimethylaminohydrolase pathway in regression of left ventricular hypertrophy with short beta-blocker therapy

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Background and Goal Study: Esmolol produces regression of left ventricular hypertrophy (LVH) (1). Increased asymmetric dimethylarginine (ADMA) may be an independent risk factor for development of LVH. We hypothesized that even a 48 hours of esmolol therapy could reduce ADMA in the left ventricle in a model of stable compensated left ventricular hypertrophy.
Materials and Methods: Adult male spontaneously hypertensive rats (SHRs) were randomly divided into esmolol therapy group (SHR-E, n= 4) and placebo group (SHR, n=6). Wistar Kyoto rats (WKY) were used as normotensive controls (n= 4). After 48 hours of intervention, left ventricle was removed to study ADMA, SDMA (symmetric dimethylarginine) and DDAH activity (dimethylarginine dimethylaminohydrolase). All the data were expressed as mean ± SEM. Comparisons between groups were made by Student's t-test for independent samples. $P < 0.05$ was considered significant.
Results and Discussion: SHR displayed a significant increase in ADMA concentration and a decreased DDAH activity compared to WKY. Moreover, ADMA significantly decreased and DDAH activity significantly increased in SHR-E compared to SHR. There were no signi□cant differences in SDMA among SHR, WKY and SHR-E.
Conclusion: Our study shows that 48 hours of esmolol therapy produces a reduction of ADMA levels by increasing its hydrolysis. In other words, esmolol is capable of normalizing ventricle's ADMA and DDAH activity. However, these effects need to be proven in future human clinical prospective studies.
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7AP6-2

ALDH2 attenuates anthracycline antitumor antibiotic cardiotoxicity at the level of a single cardiomyocyte

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Background and Goal of Study: Anthracycline antitumor antibiotic Doxorubicin (Dox) is an used for the treatment of various kinds of cancers. A limitation of Dox-based chemotherapy is severe adverse effects on normal tissues, especially the heart. Possible contributors to DOX-induced cardiotoxicity include free radical formation, apoptosis, inhibited expression of cardiomyocyte-specific genes, and altered molecular signaling pathways. However, precise mechanism of Dox-induced cardiotoxicity remains unclear. In the present study, we examined the contractile function and intracellular calcium transient in a single cardiomyocyte prepared from Dox-treated wild-type (WT) and ALDH2 knockout (KO) mice.
Materials and Methods: Mice : WT and ALDH2 KO C57BL/6 mice (8-12 weeks of age).
Dox was administered once intraperitoneally at a dose of 15 mg/kg.
Transthoracic echocardiography (M-mode) was performed using a 14-MHz linear array probe with a diagnostic ultrasound system under anesthesia.
Before and at 5 days after Dox treatment, blood sample was collected through caudal vein and serum was used for the analysis of oxidative stress (d-ROMs test).
The degree of congestive heart failure was assessed by the ratio of lung weight/tibia length.
Cardiomyocytes were prepared by collagenase treatment of the heart and loaded with Fura-2. Sarcomere length change and intracellular calcium

transient in a single cardiomyocyte electrically stimulated at 1 Hz were analyzed with IonOptix MyoCam and Photo-Multiplier system with Galvo-Driven HyperSwitch Dual Excitation Light Source.
Results and Discussion: Dox treatment increased the oxidative stress and worsened the degree of congestive heart failure in ALDH2 KO mice more strongly than in WT mice.
Dox treatment impaired intracellular calcium transient as well as contractile function in a single cardiomyocyte, with those in ALDH2 KO mice being more severely affected.
Conclusions: Dox treatment induces cardiotoxicity, at least in part, by impairing the regulatory function of proteins involving intracellular calcium movement through oxidative stress, which could be reduced by ALDH2.
Further studies should be required to clarify whether Dox treatment directly impair the contractile function of sarcomeric proteins.

7AP6-3

Anesthetic propofol overdose causes vascular hyperpermeability by reducing endothelial glycocalyx expression and ATP production

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Background: Prolonged treatment with large dose of propofol may cause cellular cytotoxicity in multiple organs and tissues such as heart, liver, kidney, and skeletal muscles. Our previous studies showed propofol overdose induces endothelial injury and vascular barrier dysfunction.
Regarding the important role of endothelial glycocalyx on maintenance of vascular barrier integrity, we therefore hypothesized that propofol overdose-induced endothelial barrier dysfunction is associated with impairment of endothelial glycocalyx.
Materials and Methods: ICR mice (n= 6 for each group) were intraperitoneally injected with 2 mg of propofol or vehicle per hour for 5 times. Five hours after treatment, vascular permeability and the expression of the core components of endothelial glycocalyx, including syndecan (SDC)-1, SDC-4, perlecan, glypican-1 mRNA, and heparan sulfate expression in vessels of multiple organs were determined. In vitro, human microvascular endothelial cells (HMEC)-1 were treated with 20 μg/ml of propofol for 16 h and the expression of endothelial glycocalyx and NAD+/NADH ratio and ATP concentrations were determined.
Results: Propofol overdose induced systemic vascular hyperpermeability, reduction of the core components of endothelial glycocalyx, including SDC-1, SDC-4, perlecan, glypican-1 mRNA, and heparan sulfate expression in vessels of multiple organs of mice. In vitro, overdose of propofol reduced the expression of endothelial glycocalyx, including syndecan (SDC)-1, SDC-4, perlecan, glypican-1 mRNA, and heparan sulfate in HMEC-1 cells. Besides, propofol overdose also induced decreases of NAD+/NADH ratio and ATP concentrations, which were then indirectly proved to be associated with the reduction of endothelial glycocalyx in HMEC-1 by using the ATP synthase inhibitor, oligomycin.
Conclusion: Propofol overdose induces ATP-dependent reduction of endothelial glycocalyx expression and leads to vascular hyperpermeability due to loss of its endothelial barrier functions.

7AP6-5

Role of the purinergic receptor P2X4 during blunt chest trauma in cigarette smoke-exposed mice

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Background: Both acute (e.g due to LPS [1] or blunt chest trauma [2]) and chronic lung injury (e.g due to cigarette smoke exposure (CS)[3]), cause up-regulation of tissue P2XR4 and P2XR7 expression, which coincides with hyper-inflammation, oxidative and nitrosative stress. Genetic deletion or blockade of P2XR7 attenuated pulmonary hyper-inflammation [1,3], whereas P2XR4 co-expression enhances the P2XR7-induced inflammatory response and compensates for reduced P2XR7 expression [4].
Therefore, we tested the hypotheses that genetic P2XR4 deletion may attenuate post-traumatic acute lung injury (ALI) after CS-exposure.
Methods: After pressure wave-induced blunt chest trauma [5] anaesthetized CS-exposed or non-CS wild type or P2XR4-ko mice (n=8 in each group) underwent 4 hrs of lung-protective mechanical ventilation together with fluid resuscitation and continuous i.v. noradrenaline (NoA) to maintain mean arterial pressure > 55 mmHg. Lung mechanics, gas exchange and systemic haemodynamics were measured hourly, lung tissue immune-histochemistry allowed for P2XR7 expression and nitrotyrosine formation.
Results: While lung mechanics and gas exchange were not affected by P2XR4 deletion, P2XR4-ko mice showed significantly lower NoA requirements to maintain haemodynamic targets, which coincided with significantly less nitrotyrosine and P2XR7 expression.
Conclusion: Genetic P2XR4 deletion not only attenuated post-traumatic ALI-induced inflammation and nitrosative stress but also ameliorated trauma-induced impairment of vascular tone, thus confirming the reversal LPS-induced arterial hypotension in P2XR7-ko mice [6].
Targeting P2XR4 may be a potential therapeutic intervention in ALI and CS-induced chronic lung disease.
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Acknowledgements: Supported by the Ministry of Science, Research and the Arts of Baden-Württemberg (Az:32-729.55-0/239-5/32-7533.-6-10/15/1) (Boehringer Ingelheim Ulm University BioCenter).

7AP6-6

Sevoflurane administration effect on lung inflammatory response and apoptosis in a model of lung resection surgery

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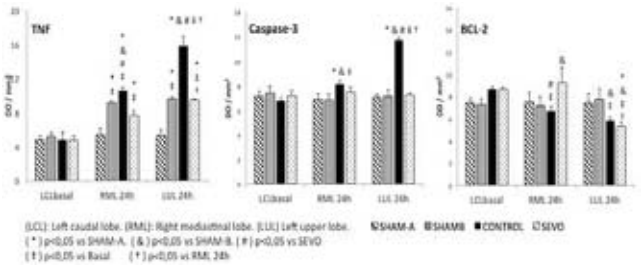
Background and Goal of Study: Consequent to lung resection surgery there is an inflammatory and apoptotic response associated with the development of acute lung injury. This response can be explained because of the direct insult of lung resection and due to prolonged one lung ventilation (OLV). Apoptosis is related to inflammation, and TNF-alfa can activate apoptosis[1]. Our team has proved a protective effect of Sevoflurane over lung ischemia-reperfusion injury, which occurs during OLV[2].
The aim of this study was to determine the effect of Sevoflurane on lung inflammatory response and apoptosis during lung resection surgery, and the isolated effect of OLV on this response.
Materials and Methods: A left caudal lobectomy procedure was performed under general anesthesia and 120 min. of OLV into two groups of 5 Mini-Pig breed pigs (Sevoflurane group-SEVO and Control group-CON). Anesthesia was maintained throughout the procedure with sevoflurane 3% in SEVO or propofol (8-10 mg kg^{-1} h^{-1}) in CON. After the procedure the animals were awaken, and 24 h. later were again anesthetized for extraction of biological samples.
In the first procedure, before starting the OLV and lung resection, a basal biopsy of left caudal lobe was performed.
In the second one, biopsy of right mediastinal lobe (OLV during lobectomy) and left upper lobe (not ventilated during lobectomy) were taken. Two additional procedures were performed in two groups of 5 animals, with the same methodology as in the control group but without lobectomy or OLV (Sham-A group), and without lobectomy but with OLV (Sham-B group). Tissue expresson of TNFα, Caspase-3 and BCL-2 were measured.
Differences between groups were analysed by ANOVA multiple range test, and Wilcoxon test for evolution of the intragroup values. P values <0.05 were considered.

Results:



[Inflammatory response and apoptosis]

Conclusions: OLV can by itself promote an inflammatory response in both lungs after lung resection surgery. Sevoflurane use has demonstrated to attenuate inflammatory and pro-apoptotic response secondary to lung resection surgery.

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7AP6-7

Use of a novel TTE mobile echocardiography simulator skin within a live crisis management scenario

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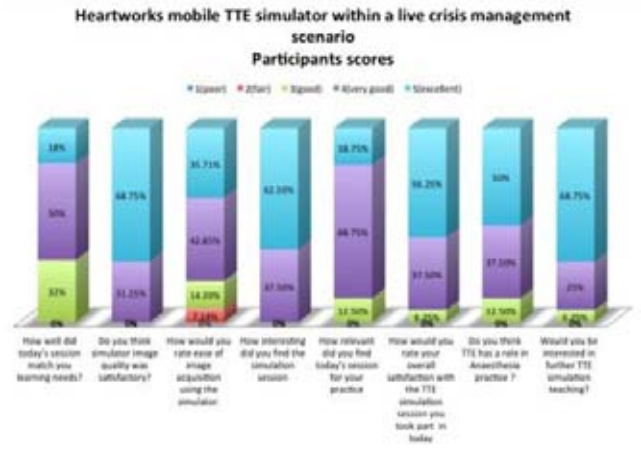
Background and Goal of Study: The role of echocardiography as a bedside diagnostic and monitoring tool is expanding rapidly. Echocardiography teaching is now part of critical care, anaesthesia and emergency medicine curricula. Ultrasound however, is a technical, visual and operator dependent discipline with a significant learning curve. Simulation can enhance and accelerate the learning of echocardiography, particularly at the early stages of training. A novel transthoracic echocardiography (TTE) mobile skin simulator (Heartworks™) provides seamless integration of TTE in to high fidelity patient simulated scenarios. Previous echo simulators require a separate mannequin in addition to the one from the high fidelity simulator resulting in a less realistic rendering of the scenario.
We surveyed the opinions of trainees after experiencing this new type of echocardiography simulation.
Materials and Methods: 24 echo-naïve junior anaesthesia trainees attending an scheduled teaching session were divided into 4 groups. Groups were presented with clinical simulation scenarios of haemodynamic instability in the peri-operative period. Trainees were then asked to diagnose the cause of shock and establish definitive treatment. Scenarios included: Acute pulmonary embolism,decompensated severe aortic stenosis and hypovolaemia. Two scenarios were presented to each group, one with and another without the availability of echocardiography. Trainees' opinions on their experience were surveyed at the end of the training session using a questionnaire.
Results and Discussion:



[Results of survey]

Feedback from participants showed high levels of satisfaction with this new simulation method. Furthermore, 87.5% of participants thought that echocardiography has a role in anaesthesia practice. The addition of the echo skin to the high fidelity simulator brings together learning of technical aspects of echocardiography with the situational awareness and human interaction provided by team simulation.
Conclusion(s): The addition of the ‚echo skin' enhances learner's experience by generating greater immersion and the perception of real applicability to day-to-day practice.

7AP6-8

Mediastinal masses in thoracic anesthesia: what to expect of these patients?

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Background and Goal of Study: Mediastinal masses (MM) can develop from a wide spectrum of diseases, many are malignant and require prompt diagnosis for immediate specific treatment. The management of MM is always challenging for the anaesthesiologist. The anteriorly located MM can have catastrophic complications due to extrinsic compression of airway, heart or great vessels. Posterior MM normally have an uneventful anaesthetic management. However, respiratory or circulatory collapse may occur in patients without preoperative symptoms. The choice of the anaesthetic technique is difficult and all the possible benefits and risks must be weighed in beforehand. The aim of this study was to characterize the population of patients with MM who underwent surgery at our institution.
Materials and Methods: Was conducted a retrospective record review of all the patients with MM operated between 2006 and 2012. Were collected demographics, pre-operative symptoms, MM location and type.
Results and Discussion: Of 204 patients with MM, 54% were female. Mean age was 53±18 years (15-86).The most frequent symptom was chest pain (25,5%), followed by dyspnoea (24,6%) and cough (23,9%). Only 8 patients had SVC syndrome. The majority had no oncological history (87%). In 69 cases the diagnosis was accidental or in other clinical contexts. The main location in the mediastinum was the anterior compartment (44,1%).The most frequent histological diagnosis was thymoma (21,6%).
Conclusions: MM present unique problems for the anaesthesiologist and are associated with significant risks. The appropriate approach begins with the detailed preoperative evaluation based on clinical and radiological findings in order to make the safest option. If the anaesthetic risk is high, alternative techniques of securing the airway (rigid bronchoscopy) and cardiopulmonary bypass should be immediately available to allow life-saving procedures. In this study group, patients were mainly women who presented with chest pain, rarely had SVC Syndrome, the most frequent type was thymoma and were predominantly located in the anterior compartment of the mediastinum. An interdisciplinary cooperation between anaesthesiologists and surgeons is the key to optimal treatment and uneventful recovery. Departments of anaesthesiology should have algorithms to manage patients with MM.

7AP6-9

Intraoperative intravenous lidocaine attenuates the stress responseof thoracic surgery

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Background and Goal of Study: Stress response is an inevitable sequel of surgery that influences postoperative morbidity. An effective way of reducing stress response is epidural anaesthesia (TEA) (1). However, we may fail in performing TEA and even a successful one can not completely abolish stress response. In this randomized, prospective, double blinded clinical trial we investigated whether intraoperative intravenous (i.v.) lidocaine and TEA could reduce the intraoperative stress response compared with TEA without i.v. lidocaine in thoracic surgical patients.
Materials and Methods: Following Ethical Committee approval a total of 40 ASA I or II patients undergoing elective thoracic surgery were divided into two groups. Before induction of general anaesthesia (GA) a thoracic epidural can-

nula was inserted (Th 6-7) in each group. In Group C (control) lidocaine was not administered while in Group L (lidocaine) a bolus of 1 mg/kg lidocaine was given intravenously at the beginning of GA and an infusion of 1 mg/kg/h during the operation. Blood samples were taken at the beginning and at the end of surgery, and on the first and third postoperative days. To characterize the changes in oxidative stress malondialdehyde concentration, myeloperoxidase enzyme activity in plasma, and the production of reactive oxygen species in whole blood were monitored. From the endogen antioxidant side the plasma protein SH group level, reduced glutathione concentration, superoxide dismutase, and catalase enzyme activity were measured. Intravenous lidocaine levels were also monitored. Two-sample t-test were used for statistical evaluation, and values of $p < 0,05$ were considered significant.

Results and Discussion: In Group L plasma malondialdehyde levels (0,86±0,09 vs. 1,22±0,09 nM) and catalase enzyme activity (2193±174 vs. 2660±66 BE/ml) were significantly lower than in Group C at the end of surgery. Lidocaine levels were below toxic level at each sampling time.

Conclusion(s): Our results suggest that intraoperative lidocaine infusion may have beneficial effect on intraoperative stress response during thoracic surgery. Previous studies demonstrated that EDA reduces stress response. We demonstrated that i.v. lidocaine further attenuates the stress reaction.

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7AP6-10

Effects of beta-3 adrenergic stimulation on nitric oxide production in myocardial cells of neonatal rats

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Background and Goal of Study: Beta-3 receptor stimulation induces a negative inotropic effect through neuronal nitric oxide synthase (NOS1) activation in the senescent heart[1)]. However, the effects of beta-3 stimulation in the immature heart have not been clarified yet. In this study, the effects of beta-3 stimulation on nitric oxide (NO) production and NOS expression were investigated using cardiomyocytes of neonatal rats.

Materials and Methods: This study was approved by the Animal Care and Use Committee of our university and was conducted in accordance with the committee guidelines. Primary culture was conducted on cardiac muscle cells from 2-day-old SD rats. Total RNA was extracted from the cells for RT-PCR. The NO production level was measured as the NO_2 level by the fluorescence method. L-arginine (5 μM) was added either 30 minutes (Control 1) or 12 hours (Control 2) before the measurement of NO production. A beta-3 agonist, BRL (20 μM), a beta-1/beta-2 blocker, nadolol (10 μM), and L-arginine (5 μM) were added to the same experimental system either 30 minutes (BRL 1) or 12 hours (BRL 2) before the measurement of NO production. The expression levels of NOS1 and endothelial NOS (NOS3) mRNA were measured by real-time PCR for 12 hours. The results are expressed as mean±SD. Data were analyzed with one-way ANOVA followed by the Scheffé test. A p value of < 0.05 was considered statistically significant.

Results: The expression of beta-3 receptors was confirmed in the myocardial cells of neonatal rats first. There was a significant increase in NO production in BRL 2 compared to Control 2 (Control 2: 1.70±0.26 μM/5×10^5 cells; BRL 2: 2.63±0.12 μM/5×10^5 cells, $p=0.017$). However, no significant difference was found in the NO production level between Control 1 and BRL 1. Stimulation with BRL increased the relative expression of NOS1 (Baseline: 0.961±0.015, BRL stimulation for 2 hours: 1.505±0.148, $p=0.015$) and NOS3 mRNA (Baseline: 0.832±0.014, BRL stimulation for 6 hours: 1.652±0.196, $p < 0.01$).

Conclusion: The production of NO was increased by beta-3 stimulation in cardiac muscle cells of neonatal rats, suggesting that beta-3 receptor stimulation might increase NO production through the activation of NOS1 and NOS3 in the immature heart.

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7AP6-11

Study of pulmonary inflammatory response secondary to lung resection surgery using propofol versus sevoflurane. Preliminary results

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Background: One lung ventilation(OLV)during lung resection surgery(LRS) results in alveolar inflammatory effects that can cause an acute respiratory distress syndrome(ARDS)despite of using lung protective ventilation strategies.Recent publications have reported the inmunomodulatory effect of halogenated anesthetics in thoracic surgery.The goal of the study was to determine the effect of sevoflurane and propofol in pulmonary inflammatory markers and to assess if there is a relationship between the rising of these markers and postoperative pulmonary complications (PPC).

Material and methods: We designed a randomized clinical trial, NCT02168751 approved by the local Ethics Committee.Written informed consent was obtained from all patients scheduled for LRS. Exclusion criteria were: treatment with immunosuppressant drugs and blood products administration prior to surgery. Patients were randomized in two groups depend on the anesthetic used: group 1 propofol(P), group 2 sevoflurane(S). After intubation all patients were managed with volume-controlled ventilation, tidal volume(TV)8 ml/kg,PEEP 5 cmH2O,FiO2 0.4-0.5 and respiratory rate to maintain end tidal CO2 30-35 mmHg.In OLV,TV 6 ml/kg, PEEP 5 cmH20, permissive hypercapnia and FiO2 0.6-1 to maintain SatO2>90% were applied. Fiberoptic bronchoalveolar lavage(BAL)was performed in both lungs before and after OLV for analysis of cytokines (IL1,IL2,IL6,IL10,TNFa) and matrix metalloproteinases 2 and 7.Expression of inflammatory markers was measured with Western Blot. Data recorded included, postoperative care unit stay,hospital stay and PPC defined as respiratory failure, atelectasis, pneumonia and ARDS. For statistical analysis we used Mann Whitney U test and Chi2 test.

Results: 60 patients of a total of 180 calculated for the study were included for this preliminary results(P=34, S=25). One patient who needed blood infusion during surgery was excluded. Proinflammatory markers increased in both lungs after OLV.Proinflammatory citokines release was higher in P group than in S group($p < 0,05$). Antinflammatory citokine IL-10 release was lower in P group than in S group ($p < 0,05$). P group presented longer postoperative care unit stay,hospital stay and more PPC than S group, although the differences were not significant.

Conclusion: Preliminary results suggest an immunomodulatory role for sevoflurane not for propofol, in patients undergoing OLV for LRS. Our results suggest a relationship between sevoflurane anesthesia and better clinical outcome.

7AP6-12

Argon protects against H2O2-induced oxidative stress in lung cell culture

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Background and Goal of Study: Medical gases (e.g. xenon, hydrogen, argon) provide organ protective effects by reducing oxidative-stress or inflammatory related injury. The noble gas xenon showed protective properties in various *in vitro* and *in vivo* models of tissue injury, however, its usage is limited by availability and high costs.Argon, the most abundant noble gas in the atmosphere, might serve as an alternative to xenon.[1,2] The underlying signal transduction pathways by which argon provides protective effects currently remain unknown, however, proposed candidates include activation of PI3 kinase/Akt, MAP kinase (MEK1) or PLC/D. The aim of this study was to investigate the effects of the noble gas argon on lung tumor cell cultures (A549) after exposure to oxidative stress caused by hydrogen peroxide (H_2O_2) and to test for underlying signal transduction pathways.

Materials and Methods: Under conventional cell culture settings the investigation of effects of gases is often limited to the diffusional gradient of O_2 through the cell culture medium (e.g. within hours). Therefore, we used gas permeable microwell plates (Coylab), which allow rapid gas exposure via respiratory active membranes. A459 cells were exposed to 50% argon for 45 and 180 min respectively (preconditioning). For induction of oxidative stress cells were treated for 4 hours with 5mM H_2O_2. Protection was visualized by Annexin/PI staining using flow cytometry (FACS). In order to study underlying

molecular mechansims we used phosphorylation state-specific antibodies for ERK1/2 and Akt in western blot experiments.
Results and Discussion: H_2O_2 exposure caused a significant injury in A549 cells ($p<0.001$). Preconditioning with 50% argon showed more alive / fewer dead cells as compared to treatment with H_2O_2 alone ($p<0.001$, Fig. 1). Furthermore, argon exposure activates ERK pathway in A549 cells.
Conclusion(s): In summary, argon preconditioning (45 or 180 minutes) provides protective effects also on lung cells (A549) challenged with H_2O_2-induced oxidative stress.
References:
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7AP7-1

Stroke volume variation in predicting fluid responsiveness during intubated and non-intubated thoracoscopic surgery

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Background and Goal of Study: Stroke volume variation (SVV) measured by FloTrac system is a useful parameter for predicting fluid responsiveness in mechanically ventilated patients. However, the usefulness of SVV for the patients with one-lung ventilation (OLV) remains unknown. The aim of this study is to monitor hemodynamic changes and evaluate SVV as a predictor for fluid responsiveness during both intubated and non-intubated thoracoscopic surgery.
Materials and Methods: Sixty-six patients with lung tumors were enrolled. Thirty-four patients received intubated thoracoscopic surgery, and 32 patients had non-intubated thoracoscopic surgery using a combination of thoracic epidural anesthesia, intrathoracic intercostal block, and target-controlled sedation. Hemodynamic parameters including SVV and cardiac index measured by FloTrac system were recorded at four different timings including T1: 5 minutes after the induction of anesthesia, T2: 5 minutes after OLV, T3: 5 minutes after volume expansion (VE), T4: 5 minutes after two-lung ventilation. Volume expansion with 10 ml/kg of crystalloid was given after T2. Fluid responsiveness was defined as an increase in cardiac index (CI) ≥ 10% after VE.
Results and Discussion: In both intubated and non-intubated groups, CI increased significantly and SVV decreased significantly from T2 to T3 (intubated CI: $p=0.0029$, SVV: $p= 0.0132$; non-intubated CI: $p=0.0002$, SVV: $p=0.0012$). 14 were responders in intubated group, and 9 were responders in non-intubated group. The area under the Receiver Operating Characteristic curve (AUC) was 0.5125 for SVV in intubated group and 0.6280 for SVV in non-intubated group. The AUC for CI was 0.8179 and 0.7319 in intubated and non-intubated group respectively. According to AUC, CI might be a better predictor for fluid responsiveness in this study. In both intubated and non-intubated group, there were no significant difference between the SVV of the responders and nonresponders ($p=0.8059$ and $p=0.1988$ respectively).
Conclusion(s): This is the first study to monitor CI and SVV in both intubated and non-intubated thoracoscopic surgery with FloTrac/Vigileo system. Stroke volume variation fails to predict fluid responsiveness in patients with mechanical ventilation or with spontaneous breathing during OLV.

7AP7-2

Assessing pulse pressure variation (PPV) in patients with atrial fibrillation. 1. Predicting the Pulse Pressure of an irregular beat in apnea

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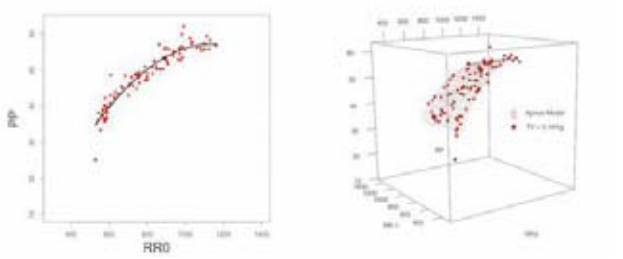
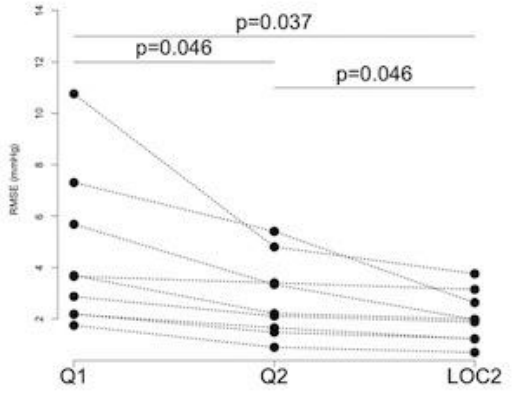
Background and Goal of Study: The use of PPV to assess volume responsiveness may be unreliable in patients with atrial fibrillation (AF) because of the intrinsic variability of this parameter in the presence of an irregular heartbeat. The observed beat-to-beat PPVs are the resultant of 2 superimposed effects: heart rhythm and mechanical ventilation. We compare 3 different models to predict the beat PP during AF excluding the effect of mechanical ventilation.
Materials and Methods: After ethical approval and informed consent, patients with AF scheduled for an ablation of the pulmonary veins under general anaesthesia, were included.ECG and invasive arterial waveforms were recorded simultaneously during a 60 sec apnea period.
3 different models were calculated
1. A quadratic model using the preceeding RR interval (RR_0). (Q1) (see fig 1)
$PP= a + b*(RR_0) + c*(RR_0)^2$
2. A polynomial quadratic model based on the two preceeding RR intervals (RR_0, RR_{-1}) in accordance with previously published work by Rawles. (Q2)
$PP= a + b*(RR_{-1}) + c*(RR_{-1})^2 + d*(RR_0) + e(RR_0)^2$
3. A Local Polynomial Regression Fitting based on RR_0 and RR_{-1}. (LOC2) (see fig 1)



[Fig1: Q1 and LOC2 of Patient 1]

For every individual model, the root-mean-square-deviation(RMSE) between predictions and measurements was calculated and compared using a One-way ANOVA for repeated measures and pairwise t-test comparisons.
Results and Discussion: 9 patients were included. The mean number of data points to determine an individual model was 69 (SD: 20). Repeated measures ANOVA showed a significant difference between the RMSE of the models. ($p=0.002$).
Mean RMSE (SD) for Q1, Q2 and LOC2 were 4(3) mmHg, 3(2) mmHg and 2(1) mmHg. (see fig 2).



[Fig 2]

Conclusion: Local Polynomial regression fitting based on the two preceeding RR intervals is the most accurate model to predict individual PPs in patients with AF in apnea.
References: Rawles JM. *Int J Biomed Comput* 1988; 23:57-68.

7AP7-3

Assessing pulse pressure variation (PPV) in patients with atrial fibrillation. 2. The effect of mechanical ventilation

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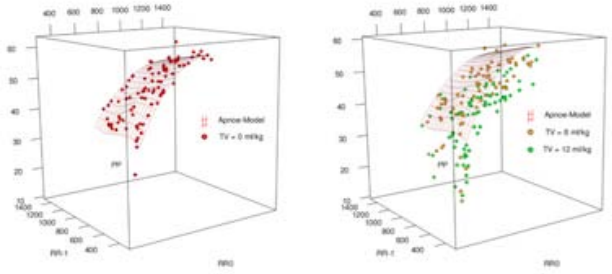
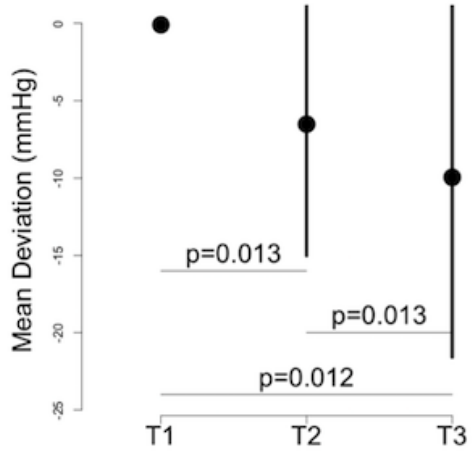
Background and Goal of Study: The observed beat-to-beat PPVs in patients with atrial fibrillation are the resultant of 2 superimposed effects: heart rhythm and mechanical ventilation (MV). We previously studied a model to predict the PP of an irregular beat during apnea. We now assess the impact of MV by measuring the deviations from this model during ventilation with low and high tidal volume.
Materials and Methods: After ethical approval and informed consent, patients, with AF scheduled for an ablation of the pulmonary veins under general

anaesthesia, were included.ECG and invasive arterial waveforms were simultaneous recorded during 60 sec with 3 different MV modes: T1: Apnea. T2: 12 x 8ml/kg and T3: 8x12ml/kg.
The analysis of the data of each patient followed a 2-step procedure.(see fig1)
-Step 1: Building an apneic prediction surface (APS).
For each beat of T1, the length of the two preceding RR intervals (RR_0, RR_{-1}) were used to construct an individual prediction model for PP of that beat, using Local Polynomial Regression Fitting.
-Step 2: Assessing deviations from APS during MV.
For every patient, the difference between the measured and the predicted PP values, based on the APS were calculated for T1, T2 and T3. The mean of these differences was used as a measure for the global deviation from the APS.



[Fig1: 3D-plot of APS and individual data points for patient 1]

Results and Discussion: 7 patients were included. The mean number of data points to determine an individual APS was 79 (SD=17).
Repeated measures ANOVA revealed a significant difference of the mean deviations from the APS between the different MV modes.(p = 0.0002). The means (SD) of the global deviations were 0(0)mmHg, -7(4) mmHg and -10(6) mmHg for T1, T2 and T3.(see fig 2)



[Fig 2: Mean differences from APS for all patients]

Conclusion: The concept of using an APS based on the two preceding RR intervals can provide a basis to assess the effect size of MV induced variations of pulse pressure in patients with AF.

7AP7-4

The accuracy of stroke volume index measurement obtained with the fourth generation FloTrac-Vigileo and new LiDCOrapid at the time of systemic vascular resistance variation

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Background and Goal: Cardiac index (CI) measurements by the arterial pressure waveform analysis are increasingly used in high-risk surgery. Recently, the fourth generation FloTrac-Vigileo (FloTrac) (Edwards Lifesciences, Irvine, CA, USA) and LiDCOrapid (LiDCO) (LiDCO, Ltd, Cambridge, UK) responding to SVR variation have been available in clinical setting. The aim of this study is to compare the accuracy of stroke volume index (SI) measurement between FloTrac and LiDCO under blood pressure variation. CI and SI obtained with intermittent pulmonary artery thermodilution catheter (PAC) are defined as gold standard in this study.
Materials and Methods: Six patients undergoing cardiovascular surgery, before or without Cardiopulmonary Bypass, were enrolled. When blood pressure decreased, we injected 10ml ice cold saline through the PAC, repeated twice. If the difference of CI was over 0.5L/min/m^2, repeated one more. Phenylephrine (0.05-0.2mg) was administered, and after two minutes, ICI was measured similarly. CI and SI of FloTrac, LiDCO and PAC was recorded at the same time. In addition, mean blood pressure (MBP) and SI variation were examined. Linear regression analysis and Pearson's correlation coefficient were calculated. A p value less than 0.05 was considered to be statistically significant.
Results: Figure 1 indicates SI comparisons correlated with PAC.

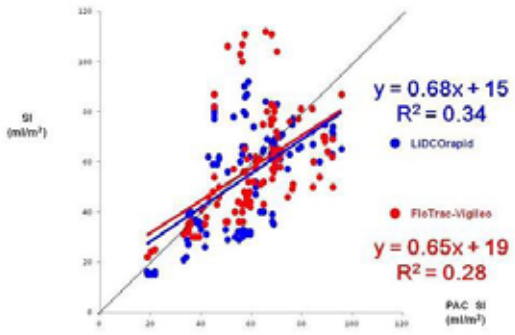

Figure 1. SI comparisons (correlated with PAC).
Both FloTrac-Vigileo and LiDCOrapid had similar value, correlated with PAC.
SI: stroke volume index

[Figure 1]

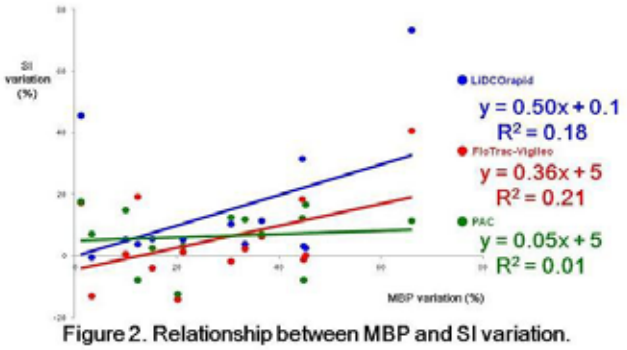

Figure 2. Relationship between MBP and SI variation.
PAC were not affected by MBP variation, however, LiDCOrapid and FloTrac-Vigileo increased significantly in proportion as MBP increased.
MBP: mean blood pressure, SI: stroke volume index

[Figure 2]

After phenylephrine administration, PAC was not affected by MBP variation, however, LiDCO and FloTrac increased significantly in proportion as MBP increased.
Conclusions: Both stroke volume index measurement in LiDCOrapid and the fourth generation FloTrac-Vigilleo are affected by MBP variation, that is SVR variation. Further research is needed to ensure the accuracy of them.

7AP7-5

Heart lung interaction index to predict fluid responsiveness after off-pump coronary surgery

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Background and Goal of Study: Indices based on cardiopulmonary interactions in mechanically ventilated patients have been shown to serve as predictors of fluid responsiveness. The heart-lung interaction index (HLI), representing the respiratory variation of plethysmogram obtained from pulse oximetry and analyzed by the ventilator, has been introduced into clinical practice.[1] The aim of the study was to assess the efficacy of HLI in prediction of fluid responsiveness after off-pump coronary artery bypass grafting (OPCAB).
Materials and Methods: Thirteen adult patients undergoing OPCAB were enrolled into a pilot study. All patients were sedated to suppress spontaneous breathing. Respiratory support in ICU was provided by a G-5 ventilator (Hamilton Medical, Switzerland) using pressure controlled ventilation mode. Patients with cardiac dysrhythmia were excluded from the study. All patients received fluid expansion by infusion of crystalloids 7 ml/kg during 5 min. HLI was obtained from a finger probe from pulse oximeter integrated to the ventilator. Pulse pressure variation (PPV), stroke volume variation (SVV) and cardiac index (CI) were measured using transpulmonary thermodilutuion (PiCCO2, Pulsion Medical System, Germany). All parameters were assessed before the fluid load test and 2 minutes after the test. Fluid responders were defined as the patients with CI increased by ≥15 % after fluid load.
Results and Discussion: Six (46%) of the patients were fluid responders and had a significantly higher HLI (18 (10 - 26) % vs. 6 (-1 - 7) %, p = 0,02), PPV (20 (11-29)% vs. 7 (4 - 11) %, p = 0,008) and SVV (21(12 - 30)% vs. 10 (7 - 5)%, p =0,049) before volume expansion. Change of HLI induced by fluid load was also significantly higher in fluid responders 13 (9 - 15) % vs. 3 (-1 - 4)%, p = 0,03. HLI correlated with PPV (rho = 0,75, p=0,05), SVV (rho = 0,79, p = 0,007) and increase in CI induced by fluid expansion (rho = 0,8; p= 0,006).
Conclusion(s): We conclude that HLI can be used as a non-invasive parameter to predict fluid responsiveness in mechanically ventilated patients after OPCAB.
References:
1. D. Demory, J. Arnal, D. Novotni, et al. *Am J Resp Crit Care Med* 2010; **181**: A4539

7AP7-6

The accuracy and precision of estimated continuous cardiac output monitoring at different ranges of cardiac output in off-pump coronary artery bypass grafting

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Background and Goal: Comparing less invasive cardiac output (CO) monitoring methods with current techniques, states of low actual cardiac output may affect the accuracy of the measurements. Recently, estimated continuous cardiac output (esCCO), using pulse wave transit time analysis has become clinically available.
The aim of our study was to evaluate the accuracy and precision of esCCO compared with transpulmonary thermodilution (TPTD), in patients with low and normal cardiac output in off-pump coronary artery bypass grafting (OPCAB).
Methods: We enrolled 20 patients scheduled for elective OPCAB into a prospective study. The esCCO values (CO_{esCCO}) were calibrated by non-invasive blood pressure (NIBP), measured with LifeScope BSM-6701K monitor (Nihon Kohden, Japan), and validated against reference CO determined with TPTD (CO_{TPTD}) using $PiCCO_2$ monitor (Pulsion Medical Systems, Germany). We performed parallel measurements of CO at eight stages during the perioperative period and analyzed the accuracy and the precision of individual CO values in the ranges of low (< 3.5 L/min) and normal (≥ 3.5 L/min) reference CO and CO_{esCCO}, respectively.
Results: Totally, 153 pairs of data were collected. We found significant correlation between the methods (*rho* = 0.67, $p<0.01$) in case of normal reference CO value (n = 111), whereas there was no correlation in low CO_{TPTD} (n = 42). Bland-Altman analysis showed that the mean bias between CO_{esCCO} and CO_{TPTD} in normal CO_{TPTD} was 0.7 L/min with limits of agreement of ± 2.7 L/min and a percentage error of 48%. However, in case of low reference CO, the mean bias between the methods rose to 1.3 L/min with limits of agreement of ± 3.2 L/min and a percentage error of 89%. Further subgroup analysis of data pairs with normal and low CO_{esCCO} also revealed a significant correlation between the methods
(*rho* = 0.6, $p<0.01$) in case of normal CO_{esCCO} (n = 133), but absence of correlation in low CO_{esCCO} state (n = 20). The mean bias between CO_{esCCO} and CO_{TPTD} in the subgroup of normal CO_{esCCO} was 1.1 L/min with limits of agreement of ± 2.7 L/min and a percentage error of 52%. In case of low CO_{esCCO}, the mean bias between the methods was -0.7 L/min with limits of agreement of ± 1.5 L/min and a percentage error of 47%.
Conclusions: In off-pump coronary surgery, esCCO calibrated by NIBP demonstrates decreased accuracy and precision in case of low reference CO. Since esCCO overestimates cardiac output, it cannot predict low actual CO values.

7AP7-7

Estimating changes in stroke volume by non-invasive pulse-oximetry pulse transit time measurements

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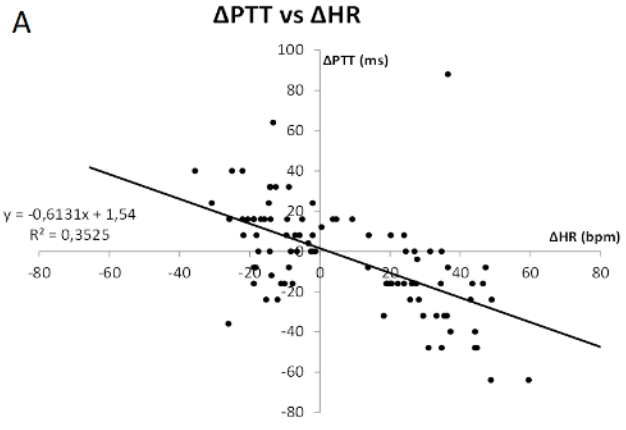
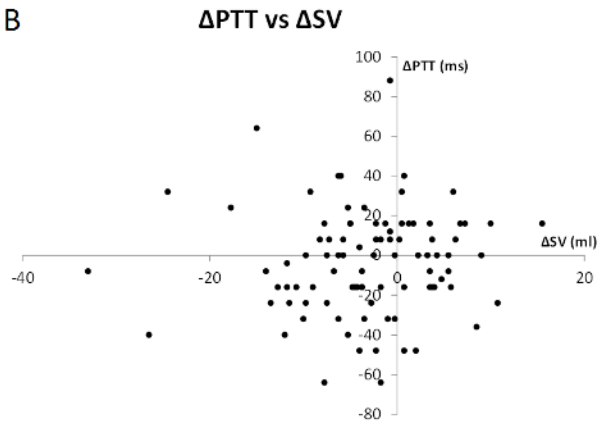
Background and Goal of Study: Pulse wave transit time (PTT), the interval between the R-wave peak on an electrocardiogram (ECG) and arrival of the pulse waves in the periphery (e.g. the finger), is reported to be a reliable estimate for stroke volume[1,2]. In this study, the PTT based on ECG and the non-invasive pulse-oximetry signal obtained at the right/left digit finger was calculated and its evolution after administration of a vasopressor or atropine. These values were compared with concomitant changes in stroke volume (ΔSV), as measured by volume-clamp plethysmography (Nexfin).
Materials and Methods: PTT was measured in 60 patients under standardized propofol/remifentanil anesthesia during ophthalmic surgery. Patients received atropine if heart rate (HR) dropped below 60 bpm and randomly norepinephrine ($10\mu g+0.05\ \mu g.kg^{-1}.min^{-1}$) or phenylephrine ($100\mu g + 0.5\mu g.kg^{-1}.min^{-1}$) if mean arterial pressure dropped >20% below normal awake values. After synchronisation of ECG- and Nexfin-derived waveforms, the PTT was determined beat-to-beat from 60 seconds before to 300 seconds after administration of the vasopressor or atropine ($=t_0$). The median SV, HR and PTT at each administration were calculated at t_0 and at t_{300} with a window of 30 seconds, and their respective relative changes determined. The relationship between ΔPTT and ΔSV, and between ΔPTT and ΔHR were depicted, and correlation was determined.
Results and Discussion: ΔHR and ΔPTT correlated only moderately (R^2 = 0.3525, Fig. 1A). However, ΔSV and ΔPTT did not correlate at all (R^2 = 0.0036, fig. 1B).



[Scatterplot of changes in HR vs PTT]



[Scatterplot of changes in SV vs PTT]

Conclusion: In this study we induced changes in stroke volume by administration of vasopressors or atropine. Although a moderate correlation was shown between the ΔHR and ΔPTT, our results indicate that the Pulse Transit Time is not suitable to reliably estimate changes in stroke volume measured by Nexfin.

References:

1. Kim et al, Anesthesia Analgesia 2013;116:94-100
2. Sugo et al., Conf Proc IEEE Eng Med Biol Soc. 2010;2853-6

7AP7-8

The revised algorithm of the FloTrac System™ improves over estimation of an arterial pressure-based cardiac output (APCO) due to transiently increased blood pressure

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Background and Goal of Study: The FloTrac System 3.0™ (FT3, Edwards Lifesciences, U.S.A.) has a problem that overestimates the cardiac output when the blood pressure increases suddenly, although the cardiac output is regarded to decrease when vasopressors are administered due to afterload increases. The cardiac output is measured by FT3 increases significantly when the blood pressure increases suddenly. Thus, it has been questioned whether FT3 shows correct cardiac output. The new algorithm, The FloTrac System 4.0™ (FT4), reflects quick reduction of vascular compliance. We compared the cardiac output changes during intravenous administration of phenylephrine 0.1mg (P) in the conventional FT3 and novel FT4 algorithm, to verify the validity of the new algorithm.

Materials and Methods: This is a retrospective, single-center study involving patients scheduled for gastroenterological surgery under general anesthesia. The arterial pressure line is connected connect to the APCO monitors, Vigileo™ or EV1000™ (Edwards Lifesciences, U.S.A), which worked on the old and new algorithm respectively, to measure the cardiac output simultaneously. We compared for the change in ratio from the baseline cardiac output before and after the P administration. Wilcoxon signed rank test was used to compare the data between groups.

Results and Discussion: The median of ratio of the cardiac output change measured by FT3 and FT4 were 38.7% (4.9% - 109%), -6.6% (-21.4% -20.8%), respectively.

Compared with FT3, the rate of the cardiac output change measured by FT4 was decreased significantly ($p < 0.001$).

The cardiac output calculation formula of FT3 algorithm was not able to respond correctly to change in hemodynamics within ten seconds after vasopressor administration, since the variables reflecting change of large vessel compliance or peripheral vascular resistance were analyzed from the date accumulated for 1 minute. However, the new algorithm, FT4 can capture rapid changes of hemodynamics and analyze arterial pressure cardiac output more correctly, since FT4 algorithm applied correction factor to reflect changes in vascular compliance every 20 seconds for every 20 seconds.

Conclusion: The problem of The FloTrac System™ to overestimate the cardiac output after phenylephrine administration was improved by revision of the algorithm.

7AP7-10

Mini-fluid challenge and PEEP-test can predict fluid responsiveness after off-pump coronary surgery

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Background and Goal of Study: Functional hemodynamic tests can reduce the risk of complications related to routine fluid challenge. Both mini-fluid challenge test (mFCT) and transient increase of PEEP (PEEP-test) can be promising bedside approaches to predict the effects of infusion therapy. The goal of this study was to assess whether these tests can predict fluid responsiveness after off-pump coronary artery bypass grafting (OPCAB).

Materials and Methods: Twenty-six adult patients after OPCAB were enrolled into a prospective observational study. After arrival to ICU, the patients were sedated by continuous infusion of propofol to suppress spontaneous breathing and received pressure-controlled ventilation with tidal volume of 8 mL/kg using a G5 ventilator (Hamilton Medical, Switzerland). Patients with cardiac dysrhythmias were excluded from the study. The mFCT was performed by a fast bolus of crystalloid solution (1.5 ml/kg over 60 seconds). The PEEP-test consisted of a transient increase of PEEP from 5 to 15 cm H_2O over 120 sec. Thereafter, all patients were tested with fluid challenge (7 ml/kg over 10 min). Mean arterial pressure (MAP), pulse pressure (PPV) and stroke volume variations (SVV), thermodilution cardiac index (CI) and CI determined by pulse contour analysis (PCCI) were measured using $PiCCO_2$ monitor (Pulsion Medical System, Germany) before, during, and after mFCT and PEEP-test, and two minutes after fluid challenge. Fluid responders were defined as the patients with CI increased by ≥15 % after fluid challenge.

Results and Discussion: In the responders, mFCT resulted in significant decrease in PPV by 4 (2-6)% and SVV by 4 (3-7)%. According to receiver operating characteristic (ROC) analysis, the reduction in PPV and SVV during mFCT predicted responders to fluid load with area under the curve (AUC) 0.75 and 0.76, respectively. In contrast to PPV and SVV, PCCI and MAP did not show changes in response to mFCT. The decrease in MAP induced by PEEP-test was more prominent in responders (8 (6-13) mm Hg vs. 3 (1-8) mm Hg in non-responders ($p=0.01$) and identified fluid responsiveness with AUC 0.80. During the PEEP-test, PCCI, PPV and SVV did not demonstrate difference between responders and non-responders.

Conclusion(s): Both mFCT and PEEP-test can be used to predict fluid responsiveness in patients after coronary surgery. The response to mFCT and PEEP-test is determined by a decrease in PPV/SVV and MAP, respectively.

7AP7-11

Stroke volumes obtained by transesophageal echocardiography and thermodilution during liver transplantation are interchangeable

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Background: Cardiac output (or stroke volume) measurement by pulmonary artery thermodilution (PAT) is quite common monitoring tool during liver transplantation (LT). But, being clinical standard for many years, thermodilution is not free from some uncertainties and limitations. It is known that transesophageal echocardiography (TEE) allows to obtain stroke volume (SV) values well correlated with thermodilution ones. Much of studies used deep transgastric position of TEE probe, which is difficult to achieve during the whole LT. In addition, the majority of the research in this area was performed in cardiac surgery patients having a limited range of cardiac performance and not in patients with hyperdynamic circulation.

Goal of Study: To compare the SV values obtained by TEE from mid-esophageal (ME) and upper-esophageal (UE) levels with those obtained by PAT during LT.

Materials and Methods: The study included 45 pts who underwent LT due to end-stage of chronic liver disease. The methods of anesthesia and monitoring were uniform. Measurement of central hemodynamics using PAT was performed at least once per hour. In case of hemodynamic stability during the next few minutes after the thermodilution the pulsed wave Doppler traces in right ventricle outflow tract (RVOT) or pulmonary artery (PA) were recorded

from ME or UE levels or both. Outflow tract area was determined as accurately as possible from the adequate scans. The quality of all Doppler traces was assessed off-line. Stroke volume was calculated as the product of velocity time integral and outflow tract area. Data were expressed as M ± SD. Bland-Altman analysis was used to evaluate the interchangeability of data.
Results: Doppler traces were obtained in 39 of 45 pts from ME level and in 11of 45 pts from UE level. In each patient, at least one trace (ME or UE) could be obtained. 135 and 34 pairs of measurements were available for ME and UE levels, respectively. Mean SV obtained by thermodilution (SV-t) was 121.2 ± 36.2 ml, SV obtained by Doppler flow measurement (SV-d) was 119 ± 42,2 ml. The mean bias between SV-t and SV-d was 1,5 ml, SD of difference - 17, 6 ml.
Conclusion: SV values obtained with PA or RVOT flow measurement from mid-esophageal and upper-esophageal levels can be used instead of thermodilution ones during liver transplantation.

7AP7-12

Dynamic predictors of fluid responsiveness during thoracic surgery. A descriptive prospective study

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Background and Goal of Study: Pulse pressure variation (PPV) and stroke volume variation (SVV) could be useful indices during thoracic surgery for lung resection to optimize fluid therapy, but different factors may limit their use. Optimal threshold values for assessing fluid responsiveness in this setting are still unknown.The objective is to validate pulse contour analysis assessing how different conditions related to surgery such as one lung ventilation (OLV), patient position and open-chest conditions affect the measurement of the PPV and SVV.
Materials and Methods: 30 patients scheduled for elective lung resection. Exclusion criteria: age < 18 years, pneumonectomy and arrhythmia. Radial artery was cannulated for invasive blood pressure monitoring and additionally connected to the cardiac index (CI) trending monitor ProAQT, for continuous measurement of CI based on pulse contour analysis, stroke volume index (SVI), PPV, SVV, dPmax as an index of left contractility. Tidal volume (VT) of 8 mL/kg during two-lung ventilation (TLV) and 6 ml/Kg during OLV, FiO_2 0.6, RR to normal $PaCO_2$ and 5 cmH_2O of PEEP.
Crystalloid were infused at a rate of 3 ml/kg/h. Studied parameters were recorded at six different time-points after 3 min of hemodynamic stability. Data were tested for normal distribution with the Kolmogorov-Smirnov test. T student test was used. Data are presented as mean (SD). The Pearson correlation between SVV and PPV and % changes in SVV and PPV were assessed using linear regression.
Results and Discussion: PPV and SVV indices decreased compared to baseline values when surgical conditions were established with a change of 30% and 32% respectively, mainly related to OLV (20% change) and patient lateral position (10% change) (PPV, p< 0,01; 95% CI4.0-8.7; SVV, p=0,02; 95% CI4.8-8.0). Open-chest did not affect indices (PPV, p=0,8; 95% CI-1.5 - 1.2; SVV, p=0.8 95% CI-1.9 - 1.6). Percentage changes in PPV and SVV during the different conditions were correlated with their baseline values (PPV, r = 0,77; p=0,02; SVV, r = 0,68; p< 0,01). Preload postload and contractility were constant during the study period.
Conclusion: Variations in PPV and SSV are produced by variations in pleural and transpulmonary pressures predominantly related to OLV and patient position. The correlation of these indices during surgery with their baseline values suggests that PPV and SVV with a percentage correction (30%) could be used in thoracic surgery to guide fluid therapy.

7AP8-1

Anaesthesiologic point of view at abdominal aortic fast tracking

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Background: Elective abdominal aortic surgery is aggressive and high risk procedure with mortality of 4-5%. Fast track program was introduced to improve outcome, hospital length of stay and costs. The goal of this study was to work out and to implement into clinical practice fast track protocol for abdominal aortic surgery.
Materials and Methods: 67 patients undergoing elective open abdominal aortic aneurysm repair or aortofemoral bypass were included. The Fast track protocol (27 patients) integrated pressure support ventilation after the main surgical stage of the procedure, intra- and postoperative prolonged epidural analgesia (not less than 48 hours), goal-direct therapy based on pulse pressure variation, early or immediately extubation after procedure. Conventional protocol (40 patients) included controlled mechanical ventilation during all stages of the procedure, only intraoperative use of epidural analgesia and liberal infusion therapy. Both groups are equal for age, American Society of Anesthesiologist physical status, summary blood loss and time of aortic cross-clamping. Data are presented as median and [interquartile range, IQR].
Results: Total positive fluid balance was less in the fast track group (7,7 mL/kg/hr [6,3;9,2] vs. 9,8 mL/kg/hr [7,6;11,5], P< 0,05). All patients of the Fast track group and only 62% patients of the conventional group were extubated immediately in the operation room. PaO2/FiO2 ratio (PF) during surgery, extubation and in the intensive care unit was similar in both groups, but next day after surgery it was 357 mmHg [297;445] in the Fast track group vs. 295 mmHg [280;380] in the conventional group (P=0,07). PF decreased less in patients receiving pressure support ventilation (17% vs. 44%, P=0,003). Implementation of the Fast track protocol reduced hospital length of stay by 4 days (7 d [6;8] vs. 11,5 d [9,5;18,5], P< 0,05).
Conclusion and Discussion: This Fast track protocol allows immediate extubation in the operation room. This apparently reduces negative effect of prolonged ventilation and allows to reduce hospital length of stay which decreases total costs of treatment.

7AP8-2

Systematic nasogastric tube in aortic surgery: is it necessary?

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Background and Goal of Study: Routine nasogastric tube (NGT) decompression has been traditionally used to prevent nausea and vomiting after abdominal surgery. Besides many studies having demonstrated no benefits derived from this practice after an elective laparotomy, Little evidence has been published regarding its employment in aortic surgery. In this study, we analyze the effects of the selective use of the NGT in patients undergoing infrarrenal aortic surgery in our center.
Materials and Methods: Prospective cohort study including patients who underwent elective infrarrenal aortic surgery between January 2013 and December 2014. Patients were prospectively included in group A (systematic NGT placement) and group B (non-systematic NGT). The main end point was the occurrence of postoperative nausea and vomiting (PONV). Secondary end points were postoperative complications, time to first oral intake, and hospital stay.
Results and Discussion: One hundred patients were finally included in the study, 50 patients per group. Preoperative and intraoperative data were similar between both groups. Higher incidence of PONV (48% vs. 10%; RR 2.4, CI 95% 1.3-4.5, p=0.003) was observed in group A. Selective NGT behaved as a protective factor regarding earlier first oral intake in first postoperative 48 hours (HR 0.67, CI 95% 0.45-0.99, p=0.05). There were no differences in other adverse events although a trend toward fewer respiratory complications was observed in patients with non-systematic NGT.
Conclusion(s): This study demonstrates higher incidence of PONV and longer time to first oral intake in patients with systematic NGT with no benefits derived from this practice. Based on these results, selective NGT decompression should be encouraged in patients undergoing infrarrenal aortic surgery.

7AP8-3

Pulmunary complications after open abdominal aortic surgery: a systematic review

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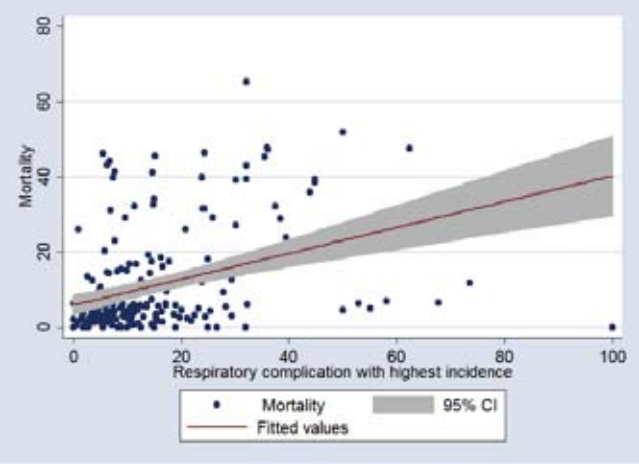
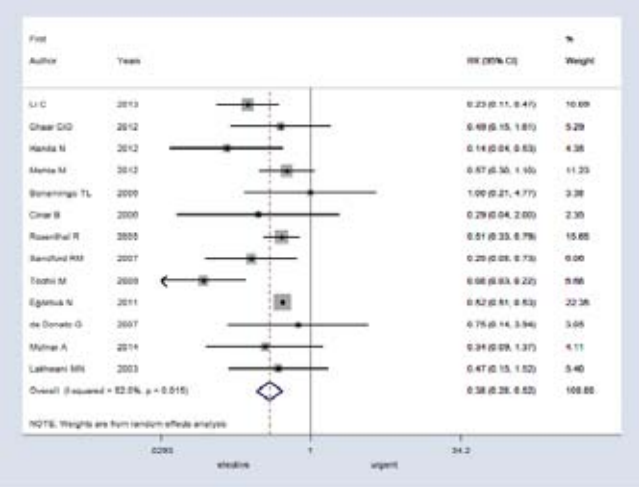
Background and Goal of Study: Postoperative pulmonary complications (PPC) are among the most frequest reported complications after non-cardiac surgery. Male, smokers, older patients and those with a history of chronic obstructive pulmonary disease or congestive heart failure are more likely to

experience PPC. The majority of patients undergoing vascular surgery belong to these categories and, therefore, are at higher risk of developing PPC. Moreover surgical site is one of the most important risk factors associated with the development of PPC and aortic surgery, togheter with upper abdominal and thoracic procedures, carries the highest risk. The aim of this systematic review is to obtain a further understanding of the real incidence of PPC after open abdominal aortic surgery and their impact on survival.
Materials and Methods: Literature search was performed on several databases by two trained investigators. All observational or randomized clinical trials reporting data on PPC after open abdominal aortic surgery were included. Exclusion criteria were: lack of data on PPC; thoracoabdominal or laparoscopic surgery. Primary endpoint was PPC rate after open abdominal aortic surgery. Secondary endopoint was the correlation between PPC and perioperative mortality. The Pearson correlation was used for statistical significance. Subanalysis were performed on elective and urgent surgery setting.
Results and Discussion: Data of 263,712 patients from 220 studies were analyzed.
Prolonged mechanical ventilation, hypoxia, atelectasis, pneumonia, pleural effusion, pulmonary edema, respiratory distress syndrome and need for postoperative invasive or non-invasive mechanical ventilation are the most common PPC reported in literature. Occurrence of PPC appears to be strongly related to postoperative mortality (rho= 0.655, p=0.001) (Fig 1), both in elective and urgent surgery. Moreover incidence of PPC is significantly higher in urgent surgery (p for effect =0.0001, I^2=52%, p for heterogeneity=0.015). (Fig.2)
Conclusions: Incidence of PPC after open abdominal aortic surgery is very high and strongly contributes to increase postoperative morbidity and mortality. The identification of all the possible strategies, processes of care or preventive measures able to reduce the incidence of PPC may help to improve outcome and survival of vascular surgery patients.



[Fig 1. Correlation between incidence of pulmonary]



[Fig 2. Forest plot for postoperative pulmonary com]

7AP8-4

Evolution of renal function in abdominal aortic aneurysm surgery with suprarenal cross-clamping

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Background and Goal of Study: To analyse the effects of suprarenal cross-clamping (SC) as opposed to the infrarenal position (IC) in the evolution of the renal function abdominal aorta aneurysm (AAA) surgery.
Materials and Methods: A retrospective cohort study of AAAs treated by elective open surgery between 2001 and 2014. The preoperative level of serum creatinine (mg/dL) was determined and compared to postoperative level at 24, 48, 72 and 96 hours, and on discharge. A deterioration in the renal function was defined as a creatinine >2 mg/dL in patients with a normal baseline creatinine level or an increase of double the baseline creatinine in patients with a previous chronic renal insufficiency (CRI). A deterioration of the glomerular filtrate (GF) was defined as a > 25% decrease. Multivariable analysis was performed on the evolution of the renal function.
Results and Discussion: A total of 464 AAA's were analysed, 359 (77.4%) with IC, and 105 (22.6%) with SC. The prevalence of preoperative CRI was similar in both groups. The type of clamp was not associated with a deterioration in the renal function (SC = 8.6% vs. IC = 5.7%; p = .13) but was associated with a deterioration of the GF (SC = 27.6% vs. IC = 13.4%; p = .001). The time the clamp was in place, the blood loss, and the preoperative CRI were independent risk factors for the deterioration of the renal function. The type of clamp increased the risk of deterioration of the renal function beyond 30 minutes (p = .001), being independently associated with a deterioration in the GF (OR 2.04; 95% CI: 0.94-4.47).
Conclusion(s): With SC less than 30 min, in patients with a creatinine level, a deterioration in the renal function is not foreseeable. With prior CRI, or if a prolonged SC is foreseen, a deterioration in the renal function can be expected, thereby making it necessary to evaluate methods for renal protection.

7AP8-5

Postoperative thoracic and low back pain following endovascular aortic repair are associated with stenting location - retrospective observational study

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Background and Goal of Study: Postoperative pain is important for early detection of complications and new-onset disease following surgery. Endovascular aortic repair is a revolutionary minimally invasive surgical method for treatment of thoracic and abdominal aortic aneurysms or dissection. However, some patients have complained of chest or back pain following that repair. Based on our speculation that postoperative chest or back pain, so-called "stenting pain", is correlated to the region of the indwelling stent, we investigated postoperative pain in patients who underwent endovascular aortic repair.
Materials and Methods: We retrospectively investigated the records of patients who underwent endovascular aortic repair from April 2010 to October 2012, with patient background, location of stent placement, and postoperative pain that required analgesics within 24 hours after surgery noted. Thoracic pain was defined as pain in the upper or middle back, chest, or shoulder, as well as hypogastric pain. A stent graft located in the thoracic aorta was termed "TEVAR", while that in the abdominal aorta was termed "EVAR". We investigated the relationship between stent location and postoperative thoracic and low back pain. Data are shown as the mean ± SD. A chi-square test was used for statistical analysis, with significance set at P<0.05.
Results and Discussion: We analyzed the records of 96 patients (mean age 74.5±8.9 yo, 71 males), of whom 68 underwent TEVAR and 28 EVAR procedures. All received anesthesia with propofol, remifentanil, and ropivacaine, which was locally injected into the surgical wound site. The incidence of thoracic pain was significantly higher in patients with TEVAR as compared to EVAR (26.5% vs. 3.8%, P=0.01), while that of low back pain was significantly higher in patients with EVAR (35.7% vs. 16.2%, P=0.04).
Our findings showed a consistent association of both thoracic and low back pain after endovascular aortic repair with stenting location. Notably, thoracic

pain rarely occurred in the EVAR patients, thus it is important to doubt new-onset disease if a patient complains of chest pain after undergoing an EVAR procedure.
Conclusion(s): Thoracic and low back pain after endovascular aortic repair are associated with stenting location.

7AP8-6

Intraoperative support ventilation and high risk vascular surgery

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Background: Decreasing of prolonged mechanical ventilation with early switching to pressure support ventilation could be reliable for reduction of postoperative respiratory complications. There is evidence of usefulness of spontaneous ventilation during low risk surgery. Its usability during high risk surgery is unclear. The goal of this study is to work out and to implement algorithm of application of support ventilation modes.
Patients: 50 patients undergoing abdominal aortic surgery were included. Inclusion criteria: intra- and postoperative prolonged epidural analgesia (not less than 48 hours), goal-direct therapy based on pulse pressure variation, early or immediate extubation after procedure.
Results: All patients were randomized either to initiation of pressure support ventilation after the main surgical stage of the procedure (the PSV group) or to controlled mechanical ventilation during whole procedure (the CMV group). There is no difference in age, American Society of Anesthesiologist physical status, and blood loss between the groups. Time of the procedure and aortic cross-clamping was greater in the PSV group (216 min [181;273] vs. 183 min [133;230], P< 0,05; 40 min [30;58] vs. 21 min [16;41], P< 0,05).
Patients of the PSV group were in ventilated in pressure support mode for 47% of the duration of the procedure.
All patients of the PSV group and only 80% patients of the CMV group were extubated immediately in the operation room. PaO2/FiO2, spirometry, pulmonary shunt, awake time and duration of stay in the intensive care unit were similar in both groups. There was 3 cases of recurarisation that required neostigmine, 1 case of atelectasis and 2 cases of acute lung injury in the CMV group (P< 0,05). A total dose of paralytic agent (cisatracurium) was 0,83 mg/kg/hr in the PSV group and 1,2 mg/kg/hr in the CMV group (P=0,055). Hospital length of stay was 7,5 days in the PSV group and 8,5 days in the CMV group (P=0,07). Postoperative 10-point visual analogue comfort score was better in the PSV group (6 [5;7] vs. 8 [6;9,5], P< 0,05).
Conclusion: Intraoperative application of pressure support ventilation allows immediate extubation in the operation room. It reduces respiratory complications and allows avoiding recurrence of myoplegia. Intraoperative protocol of pressure support ventilation reduces hospital length of stay.

7AP8-7

Reversal of neuromuscular blockade and tracheal extubation in internal carotid artery surgery

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Background and Goal of Study: Recovery and tracheal extubation are potentially dangerous intraoperative period in internal carotid artery surgery that is due above all to the risk of hemodynamic instability. It is important to ensure smooth recovery, as well as prompt recovery of spontaneous breath, and use all means of hemodynamic control during this period. Estimation of effectiveness of Sugammadex and antireflexive endotracheal tube in anaesthetic support scheme.
Materials and Methods: Prospective randomized controlled clinical patient study was approved by the Committee on Ethics of the # 1 Primorsky Krai Clinical Hospital. All patients were split into two groups. Those of the control group (n-32) were using traditional endotracheal tube, taking neostigmine for decurarization. Patients in the treated group (n=30) were using antireflexive endotracheal tube, with 40 mg of Lidocaine 2% solution being injected into its irrigation port 10 minutes prior to anticipated recovery, and taking Sugammadex for reversal of neuromuscular block. All patients were comparable by gender, sex, comorbidity, type and duration of surgical intervention, and anaesthetic method. Systemic hemodynamics and neuromuscular conductivity indices, as well as duration of postoperative artificial pulmonary ventilation were estimated. Obtained data were processed using Microsoft Excel-2003 and Statistica for Windows - v. 6.0 software.
Results and Discussion: Hemodynamic profiles had unidirectional pattern in both groups, yet significant difference in hemodynamic values between two groups that were in average higher in the control group by 16,4 - 22,.2% ($p<0.05$) was noted too. Average heart rate values of in the treated group were significantly lower ($p<0.05$) than those in the control one by 12.2 - 16.1%. Emergence of spontaneous sustaining breathing and good muscle tone recovery to the TOF level of 0.9 were noted virtually immediately for patients in the treated group. It allowed to cut the duration of postoperative artificial pulmonary ventilation 1.4 times, comparing with the control group ($p<0.05$).
Conclusion(s): Combined application of Sugammadex and antireflexive endotracheal tube in internal carotid artery surgery provides extra opportunities for hemodynamic control during potentially dangerous anesthesia and promotes fast and complete recovery of muscle tone and spontaneous breathing, which allows to cut the duration of postoperative artificial pulmonary ventilation.

7AP8-8

Sedation with dexmedetomidine or propofol for carotid endarterectomy, a randomized controlled trial

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Background and Goal of Study: Sedation of the patient during operation under regional anesthesia improves the quality of anesthesia and is sometimes mandatory. Many sedative agents like benzodiazepines, narcotic analgesics, propofol, and dexmedetomidine have been used for sedation. We aimed to compare sedative and hemodynamic effects of dexmedetomidine and propofol given for sedation to patients undergoing operation under regional anesthesia.
Materials and Methods: After the approval of Local Ethics Committee 28 patients of ASA 1-3 physical status, aged 50-80 years-old, scheduled for carotid endarterectomy operation under superficial and deep cervical plexus blockade, were enrolled for the study. Patients were randomly allocated into two groups, each containing 14 patients. 0.5 mg/kg/h propofol infusion in the first group (Group P) and 0.2 μg/kg/h dexmedetomidine infusion in the second group (Group D) were given. Systolic, mean, diastolic arterial pressures (SAP, MAP, DAP), heart rates (HR) and Ramsey Sedation Scores (RSS) of the patients were recorded. In comparison of quantitative data Student-t and Mann Whitney U tests were used to compare normal and abnormal distribution parameters between groups, respectively. Comparing normal distribution parameters and abnormal distribution parameters in each group paired sample t-test and Wilcoxon signed-rank tests were used, respectively. In comparison of qualitative data Chi-Square and Fisher's Exact Chi-Square tests were used. Significance was accepted with $P<0.05$.
Results and Discussion: MAP, DAP and SpO_2 values were significantly lower in Group D compared with Group P, ($P<0.05$); but this difference had no clinical significance. RSS scores achieved targeted values, but two groups revealed no significant difference, ($P>0.05$). The main consequence of our study was that, both dexmedetomidine and propofol, administered for sedation in regional anesthesia, provided adequate increase in sedation levels. There was no superiority of any of the agents regarding sedation levels. Hemodynamic and respiratory parameters were altered with either agent, whereas these were not significant clinically.
Conclusions: Both propofol and dexmedetomidine can be safely used for sedation in patients undergoing carotid endarterectomy under regional anesthesia, if the appropriate monitoring conditions are provided.

7AP8-9

Morphological variation of the carotid artery bifurcation level

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Background and Goal of Study: Knowledge of carotid bifurcation is important for vascular surgical procedures in the region, such as carotid endarterectomy or radical neck dissection, catheterization and aneurysms. Carotid sinus hypersensitivity is an exaggerated response to carotid sinus baroreceptor stimulation.
Materials and Methods: 100 subjects were randomly selected in in-patient and out-patient. All measurements were performed on 100 subjects (40 female and 60 male), ranging in age from 18 to 104 years. The subjects were candidates for computed tomography angiography (CTA).
Results and Discussion: Carotid bifurcation level was compared to the level of cervical vertebra. Most of carotid bifurcations (CB) were found at the level of C3. The vertebra level of CB was differently distributed in distance of the whole neck measured along the vertebral column between upper border of C1-C2 to lower border of C5. 54% of the level of CB was asymmetrical between the right and left side. It is commonly accepted that the carotid artery bifurcation occurs about the level of C Ⅳ for radiological purpose. Our findings call attention to the fact that vertebral level of the carotid arteries bifurcation are the clinically relevant variations of the location of carotid bifurcation should be considered by surgeons performing procedures in neck area.
Conclusion(s): Risky surgical processes for stimulation of the carotid sinus should also be discussed with the surgeon before and during surgery. Anesthesiologists should pay more attention to vital sign monitoring and thorough preparations for emergency for surgical procedures that involve manipulation of the carotid sinus.
Acknowledgements: We appreciate for Shiga University of Medical Science to support this study.

7AP8-10

V-POSSUM score for carotid endarterectomy: friend, foe or accomplice?

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Background and Goal of Study: Surgical performance measured by scoring systems and risk prediction models allow to compare outcomes but should be regularly retested against a changing surgical patient population. The aim of this work was to determine the applicability of risk score V-POSSUM for carotid endarterectomy, a high risk procedure with no risk prediction score so far, in our population and explore predictive factors.
Materials and Methods: We conducted a retrospective study, approved by the Clinical Research and Ethics Committee of Santa Maria University Hospital of Lisbon. All patients submitted to elective carotid endarterectomy (CEAs), under general anesthesia, in 2013 were included. Data were collected based on pre-anesthetic evaluation sheets and the clinical process. Patients with missing data were excluded from the study. All analyses were performed using the statistical software IBM SPSS Statistics 19, using χ^2 and Spearman Correlation test. A p-value < 0.05 was considered statistically significant.
Results and Discussion: 133 patients were submitted to analysis. Most were men (69%) with a median age of 70,3 years old. Cardiovascular disease was the most prevalent comorbidity (93,2%). Although there was a correlation (correlation coefficient of 0.196 for mortality and 0,017 for morbidity), this was not statistically significant ($p>0,05$). Deaths and morbidity were over-predicted by a factor of more than two. We aimed to evaluate the inclusion of other factors however failed due to missing data. Patients who had bilateral stenosis (52,8%), didn't had significant statistical association with mortality and morbidity. This sample was not powered to find differences in mortality and morbidity, which could have attenuated the results. However like previous studies have shown, we found that V-POSSUM not only didn't have statistical correlation, but also, over-predicted these outcomes. On the other hand, risk prediction scores need to be population/procedure adjusted remain a useful guide for decision-making.
Conclusion(s): V-POSSUM over predicted mortality and morbidity in this population for CEA. We didn't find other risk factors that stand out for a CEA specific risk model. National guidelines on CEA for asymptomatic patients state that the procedure should be performed with a $\leq 3\%$ risk of perioperative death or stroke. This reinforces the need to revise, adjust and update V-POSSUM or to develop a CEA-specific risk score.

7AP8-11

Neurologic monitoring during carotid endarterectomy (CEA) - a guide for a successful outcome

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Background: Transcranial Doppler (TCD) and stump pressure (SP) are indirect methods of neurological monitoring used in CEA surgery to determine the adequacy of cerebral perfusion and guide the need for shunt insertion, blood pressure (BP) control and modification of surgical approach. Additionally TCD can detect thrombotic occlusion and microemboli, and predicts the risk of postop hyperperfusion syndrome.[1] We report a case of a patient undergoing CEA in whom both TCD and SP monitoring were used, reviewing the intraop advantages of their use.
Case report: 79 years old male, with history of hypertension, sleep apnea and right cerebral hemisphere stroke 3 months before, without sequelae; treated with indapamide, irbesartan, aspirin and overnight CPAP. Admitted electively to right CEA surgery. Preop evaluation revealed: unremarkable neurological examination; Carotid Doppler ultrasonography with right carotid artery (CA) occlusion and 90% stenosis of the left CA. General anesthesia was induced, under standard monitoring, associated with IBP, BIS and TCD. During the procedure there were transient changes in blood flow velocitiy (vFlow) associated with episodes of hypotension, which ceased after BP increment with ephedrine boluses. After IV administration of heparin, CA was occluded, producing a significant decrease in vFlow (18cm/s). SP measured below 50mmHg. TCD returned to baseline following shunt insertion. After atheroma resection, lumen washing and suture, shunt was withdrawn and the clamps sequentially removed. During shunt removal, TCD tracings had high intensity transients and produced a chirping sound consistent with gaseous emboli. The patient was extubated uneventfully and transferred to the PACU, where he stayed under surveillance. Discharged at day 3, with overlapping postop neurological evaluation and no signs of hyperperfusion at TCD.
Discussion: Taken separately, no method can reproduce the detection of brain ischemia during CA cross-clamping achievable with regional anesthesia.[2] However, a combination of SP and TCD appear to deliver the best results, determining accurately the patients who benefit from shunt insertion, whose liberal use isn't harmless. Real time monitoring identifies potential intraop complications, allowing immediate changes in anesthetic and surgical techniques, thus preventing the occurrence of postop morbidity.
References:
1. *Br J Anaesth* 2007 99(1):119-31
2. *Can J Anesth* 2013 60:266-279

7AP8-12

Carotid endarterectomy, what if the patient was awake?

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Background: Management of carotid bifurcation stenosis is a cornerstone of stroke prevention. Carotid endarterectomy(CE) is the first line treatment for most symptomatic patients with stenosis of 50-99% and asymptomatic with stenosis of 60-99%. The perioperative risk of stroke and death in asymptomatic patients must be < 3% to ensure benefit. In intra and pos operative periods there are changes in cerebral perfusion that need to be assessed. A carotid artery stump pressure (SP) of < 50 mmHg has been sugested as na indication for selective shunt in CE under general anesthesia. We report a case of a patient in whom cerebral oximetry monitorization was not a reliable indicator of real cerebral perfusion.
Case report: A 70 year old, autonomous, man with diabetes and hypertension, admitted for left CE. ASA standard monitorization was ensued and intravenous cannulation was performed. INVOS and BIS monitorization were used. Left radial artery was catheterized and induction of anesthesia made with remifentanil perfusion, propofol and rocuronium bolus. TIVA with remifentanil and propofol were administred for maintenance. Carotid artery SP was < 50 mmHg but no ischemic event was suspected because INVOS did

not reveal a variation superior to 10%. At the end of anesthesia the patient revealed aphasia and right hemiparesis. He took a CT scan, half an hour later,that showed a recent stroke in the middle cerebral artery territory. The angioCT revealed a kinking of the endovascular prosthesis. He was immediately re-operated. During the post-operative period, recovery of aphasia and right hemibody strength was not complete.
Discussion: Cerebral perfusion monitorization is controversial, but awake patient still is most sensitive and specific, allowing permanent assement of consciousness level, speech and muscular strength, detecting symptomatic intraoperative complications
References:
Howell SJ et al. Carotid endarterectomy Br. J. Anaesth. (2007) 99 (1):119-131.
Learning points: Awareness should be raised not to guide our medical judgment solely by one form of monitoring which can be misleading. Also, attention should be paid to patient clinical status after awakening from anesthesia in order to diagnose any complication that can be solved in time, which can lead to a quicker recovery.

7AP9-1

Role of sirtuins in cardioprotection by ischemic and anesthetic preconditioning

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Background and Goal of Study: Sirtuins (SIRTs), class III histone deacetylation enzymes, exert anti-aging effects. Seven SIRT types (SIRT1-SIRT7) exist in humans. SIRT3 was recently reported to protect cardiomyocytes from oxidative stress-mediated cell death [1]. Our study aimed to determine whether SIRTs are involved in cardioprotection by ischemic and anesthetic preconditioning (IPC and APC, respectively).
Material and methods: The protocol was approved by the institutional Animal Care and Use Committee. Following thoracotomy and establishment of baseline values, male C57BL/6 mice (8-10 weeks old; 21-26 g) were assigned to 1 of 4 experimental groups. The Resv group received resveratrol, active agent of SIRT (10 mg/kg) 60 min before coronary artery occlusion (CAO). The IPC group was pretreated with 5 min of CAO and 15 min of reperfusion. In the APC group, isoflurane (1.0 MAC) was administered for 30 min and discontinued 15 min before CAO. The Control group underwent thoracotomy without pretreatment. All mice then underwent 30 min of CAO followed by 2 h of reperfusion. Thereafter, myocardial infarct size and area at risk of ischemia were measured by Evans blue dye and TTC staining. In the next experiment comprising different mice in the IPC, APC and Control groups, after IPC or APC stimulation as above, ventricular muscle was dissected and RNA was extracted. cDNA was synthesized, and expression levels of mRNAs of SIRT1 and SIRT3 were measured using real-time PCR. Statistical analysis was performed with one-way ANOVA followed by Scheffé's test. Data are expressed as mean±SD. *P* values of < 0.05 were considered statistically significant.
Results: Compared with the Control group, myocardial infarction size in the Resv group was reduced significantly (29±6%, n=6 vs. 42±4%, n=6). Myocardial infarction size also decreased significantly in the IPC and APC groups (31±7%, n=6; 28±7%, n=6, respectively) compared with the Control group. In the IPC and APC groups, the expression levels of mRNAs of SIRT1 and SIRT3 standardized by GAPDH increased significantly compared with those of the Control group (SIRT1: 2.951±0.044, 3.915±0.255, 1.319±0.063; SIRT3: 3.495±0.566, 3.449±0.797, 1.230±0.263, respectively).
Conclusions: Expression of SIRT1 and SIRT3 genes in myocardium was induced by IPC and APC, which suggests that SIRTs are involved in myocardial protective effects of IPC and APC.
Reference: 1. Chen CJ, Fu YC, Wang W, Biochem. Biophys. Res. Commun. 2013;430:798-803

7AP9-2

Effects of isoflurane post-conditioning on ischemia-reperfusion heart injury healing in rats

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Background and Goal of Study: Re-establishment of the blood flow in coronary arteries paradoxically exacerbates the initial damage caused by the ischemia itself. Application of isoflurane at the beginning of reperfusion results in an early-phase increase of progenitor cells number and proliferation of new blood vessels. The main effect detected in chronic phase of infarct healing was a smaller number of progenitor cells. The aim of this study was to investigate weather isoflurane post-conditioning has positive effect on the myofibroblast number and dinamic of scar formation.
Materials and Methods: Ischemia was induced in Sprague-Dawley female rats for 30 minutes. Starting from the last 5 minutes of ischemia up until 10 minutes into reperfusion time, the isoflurane group (n=8) recieved 1.5% of isoflurane, while the control group (n=8) received only an air/oxygen mixture. The animals were left to survive 4 days (subacute phase of infarct healing) or 14 days after reperfusion (chronic phase). Colocalization of Nestin and -smooth muscle actin (SMA) antibodies was used as a marker of "de novo" formed myofibroblasts from progenitor cells. SMA alone was used as a marker of all myofibroblasts and mature blood vessels. For statistical comparison between groups we used t-test.
Results and Discussion: In subacute phase of infarct healing the number (mean ± SD) of myofibroblasts was significantly higher in isoflurane treated animals (2431.6 ± 331.3) in comparison to the control group (1321.8 ± 293.5), p=0.002, however significant difference was not found when comparison of "de novo" formed myofibroblasts was done (p=0.056). In the chronic phase of infarct healing, postconditioned animals had significantly lower number of myofibroblasts (197.5 ± 47.1 vs. 290.0 ± 57.1, p=0.046), including those derived from progenitor cells (23.3 ± 4.6 vs. 40.7 ± 8.6, p=0.011), and also higher percentage of mature blood vessels (61.2 ± 2.9 vs.45.5 ± 4.3, p=0.029). The effect that isoflurane postconditioning had on both, the granulation tissue formation and the appearance of infarct area in chronic phase suggested faster dynamics of infarct healing.
Conclusion(s): Isoflurane treated animals had higher number of myofibroblasts in granulation tissue. The smaller quantity of myofibroblasts along with the higher number of mature blood vessels found in the chronic phase indicate faster healing of the infarct area in isoflurane-treated animals.

7AP9-3

Mitochondrial ATP-sensitive potassium channels play a role in reducing both myocardial infarction and reperfusion arrhythmia in remote ischemic preconditioned heart

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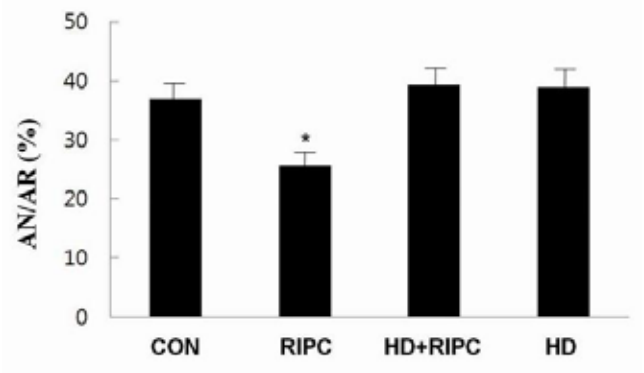
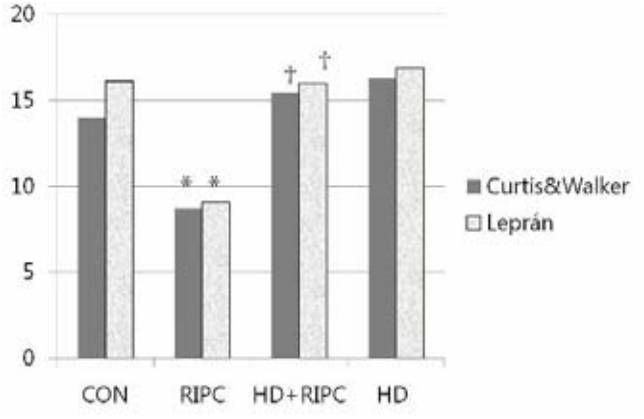
Background and Goal of Study: It has been proposed that the mitochondrial ATP-sensitive potassium (mKATP) channels play a role in reperfusion arrhythmias (RAs) in ischemia-reperfusion (I/R) injury. Although there is evidence that remote ischemic preconditioning (RIPC) reduces RAs, there is few data about relationship between RIPC and mKATP channel.
Therefore, we evaluated whether mKATP channels are associated with reducing both infarct size and arrhythmia in RIPC.
Materials and Methods: Isolated rat hearts were subjected to 30 min of regional ischemia and 2 hr of reperfusion through Langendorff perfusion apparatus. RIPC was induced by 3 cycles of 5 min of occlusion and 5 min of release of bilateral femoral artery. The animals were randomly divided into 4 groups as follows;
1) CON, I/R injury but not RIPC,
2) RIPC,
3) HD+RIPC, pretreatment of a selective mKATP channels blocker 5-HD in RIPC, and
4) HD, pretreatment of 5-HD in CON.
Cardiodynamics and infarct size (AN/AR) were determined. The severity of arrhythmia were quantitated via two modified scoring system by Curtis and Walker and Leprán.

Score	Curtis and Walker	Leprán
0	<10 PVC	No arrhythmia
1	10-50 PVC	≤10sec VT or other arrhythmia, no VF
2	>50 PVC	11-30sec VT or other arrhythmia, no VF
3	1 VF	31-90 sec VT or other arrhythmia, no VF
4	2-4 VF	91-180 sec VT or other arrhythmia, and/or <10 sec reversible VF
5	>4 VF	>180 sec VT or other arrhythmia, and/or >10 sec reversible VF
6		Irreversible VF

[Arrhythmia scoring system]



[Measurement of infarct size]



[Arrhythmia score]

Conclusion(s): In conclusion, mKATP channels play a role in reduction of both infarct size and RAs in RIPC.

7AP9-4

Upper and lower limbic remote ischemic preconditioning does not induce cardioprotection in patients undergoing cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Remote ischemic preconditioning (RIPC) provides perioperative myocardial protection and improves the prognosis of patients undergoing cardiac surgery with cardiopulmonary bypass (CPB). RIPC evokes activation of signal transducer and activator of transcription 5 (STAT5) and organ protection. We hypothesized that the amount of remote ischemic tissue affects the effect of target organ protection.
Patients and methods: With IRB approval and informed consent obtained from each patient, 18 adult patients undergoing scheduled simple aortic valve replacement (AVR) were enrolled in this study. Patients were randomly allocated to ULPC, LLPC or Control group. Anesthesia was induced and maintained with propofol, remifentanil and rocuronium. In ULPC group, after anesthesia induction, RIPC comprised four cycles of 5-minute left upper arm ischemia induced by inflating a cuff to 180 mmHg with an intervening 5 minutes reperfusion. In LLPC group, RIPC comprised four cycles of 5-minute left thigh ischemia induced by inflating a cuff to 180 mmHg with an intervening 5 minutes reperfusion. In Control group, a cuff was placed around the left upper arm and left uninflated. The postoperative level of serum creatine kinase isoenzyme MB (CK-MB) and estimated glomerular filtration rate (eGFR) and the postoperative peak level of creatine kinase (maxCK) were recorded. Data were compared using ANOVA followed by Fisher's PLSD. A p-value < 0.05 was considered statistically significant.
Results and Discussion: Demographic data showed no significant difference. The results are shown in table. CK-MB, maxCK and eGFR showed no significant difference. In this preliminary study, our result shows both RIPC is neither cardio- nor reno-protective. One reason may be propofol anesthesia. Propofol is reported to interfere with RIPC.
Conclusion: Both RIPC with upper arm and RIPC with thigh failed to show cardiac and renal protection.

		ULPC	LLPC	Control	p
maxCPK (IU/l)		617 ± 493	633 ± 328	597 ± 298	0.992
CK-MB (ng/ml)	at arrival in ICU	24.3 ± 14.3	23.1 ± 7.9	41.5 ± 38.1	0.241
	POD1	21.3 ± 13.9	30.4 ± 28.0	39.0 ± 27.9	0.323
	POD2	7.9 ± 4.4	9.6 ± 5.9	11.5 ± 13.2	0.434
	POD3	3.2 ± 2.0	3.1 ± 1.1	7.9 ± 12.4	0.176
eGFR (ml/min/1.73m^2)	at arrival in ICU	64.2 ± 17.6	49.1 ± 15.0	53.3 ± 21.4	0.142
	POD1	48.5 ± 13.0	32.1 ± 9.9	44.8 ± 20.3	0.098
	POD2	54.4 ± 14.7	37.5 ± 21.9	53.0 ± 26.0	0.215
	POD3	60.8 ± 20.8	38.7 ± 20.9	60.3 ± 28.7	0.151

[Myocardial Damage and Renal Function]

7AP9-6

Ischemia-reperfusion lung injury in pigs influences the respiratory function whatever the anesthetic

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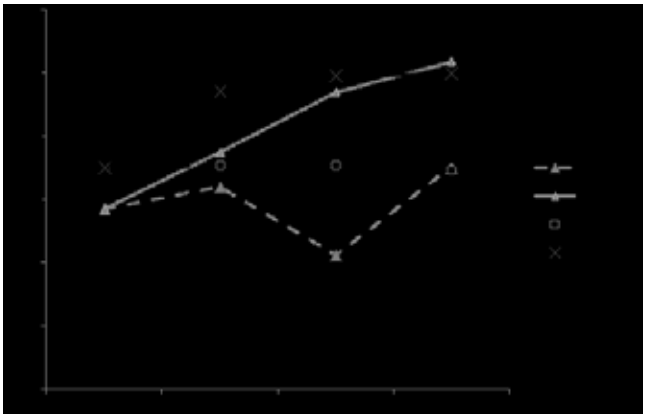
Background and Goal of Study: Lung transplantation leads to a lung ischemia/reperfusion (I/R) syndrome with a high risk of lung injury. Current studies about one-lung ventilation have suggested the influence of anesthetics on this response.
The aim of the study was to compare two anesthetics (Sevorane and Propofol) on the respiratory function of experimental I/R.
Materials and Methods: 18 pigs were included accordingly to the Swiss experimental board (GE14-04) and were randomized in two groups: group SEVO, for Sevorane and group PPF, for Propofol. Both drugs were administrated during the whole experiment. A double-lumen tube was placed by tracheotomy to allow one-lung ventilation and a clamping of the pulmonary artery was performed during 60 minutes. Then a post I/R period of reperfusion was respected for 75 minutes.
At every step, hemodynamic including continuous Swan-Ganz measurements and respiratory data were collected, especially arterial gas, lung morphology with ultrasound and measurements of Forced Oscillation Technique. Comparison between ventilated and non-ventilated lung and between groups were performed.
Results and Discussion: 15 pigs completed the study. No difference between anesthetics was detected during the clamping period and after both lung ventilation about criteria as hemodynamic and gazometry.
Nevertheless reperfusion led to a significant difference in ischemic lung in PPF group concerning lung ultrasound. FOT demonstrated a significant difference in resistance airway between ventilated and non-ventilated lung with a delayed impairment in SEVO but similarity between groups at the 75th minute (Figure).



[Comparison PPF and SEVO]

Conclusion(s): In this context, the pro-inflammatory response was slightly delayed in the group SEVO with a slow compartmentalization of the injury following lung reperfusion. There was no delayed difference in I/R reperfusion whatever the anesthetics.

References: Schilling T, Kozian A, Senturk M, Huth C, Reinhold A, Hedenstierna G, Hachenberg T. Effects of volatile and intravenous anesthesia on the alveolar and systemic inflammatory response in thoracic surgical patients.Anesthesiology. 2011 Jul;115(1):65-74

7AP9-7

Anesthesic preconditioning preserves endothelial glycocalix from lung ischemia reperfusion injury in an experimental model of lung autotransplant in PIGS

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Background and Goal of Study: Healthy lung vascular endothelium is coated by the glicocalix, that's a structure consisting mainly of proteoglycans and glycoproteins carrying covalently glycosaminglycans. It's important in multiple edothelial funcitons, but is severely damaged by lung ischemia-reperfusion injury.

We evaluated the effect of anesthesic preconditioning with sevoflurane on integrity of lung endothelial glycocalix in an experimental model of lung autotransplant in pigs.

Materials and Methods: Two groups (sevoflurane and propofol) of 6 large white pigs were submitted to a left lung autotransplant (ischemia time 111±13 min.). We catetherized femoral and pulmonary arteries. In one group, we used sevoflurane 3% until left pulmonary artery was clamped, then we continued with propofol. In the other group we used propofol throughout the process. Measures of glycocalix damage were made using Heparan sulfate, Cathepsin B and both, lung and serum Syndecan in four moments; Pre-pneumonectomy, pre-reperfusion and 10 and 30 minutes after reperfusion. Non-parametric test was used to find statistical meaning (U Man-Withney).

Results and Discussion:

VARIABLES	GROUP	PRE-PNEUMO-NECTOMY Mean ± SD	PRE-REPER-FUSION Mean ± SD	REPERFUSION 10' Mean ± SD	REPERFUSION 30' Mean ± SD
CATHEPSIN B ng/ml	CONTROL	14,52 ± 0,52	14,51 ± 0,28	16,18 ± 0,57	16,56 ± 0,19
	CONTROL VS SEVOFLURANE	NO DIFFERENCES	NO DIFFERENCES	NO DIFFERENCES	P=0,015
	SEVOFLURANE	14,71 ± 0,34	14,49 ± 0,20	15,52 ± 0,29	15,45 ± 0,32
HEPARAN SULFATE ng/ml	CONTROL	0,44 ± 0,04	0,45 ± 0,02	0,53 ± 0,04	0,65 ± 0,03
	CONTROL VS SEVOFLURANE	NO DIFFERENCES	NO DIFFERENCES	NO DIFFERENCES	p=0,001
	SEVOFLURANE	0,43 ± 0,02	0,44 ± 0,01	0,47 ± 0,01	0,49 ± 0,01

[Table 1]

VARIABLES	GROUP	PRE-PNEUMO-NECTOMY Mean ± SD	PRE-REPER-FUSION Mean ± SD	REPER-FUSION 10' Mean ± SD	REPER-FUSION 30' Mean ± SD
LUNG SYNDECAN ng/mg protein	CONTROL	9,23 ± 0,34	9,57 ± 0,09	7,76 ± 0,25	6,87 ± 0,16
	CONTROL VS SEVOFLURANE	NO DIFFER-ENCES	NO DIFFER-ENCES	P=0,0002	P=0,0001
	SEVOFLURANE	9,14 ± 0,29	9,29 ± 0,27	9,59 ± 0,09	8,71 ± 0,15
SERUM SYNDECAN ng/ml	CONTROL	0,16 ± 0,01	0,26 ± 0,01	0,38 ± 0,03	0,60 ± 0,03
	CONTROL VS SEVOFLURANE	NO DIFFER-ENCES	P= 0,0001	P=0,0006	P=0,0001
	SEVOFLURANE	0,15 ± 0,01	0,17 ± 0,005	0,21 ± 0,02	0,28 ± 0,02

[Table 2]

Glycocalyx greater destruction is observed in control group. This is evidenced by increased serum components (heparan sulfate and serum syndecan) and a decrease of its structural components in pulmonary tissue (lung syndecan) when comparing both groups.

Besides, increased activity of cathepsin B, the enzyme producing glycocalix lysis, is observed in control group.

Sevoflurane glycocalix protection, is the first time observed in an in vivo lung model.

Conclusion: Preconditioning with sevoflurane protects glycocalix in lung ischemia reperfusion injury.

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7AP9-8

Effects of isoflurane and sevoflurane on norepinephrine-induced constriction in rat arteries to vital organs

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Background and Goal of Study: Isoflurane and sevoflurane attenuate norepinephrine-induced contraction with increaseing cytosolic Ca^{2+} in rat aorta in a dose-dependent manner.

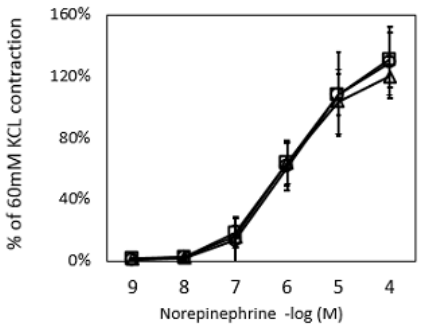
The aim of this study was to investigate whether isoflurane and sevoflurane attenuate norepinephrine-induced contraction in carotid, mesenteric, renal arteries isolated from rats.

Materials and Methods: We performed functional examinations using intact carotid, mesenteric, renal artery rings isolated from male Wister rats. Changes in ring tension produced by norepinephrine in 37°C Krebs-Henseleit solution bubbled with 95% O_2, 5% CO_2 and isoflurane (0, 1.0, 2.0%) or sevoflurane (0, 2.0, 4.0%) were measured**.** The anesthetics concentrations in the Krebs-Henseleit solution were analyzed using gas chromatograph. Each contractive response was normalized to the response to KCl (60 mM) in the same ring. The concentration producing a half-maximal response (EC_{50}) was calculated using a non-liner regression analysis, and the maximal response (E_{max}) was considered to be the maximal contractile amplitude in the individual concentration-response curve. The results of experiments are expressed as mean ± SD. Statistical analyses were done with Kruskal-Wallis test and Scheffé method as a post hoc comparison for multiple comparisons at a significance level of 0.05.

Results and Discussion: Norepinephrine induced dose-dependent contraction in the all arteries with or without exposure to isoflurane and sevoflurane. Isoflurane exposure did not affect the contraction in the all arteries. The dose-response relationship in renal artery was shown in the Figure.

The EC_{50} and E_{max} of norepinephrine-induced contraction in carotid, mesenteric, renal arteries were not changed significantly in the all arteries by exposure to the anesthetics.

Conclusion: Clinically relevant concentrations of isoflurane and sevoflurane did not attenuate norepinephrine-induced contraction in rat carotid, mesenteric, renal arteries. Our results may support the safety on clinical use of these anesthetics.



[Figure. Norepinephrine-induced contraction of the renal artery during isoflurane exposure. O: Control, Δ : 1.0% isoflurane, □: 2.0% isoflurane. Mean ± SD. n = 6]

7AP9-10

Influence of Xenon-anaesthesia on micro- and macrocirculatory parameters

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Background and Goal of Study: The noble gas Xenon (Xe) is an anaesthetic with favourable haemodynamic and neuroprotective effects. We studied the microcirculatory impact of Xe-anaesthesia through sublingual IDF (Incident Darkfield Imaging) by means of Cytocam (Braedius Medical) and the macrocirculatory impact with FloTrac (Edwards Life Sciences).
Materials and Methods: We included 18 patients scheduled for elective implantation of an AICD, after Ethical Committee approval and written informed consent. They were, depending on their left ventricular ejection fraction (LVEF), allocated to Group 1, N=10, LVEF < 30% or to Group 2, N=8, LVEF 31- 45%.Depth of anaesthesia was guided by neuroSense ®monitoring.After induction with etomidate, sufentanil and rocuronium, a basic set of variables was collected of the micro- and macrocirculatory level.Xe was then initiated. Five min after steady state,a second set of variables was taken.
Results and Discussion: *Data (mean +/- SD) are shown.*

N=10	Before Xenon	After Xenon	P-value
TVD	15.9±2.62	15.36±1.74	0.575
PVD	15.2±3.15	15.2±1.7	0.878
PPV	97.33±0.74	97.8±0.93	0.202
MFI	2.77±0.11	2.83±0.06	0.170
Ea	1.38±0.29	1.38±0.19	0.780
SVRI	0.48±0.19	0.45±0.08	0.799
MAP	84.86±13.9	84.63±12.5	0.959
HF	78.40±17	72.4±12.7	0.033
CI	2.32±0.49	2.35±0.39	0.469

[Group 1]

N=8	Before Xenon	After Xenon	P-value
TVD	16.13±2.49	16.36±1.97	1.000
PVD	15.69±2.41	15.99±1.79	0.889
PPV	97.20±0.83	97.62±1.10	0.401
MFI	2.83±0.07	2.77±0.11	0.168
Ea	1.24±0.33	1.08±0.32	0.025
SVRI	0.44±0.104	0.41±0.17	0.889
MAP	80±14.2	66±14.73	0.012
HF	72±11.73	55±22	0.027
CI	2.39±0.84	1.84±0.43	0.469

[Group 2]

HF was lower in both groups.Moreover microcirculatory variables were not affected by Xe administration.In group 2, Ea (1,24 +/-0.33 versus 1.08 +/-0.32, p=0,025) and MAP (80 +/-14,2 versus 66+/-14.73, p=0,012) were significantly altered by Xe-administration.These findings suggest a central vasodilatation provoked by Xe,not observed in Group 1.
Conclusions:
1. Xe has no effect on microcirculation in patients with LVEF < 45%.
2. Xe provides central vasodilatation in those patients with an LVEF between 31 and 45%.

7AP9-12

Alkaline phosphatase in prevention of inflammation-mediated complications after cardiac surgery

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Background and Goal of Study: The APPIRED II study is designed to demonstrate the reduction of post-operative SIRS (systemic inflammatory response syndrome) in bIAP(bovine intestinal alkaline phosphatase (bRESCAP))-treated patients, after complicated cardiac surgery, demanding extended cardiopulmonary bypass and aortic cross clamp time.
Materials and Methods: The APPIRED II study is a randomized, double-blind phase IIIa study. Ethical approvel was obtained. Within this study 52 patients were treated. The study was started in het expectation that there is a reduction of SIRS in bIAP-treated patients (27 patients) compared to placebo-treated patients (25 patients). Patients received intravenous as a bolus either placebo or bIAP (1000IU) just prior to surgery, followed by a 40IU/kg bIAP or placebo infusion during the first 8 hours. The pro-inflammatory cytokine (TNFα , IL-6 and IL-8) levels were measured. The intended therapeutic bIAP concentration of twice the basic endogenous alkaline phosphatase activity in plasma was reached only during the first 12 hours. The overall difference in outcomes between treatment groups were tested by the student t-test.
Results and Discussion: No overall significant differences were observed in the pattern of the cytokine response between the two groups. TNFα - measurements were not evaluable, due to laboratory reasons. Mortality occurred in 3 patients, all in the placebo group. (see table). Clinical it was remarkably that during the whole observation period there was a better recovery of cardiac function in bIAP-treated patients. The levels of lactate and CRP were slightly lower in the bIAP group patients. This may indicate a faster recovery upon surgery in the bIAP group patients, but the differences were not statistically significant.

		EuroSCORE	EuroSCORE	Mortality	Morbidity		
	N	Mean ± SD	>10		SAE	AE	No AE
bIAP	27	5.8 ± 3.1	5	0	4	13	10
Placebo	25	5.6 ± 2.6	1	3	9	11	5

[Table 1]

Conclusion: Although no clear-cut statistical differences were observed between the bIAP and placebo group of patients, the clinical observations substantiate the therapeutic efficacy of bIAP-treatment. As most of the differences were transient, we conclude that the eight hours regime in this APPIRED II study was too short to demonstrate effects on cytokine storms. Therefore in the following Phase-3 trial a sustained application of bIAP for 24 hours after surgery is proposed.

7AP10-1

Prophylaxis of atelectasis and pneumonia in patients post tracheal reconstruction or lung reconstructive surgery

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Background and Goal of Study: Post-operative pneumonia remains a dangerous complication following tracheal/pulmonary surgery. The insufficient mucus drainage occurs as a result of inadequate spontaneous breathing following extubation due to the residual neuromuscular blockade which is not always correctly acknowledged by anesthesiologists. The reversal of muscle relaxation using gamma cyclodextrin fully guarantees neuromuscular recovery after extubation, thus reducing respiratory complications. The objective was to evaluate the post-operative respiratory impairment in patients following tracheal/ lung reconstructive surgery after extubation using gamma cyclodextrin as reversal agent.
Materials and Methods: 78 patients aged between 18 to 68 years were studied from 2012-2014. Patients underwent surgery due to lung cancer and tracheal tumor. Muscle relaxation was achieved by using rocuronium bromide at recommended doses under control of TOF-watch (level of neuromuscular block). Patients were divided into 2 groups: Group 1 (n = 45), where recovery

from muscle relaxation was allowed the standard passive way and extubation was carried out at TOF ratio of 0.8 - 0.9. Group 2 (n = 33), where reversal of neuromuscular block was carried out by administering gamma cyclodextrin at a dose of 4 mg/kg and extubation was carried out at the same TOF ratio as in group 1. Any post-operative respiratory complications in these patients were noted.
Results and Discussion: Post-operative pneumonia was noted in 3 (6.6%) patients from group 1 whereas in group 2, no cases of pneumonia were observed. Respiratory failure occurred in 5 (11%) patients from group 1 and in 1 (3%) patient from group 2. Atelectasis diagnosed and confirmed by chest X-ray examination was detected in 6 (13%) patients from first group and in 1 (3%) patient of the second group. The differences were statistically significant. No fatal outcome was noted.
Conclusion(s): Therefore, the study allowed us to conclude that patients who received gamma cyclodextrin as a neuromuscular blockade reversal agent had significantly lower risks of respiratory complications compared to patients who were weaned off from muscle relaxation the standard passive method.

7AP10-2

Anaesthetic techniques and considerations for bronchoscopy after lung transplantation: audit on patient satisfaction and experiences from a tertiary cardiothoracic and transplant centre

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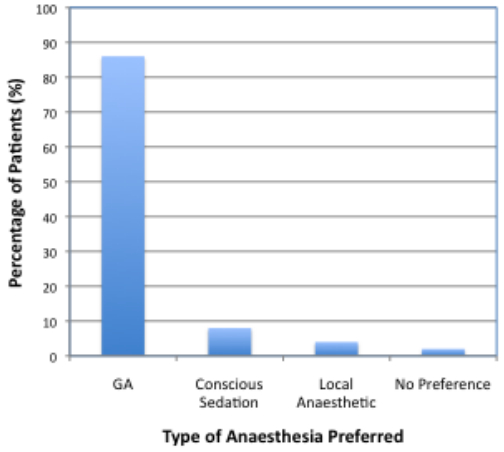
Background and Goal of Study: The approach to bronchoscopy varies among different centres, where conscious sedation or general anaesthesia (GA) are possible anaesthetic options. We were interested in patients' satisfaction with predominantly GA-based technique for bronchoscopy in lung transplant patients. We investigated causes of anxiety pre and post procedure, overall experience satisfaction and patients' preferences for future procedures. The bronchoscopists' viewing conditions and patient tolerance of procedure were also evaluated.
Materials and Methods: A proforma was designed by the anaesthetic department, transplant physicians and Trust psychiatrists. Fifty patients were consented and completed proformas before and after their bronchoscopy. Quantitative scoring scales were used to assess patient anxiety levels (0=no anxiety, 10=extremely anxious) and overall satisfaction (0=very good, 10=extremely unsatisfied). Bronchoscopists also scored their airway viewing conditions and patient tolerance of the procedure.
Results and Discussion: For descriptive statistics normality was assessed with Kolmogorof-Smirnoff criterion: for $P<0.05$ (Mean ±SEM): Statistically significant anxiety levels pre and post procedure were 3.24±0.38 and 1.58±0.29 respectively ($p<0.001$). Patients' mean satisfaction overall score was 1.46 ±0.31, which was impressively good.
Causes of anxiety included: bronchoscopy itself (36%), GA (20%), results (14%), possible complications (6%) and no anxiety (18%). The vast majority of patients' preferred GA for any future procedures. (Figure 1)



[Figure 1: Preference for Future Anaesthesia]

Viewing scores from bronchoscopists showed 98% (49/50) with acceptable/excellent viewing conditions and unusually good tolerance of procedure ($x^2=50.744$, $df=8$, $p<0.001$ indicating no significant difference of opinion between operators).
Conclusion(s): Anxiety was significantly reduced due to well-tolerated experiences under GA. Overall bronchoscopist acceptability of airways viewing was of good experience with GA. These results highlight the satisfactory conditions at Harefield Hospital with use of GA during bronchoscopy and how the majority of patients continue to prefer GA for future bronchoscopy.

7AP10-3

Does CPB increase postoperative complications after lung transplantation?

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Background and Goal of Study: Lung transplantation is a very complex surgery which may be the last therapeutic alternative in patients with end-stage pulmonary disease. Some lung receptors are not capable of handling the hemodynamic changes developed during one-lung ventilation (OLV). This fact makes the cardiopulmonary bypass (CPB) necessary. However, CPB is associated with side effects such as higher risk of bleeding, more primary graft failure (PGF) and larger mortality.
We wanted to analyze the CPB impact on the hemodynamic and respiratory postoperative progression, as well as on complications and survival rates.
Materials and Methods: We made a retrospective observational study in our centre; we collected ten lung transplantations made with CPB and ten off pump. All the transplantations were double lung transplantations (DLT).
90% of the off pump transplantations suffered of pulmonary hypertension (PH) previously and 40% of the CPB ones.
Results and Discussion: Complications and transfusion rate (100% vs. 40%) were higher in the CPB group during the intraoperative (IO) period.
Complications were higher in the CPB group during the early postoperative (PO) period; we have observed larger bleeding (1649 ± 1130 vs. 1066 ± 690 ml), thrombocytopenia (50% vs. 0%) and acute kidney injury (AKI) rates in the first 48 PO hours (30% vs. 10%). Moreover, transfusion rates (80% vs. 20%) were higher in these patients.
Neurological complications and diaphragmatic paralysis were more frequent in the CPB group.
PGF rate was 70% in the CPB group and 90% in the non- CPB group. Severe PGF rate was higher in the CPB group (42, 9% vs. 22,2%).
PGF at the ICU arrival was established on 85, 7% of the CPB group and only on 4, 4% of the non-CPB group.
After the early PO period (after 48 hours) bleeding amount (700 ± 285 vs. 703 ± 408ml) and AKI rate (10%) were similar in both groups.
Extubation time (53, 6 ± 29, 3 vs. 29, 67 ± 32, 97 h) and the time until hospital discharge (67, 3 ± 56, 4 vs. 49, 4 ± 22, 7 days) were longer in the group that held the transplantation with CPB.
ICU (90%) and hospital discharges (80% vs. 90% in the non-CPB group) were similar.
Conclusion: Lung transplantation held with CPB could have more complications not only in the intraoperative period but also during the early PO. These complications could make hospital stay time longer.
To confirm these facts, more studies should be made.

7AP10-4

Study of the relationship between systemic inflammatory markers and postoperative acute kidney injury in patients undergoing lung resection surgery

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Background: It is known that patients undergoing lung resection surgery (LRS) are at risk for postoperative acute kidney injury (AKI). Multiplex cytokine immunoassays allow the evaluation of early inflammatory response.Until now, it has not been explored the role of systemic inflammatory response in this

kind of surgery. The goal of our study was to assess the relationship between inflammatory biomarkers and postoperative AKI. Furthermore, we wanted to assess the possible impact of AKI on patient outcome.
Materials and Methods: This is a prospective study approved by the local Ethics Commitee.152 patients undergoing LRS were included.Written informed consent was obtained from all patients.Exclusion criteria were: administration of immunosuppressant drugs and blood products prior surgery. After intubation,patients were managed with same ventilation parameters in two-lung ventilation and in one-lung ventilation(OLV). Restrictive fluid therapy was set at 2mL/kg/h to maintain urine output>0.5mL/kg/h. Radial artery was catheterized with FloTrac sensor (*Edwards*)for continous monitoring of cardiac output,cardiac index, stroke volume variation, stroke volume, stroke volume index and invasive arterial pressure. Data were recorded at baseline during two-lung ventilation, 30minutes after initiating OLV, and at the end of OLV. Blood multiplex cytokine immunoassays were performed at different times during surgery: baseline, during OLV, at the end of surgery, 6 and 18hours after surgery. Expression of cytokines (IL1, IL2, IL6, IL10, TNFa), nitric oxide and matrix metalloproteinase 2 and 7 were measured with Western Blot. Carbon monoxide by Onamura-Sato method. AKI was defined as an increase at least of 0.3 mg/dl creatinin and/or oliguria (< 0.5ml/kg/h during more than6h). We also analysed the relationship between postoperative AKI and pulmonary failure, intensive care unit and hospital length of stay.
Results: Incidence of AKI in our study was6.9%(11/152). No patient required postoperative renal replacement therapy. Patients who developed postoperative AKI showed higher levels of cytokines 6h postoperative. Respiratory failure was more frequent in patients with AKI (OR11.2 CI95% 2.6 to 47.7, p<0.001) and they had longer postoperative hospital stay (9.6 vs 7.4 days, p< 0.05).
Conclusions: Perioperative monitoring of cytokines is a useful tool to alert the potential risk of developing postoperative AKI. Exagerated perioperative inflammatory response is associated with worst postoperative outcome and longer hospital stay.

7AP10-5

The effect of positive end expiratory pressure on compliance and oxygenation during one-lung ventilation

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Background and Goal of Study: The optimal level of applied positive end expiratory pressure (PEEP) in most mechanically ventilated patients is unknown. It is increased to maintain adequate oxygenation in select populations. The objective of this study was to evaluate the effect of applied supraphysiologic PEEP (10 cm H2O) during one-lung ventilation on lung compliance and oxygenation.
Materials and Methods: After ethical committee approval and written informed consent were obtained, we enrolled patients scheduled for elective thoracic surgery and one lung ventilation with double-lumen tube, with age ≥ 18 years. Exclusion criteria were ASA > III, haemodynamic instability, emergency procedure and patient refusal to provide informed consent. A prospective, longitudinal, analytical study on a sample of 80 patients randomly assigned to two groups was performed. Control group (CG) was assigned to receive PEEP =0 mmHg and supraphysiologic PEEP group (SPG) received PEEP = 10 mmHg during one-lung ventilation. Primary outcome was maximum level of lung compliance reached during one-lung ventilation. Secondary outcome were level of oxygenation measured by performing arterial blood gas analysis, Ppeak, Pplateau, blood pressure and SatO2.
Results and Discussion: Demographic characteristics of two groups were comparable on admission. In SPG there were a significant increase in lung compliance compared to CG where PEEP was not applied (SPG 32,13± 8,37 vs CG 25,89 ± 7,56; p< 0,001). Moreover, there were no significant differences between groups in oxygenation, Ppeak, Pplateau, blood pressure and SatO2 (p>0,05).
Conclusion(s): In patients undergone thoracic surgery during one-lung ventilation, the application of supraphysiologic positive end expiratory pressure led to significant increase in lung compliance.

7AP10-6

Relationship between post-operative pulmonary complication and intraoperative ventilator setting during one-lung ventilation; prospective observational study

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Background and Goal of Study: Recently some studies suggested that intraoperative ventilator setting might affect the incidence of post-operative pulmonary complication (PPC). However this relationship has not been sufficiently known yet during one-lung ventilation (OLV). Therefore we assessed the relationship between post-operative pulmonary complication and intraoperative ventilator setting during one-lung ventilation.
Materials and Methods: In this prospective observational study, adult patients undergoing one-lung ventilation during respiratory surgery from April 2014 to October 2014 were enrolled at 2 centers. We investigated patients' background and ARISCAT PPC score, the types of anesthesia, ventilator settings, PPC (pneumonia and atelectasis, pleural effusion, prolonged air leakage, pulmonary embolism, respiratory failure) occurring within the first 7 days after surgery. We compared variables with either Student's t test or χ^2 test, logistic regression, and P value <0.05 was considered statistically significant.
Results and Discussion: Of the 197 patients, fifty-two patients (26%) suffered from PPC. The postoperative length of stay was longer in patients with PCC than in those without PCC (PCC group: 14.0±10.6 days vs. non-PCC group: 9.8±6.9 days; p = 0.002). There were no significant difference between PCC group and non-PCC group in sex and age, ARISCAT PCC score, preoperative respiratory function, types of surgery, types of anesthesia. Tidal volume corrected for predicted body weight and PEEP at the beginning of OLV didn't differ between both groups (6.3±1.8 ml/kg vs. 6.2±1.4 ml/kg and 3.8±1.6 cmH_2O vs. 3.8±1.6 cmH_2O). Inspired oxygen concentration of PPC group was significantly higher than those of non-PPC group (92±13% vs. 85±21%; p = 0.018). On multivariable logistic regression analysis, odd ratio per inspired oxygen concentration increase of 10% was 1.23 (95% CI: 1.02 to 1.53, p=0.025).
Conclusion(s): In the patients undergone one-lung ventilation during respiratory surgery, the incidence of PPC was 26%. Most of them tended to be ventilated by low tidal volume and low PEEP. The higher inspired oxygen concentration during OLV might cause the more PPC.

7AP10-7

The effects of lateral positioning and one lung ventilation on stroke volume variation using pulse contour analysis and their pivotal role for precise fluid management using goal-directed therapy in enhanced recovery after thoracic surgery (ERATS): a prospective study

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Background: Stroke Volume Variation (SVV) has been demonstrated to be a good predictor of fluid responsiveness in high-risk surgical patients during controlled mechanical ventilation. The ability of SVV as a reliable predictor of fluid responsiveness in surgical patients undergoing one-lung ventilation (OLV) has been tested leading to various results. The goal of our study was to evaluate the changes of SVV, cardiac output (CO), cardiac index (CI) and SV that occur from heart lung interaction during two lung ventilation (TLV) and OLV as well as changes that occur from the supine to the lateral decubitus position during thoracic surgery. The utility of the minimally invasive Vigileo FloTrac™ cardiac output monitor in assessing these hemodynamic changes has not been adequately described. We hypothesize in patients undergoing thoracic surgery with OLV, that CO and SVV, will not vary significantly from previously described values with this device.
Materials: We prospectively collected data from 46 adult patients undergoing elective thoracic surgery requiring one-lung ventilation over a two-year period. Routine ASA monitors including an arterial catheter with the Vigileo-FloTrac were inserted after induction. CO and SVV in addition to other hemodynamic variables were measured. 11 data points reflecting changes in position and ventilation throughout the procedure were compared using Wilcoxon signed rank test to identify significant differences from baseline at each patient state.

Hochberg's step-up Bonferroni method was used to calculate adjusted p-values to address multiplicity.
Results: Values were collected during the procedure and included: supine (MV), lateral, and supine (spontaneous TLV in OR, recovery area, and with passive leg raise). End-points consisted of change from baseline of CO and SVV. SVV was used as the primary value for hemodynamic trending. Adjusting for multiplicity, no significant difference was found in SVV from the baseline supine TLV state (n=46, mean 9.76, SD 3.66, median 10.00) to operative conditions, consisting of lateral position, OLV, and thoracotomy incision or VATS (n=44, mean -0.86, SD 5.77, median -2.0, p=0.64). There was no significant difference in CO values.
Conclusions: Our study supports the use of pulse contour analysis in patients undergoing thoracotomy in a lateral position requiring OLV. No significant difference in SVV and CO values were appreciated between the baseline TLV state and operative OLV conditions.

7AP10-8

Prophylactic high-flow nasal oxygen as part on an enhanced recovery programme after lung-resection surgery - a randomised controlled trial

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Background: Patients undergoing lung resection surgery are at risk of post-operative pulmonary complications, which pose significant morbidity and mortality risks. The incidence of complications following lung surgery can be as high as 50% (1). Continuous positive airway pressure (CPAP) improves gas exchange, reduces work of breathing and reverses atelectasis. CPAP has been shown to increase performance in the six-minute walk test (6MWT) of patients after lung resection versus standard oxygen. However CPAP is costly, labour intensive, requires admission to high-dependency or intensive care, and may have adverse side effects such as mask discomfort and skin abrasions. High-flow nasal oxygen (HFNO) therapy (Optiflow, Fisher and Paykel Healthcare) is a potential alternative to CPAP, which delivers humidified low level, flow-dependent positive airway pressure. This has proven beneficial in hypoxaemia, but has never been studied prophylactically after lung surgery.
Goal of Study: To determine if prophylactic HFNO therapy after lung resection surgery improves early postoperative recovery, as determined by the primary outcome measure, a six-minute walk test (6MWT), compared with standard soft face mask or nasal cannulae oxygen(SO).
Materials and Methods: A randomized controlled study was conducted with ethical approval. Patients having elective lung resection were eligible for inclusion. Patients were randomly assigned to HFNO or SO for 24h. Quality of recovery was assessed by PQRS questionnaire (2)
Results and Discussion: Sixty-one patients, equally matched in age and sex, were included. There was no difference in the 6MWT or spirometry, however median (range) length of hospital stay was significantly lower in the HFNO group, (4 days (1-22) days vs control (5 days (2-18), p< 0.05.
Conclusion: Prophylactic high flow nasal oxygen therapy as part of an enhanced recovery programme was associated with reduced length of hospital stay in patients after elective lung resection surgery. This has implications for reduced costs and better service provision.
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7AP10-9

Continuous paravertebral block versus patient-controlled epidural and intravenous analgesia following lung surgery: a retrospective study

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Background and Goal of Study: The analgesic effect of a continuous thoracic paravertebral block (TPVB) for acute post-thoracotomy pain relief is considered to be comparable to that of an epidural block. However, detailed analyses of TPVB as a postoperative analgesia are lacking. The goal of this study was to assess the detailed analgesic and adverse effects of TPVB following lung surgery compared to those of patient-controlled epidural (PCEA) and intravenous (IVPCA) analgesia.
Materials and Methods: We retrospectively investigated patients who underwent lung surgery from October 2013 to November 2014. For postoperative pain relief, each received either TPVB, PCEA, or IVPCA. From medical records, we collected data from postoperative day (POD) 1 and POD2, including visual analog scale (VAS) scores for pain at rest and during movement, adverse effects and complications. Statistical analyses were performed using a chi-square test with Haberman residual analysis, and Mann-Whitney's U test. Data are shown as the median (range). A p-value less than 0.05 was considered to be statistically significant.
Results and Discussion: A total of 143 patients were enrolled, of whom 37 received TPVB, 49 received PCEA, and 57 received IVPCA for postoperative pain relief. On POD1, VAS at rest was significantly lower in patients who received PCEA as compared to those with IVPCA [6 (0-60) vs. 22 (0-71), p< 0.05], but not those with TPVB [12 (0-90)].
However, pain reduction during movement was significantly greater in patients who received PCEA as compared to those with TPVB or IVPCA [30 (0-86) vs. 52 (0-100) and 52 (0-100), respectively, p< 0.05]. On POD2, there was no significant difference in pain scores in any of the groups. Adverse effects caused discontinuation or dose reduction of the postoperative pain relief regimen in the patients who received PCEA or IVPCA, whereas no such adverse effects occurred in patients with TPVB.
There were no complications in any of the enrolled cases. The present results suggest that TPVB is insufficient for at least postoperative pain during movement.
Conclusion(s): TPVB provided equivalent analgesia at rest as compared to PCEA along with fewer adverse effects, while its analgesic effect during movement was inferior to that of PCEA.

7AP10-10

Transcutaneous monitoring of carbon dioxide partial pressure during one-lung ventilation for thoracic surgery

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Background and Goal of Study: During one-lung ventilation for thoracic surgery, there may be a great difference between the end-tidal carbon dioxide partial pressure ($PetCO_2$) and the arterial blood carbon dioxide partial pressure ($PaCO_2$) because of the increasing dead-space ventilation. Transcutaneous carbon dioxide partial pressure ($PtcCO_2$) monitoring can be used to evaluate $PaCO_2$ noninvasively and continuously.
In this study we compared the accuracy of $PetCO_2$ versus $PtcCO_2$ in predicting $PaCO_2$ during prolonged one-lung ventilation for thoracic surgery.
Materials and Methods: Eighteen adult patients who were scheduled to undergo one-lung ventilation during thoracic surgery of two hours or more were enrolled in this study. $PetCO_2$, $PtcCO_2$, and $PaCO_2$ were monitored and data were collected before one-lung ventilation and at four time-points during one-lung ventilation. Agreement among monitored results was evaluated by bland-altman analysis.
Results and Discussion: Ninety sample sets were obtained. The mean $PaCO_2$-$PetCO_2$ gradient was 11.8 ± 6.4 mmHg during two-lung ventilation and 11.8 ± 4.9 mmHg during one-lung ventilation. The mean $PaCO_2$- $PtcCO_2$ gradient was 4.1 ± 6.5 mmHg during two-lung ventilation and 2.9 ± 6.1 mmHg during one-lung ventilation. The $PaCO_2$-$PtcCO_2$ differences were significantly lower than the $PaCO_2$-$PetCO_2$ differences at all five time-points (p<0.05).
Conclusion(s): $PtcCO_2$ monitoring provided a more accurate estimate of $PaCO_2$ than $PetCO_2$ during both two-lung and one-lung ventilation for patients undergoing thoracic surgery.

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7AP10-11

Double lumen tube caused auto-PEEP during one-lung ventilation

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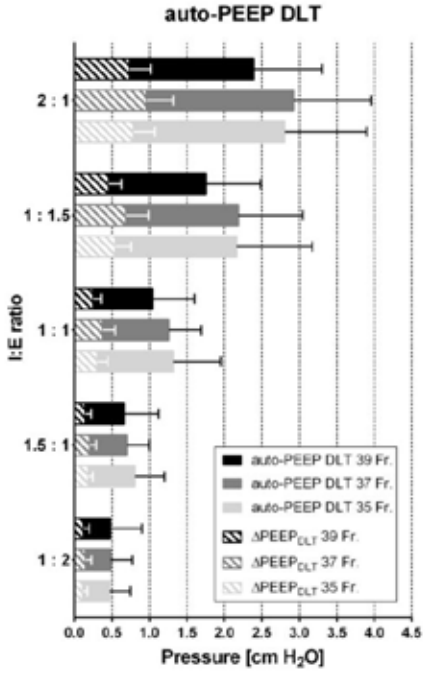
Background: Endobronchial double lumen tubes (DLT) are routinely used to enable total atelectasis and one-lung ventilation (OLV) for thoracic surgery. The small inner diameter of the DLT's bronchial lumen increases the flow dependent resistance, which may result in incomplete expiration. As a consequence the end-expiratory pressure in the ventilated lung is increased with respect to the positive end-expiratory pressure set at the ventilator (auto-PEEP). We hypothesized that during OLV in patients the DLT contributes to the auto-PEEP to a relevant extent.
Methods: After informed consent airway pressure (P_{aw}), flow rate and bronchial pressure (P_{bronch}) were measured in adult patients undergoing thoracic surgery (Ethics Committee of the University Medical Centre Freiburg, No: 354/13). Tracheae were intubated with DLTs of the Robertshaw type (35, 37, 37 Fr. outer diameter (OD)) with the bronchial branch placed contralateral to the side of surgery. During pressure controlled OLV the inspiration to expiration (I:E) ratio was changed from 1:2 to 1:1.5, 1:1, 1.5:1, 2:1, consecutively. At each condition the auto-PEEP was calculated based on P_{aw}, flow rate, and P_{bronch}, measured within 50 ms at the end of the expiration. The DLT related pressure portion of the totally estimated auto-PEEP was quantified ($\Delta PEEP_{DLT}$).
Results and Discussion: 72 patients were included in the study (each DLT size was used in 24 patients). Over the entire breathing cycle, the average between P_{aw} and P_{bronch} was 2.3 ± 0.7 cm H_2O ($p<0.001$). The mean total auto-PEEP was less than 2.9 ± 1.5 cm H_2O (range 0 - 5.9 cm H_2O; Figure 1). $\Delta PEEP_{DLT}$ was between 25% and 31% of the total auto-PEEP, independent of the OD and the side of the DLT's bronchial branch.



[Figure 1]

During OLV the resistance of the DLT causes a noticeably difference between airway and bronchial pressure. While the overall value of auto-PEEP was low, the DLT-dependent portion of the total auto-PEEP was independent of the DLT's OD.
Conclusion: Pulmonary hyperinflation is partly reasoned by the DLT's resistance. However, in adult patients the choice of the DLT does not increase the risk of auto-PEEP during OLV to a relevant extent.

7AP10-12

Nonintubated versus conventional intubated thoracoscopic segmentectomy in lung cancer patients - a propensity-matched analysis

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Background and Goal of Study: Our previous study showed that thoracoscopic segmentectomy without tracheal intubation is feasible and safe to avoid adverse effects associated with intubated general anesthesia.[1] However, a comparison between nonintubated and conventional intubated thoracoscopic segmentectomy for lung cancer has not been previously reported. The goal of this study is to compare the perioperative outcomes of nonintubated and conventional intubated thoracoscopic segmentectomy in lung cancer patients.
Materials and Methods: From August 2009 to September 2014, a total of 161 patients with lung cancer underwent thoracoscopic segmentectomy using nonintubated or conventional intubated technique. A propensity-matched analysis, incorporating age, gender, body weight, tumor size and forced expiratory volume in 1 s, was used to compare the perioperative outcomes between nonintubated and intubated technique.
Results and Discussion: Overall, 59 patients underwent nonintubated surgery, while 102 patients underwent intubated surgery. Propensity matching produced 50 patients in each group with comparable demographic and cancer staging profiles. The complication rate was not significantly different between the 2 group (12% vs 20%, $p = 0.414$). Patients who underwent nonintubated surgery were associated with shorter surgical time (145 ± 34 min vs 157 ± 47 min, $p = 0.013$), less intraoperative blood loss
(35.9 ± 68.5 mL vs 83.5 ± 168.4 mL, $p = 0.068$) and early discharge after surgery (4.6 ± 2.0 days
vs 5.7 ± 3.6 days, $p = 0.071$). There was no in-hospital mortality in either group, but three patients (6%) in the nonintubated group required conversion to tracheal intubation because of excessive diaphragmatic movement.
Conclusion(s): Nonintubated thoracoscopic segmentectomy could achieve better perioperative outcomes compared with conventional intubated technique. A nonintubated technique may facilitate early recovery after thoracoscopic surgery in lung cancer patients.
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7AP11-1

Effects of dexmedetomidine on systemic vascular resistance (SVR) in intraoperative coronary artery bypass grafting (CABG) surgery

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Background and Goal of Study: Dexmedetomidine (Dex) is a potent and selective alpha-2 adrenergic agonist, which gives important sympatholytic and vagotonic effects. Given the importance of achieving hemodynamic stability in intraoperative cardiac surgery, it is necessary to know the concrete effects of Dex on SVR.
Materials and Methods: We studied 40 patients submitted for CABG. Upon realisation of decannulation and ensuring a correct haemostasis and previous to sternum closure, a bolus of Dex of 1 mcg/kg was administered over 15 minutes and continued with an infusion of Dex at 0.05 mcg/kg/h. The values of SVR were collected trhee times, first 1 min before the bolus, second 5 min after the bolus was started and third at the end of the bolus. The study included

patients with similar pathological backgrounds submitted for the same type of surgery. Patients submitted for emergency surgery, intraoperative complications and hemodynamic instability that required elevated doses of vasoactive drugs were excluded. Other haemodynamic parameters such as heart rate, blood pressure, cardiac output , cardiac index , were also recorded; and all of them were related to the values of SVR and the dosage of dexmedetomidine.
Results and Discussion: Patients registered a slight drop in SVR at the end of the bolus of Dex with respect to the basal value, but in no cases was this decrease higher than 15% and a modification of the values of vasoactive drug infusion was not required. None of the other registered hemodynamic parameters showed significant changes.
Conclusion(s): Dexmedetomidine does not produce relevant changes in the basal values of SVR and can be safely used in CABG operations delivering a stable hemodynamic status throughout the operative period.
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7AP11-2

Implications of Dexmedetomidine on the respiratory ultra fast-track treatment in cardiac surgery

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Background and Goal of Study: Dexmedetomidine (Dex) is a potent and selective alpha-2 adrenergic agonist, which gives important sympatholytic and vagotonic effect in addition to its known and particularly sedative-analgesic effects without respiratory depression. This makes it a very useful drug for the respiratory ultra fast-track treatment in cardiac surgery.
Materials and Methods: We studied 50 patients aged 29 to 88 years undergoing non-emergency cardiac surgery, presenting with no severe alterations in respiratory function and no important intraoperative complications. Upon induction of anaesthesia, it was maintained with sevoflurane 1% - 1.5% and an infusion of remifentanil 0.05 - 0.1 mcg/kg/min. After ensuring a correct haemostasis and before closing the sternum, a bolus of Dex 1 mcg/kg was administered for 15 minutes and an infusion of Dex at 0.05 mcg/kg/h was continued until the end of the intervention. We compared different parameters from three arterial blood gases (ABGs), 1st at the arrival of the patient to the operating room, 2nd just before the patient was extubated with FiO2 21% and 3rd 6 hours post extubation.
Results and Discussion: At the end of the intervention, the perfusion of Dex at 0.05 mcg/kg/h was continued. The analgesia was controlled with morphine 0,06 mg/kg and metamizol 25 mg/kg, the nausea were treated prophylactically with ondansetron 0,05 mg/kg, the neuromuscular block was reverted with sugammadex 4mg/kg and a subsequent satisfactory extubation was performed with a RAMSAY 2-3 level of sedation and correct . 94% of the patients had no significant alterations in weaning or arterial gasometry. 6% of the cases required non-invasive ventilation between 6-12 hours upon arrival to the ICU and none of patients had to be reintubated. The value of pO2 was within normal parameters in all cases and pCO2 value not increase more than 17 % from baseline. No significant changes occurred in the acid-base balance. No patient had severe hemodynamic alterations Associated with the administration of dexmedetomidine
Conclusion(s): Dexmedetomidine, due to its pharmalogical profile, is an optimum and safe drug to carry out ultra fast-track respiratory treatment in cardiac surgery.
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7AP11-3

Transesophageal echocardiographic evaluation of the effect of dexmedetomidine infusion as an adjuvant to general anesthesia on the cardiac function

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Background and Goal of Study: Dexmedetomidine is highly selective α_2 agonist applied as a novel sedating agent, adjuvant in various anesthetic settings for analgesia, anxiolytics and sedatives. Multiple studies have reported that dexmedetomidine has a protective effect on heart and anti-inflammatory properties, improving perioperative outcome in cardiac surgery. However, few studies to date have explored the impact of the dexmedetomidine on direct cardiac function assessed by echocardiography. The purpose of this study was to investigate the systolic and diastolic cardiac function on clinically useful doses of dexmedetomidine as an adjuvant for general anesthesia.
Materials and Methods: Thirty healthy patients undergoing total intravenous anesthesia (TIVA) with propofol and remifentanil were allocated into either Group D or Group S. At 10 min after the induction of anesthesia, Group D was infused with dexmedetomidine (1.0 μg/kg over 10min, followed by a continuous infusion of 0.5 μg/kg/hr throughout 1 hr), and Group S was infused with saline (comparable volume to dexmedetomidine). Heart rates (HR), systolic blood pressure (SBP), bispectral index (BIS), total infused dose of propofol and remifentanil were recorded. Systolic function was assessed by ejection fraction (EF), fractional area change (FAC) of left ventricle (LV) and right ventricle (RV) from apical four-chamber view of transesophageal echocardiography (TEE). Diastolic function was assessed by the ratio of early diastolic transmitral or transtricuspid peak flow velocity to mitral or tricuspid annulus velocity(E/E'-MA and E/E'-TA, respectively).The time of assessment were just before (T0), 20 min (T1), 40 min (T2) and 60 min (T3) after the infusion of dexmedetomidine or saline.
Results and Discussion: The total infusion volume of propofol was smaller in group D (590.1 ± 161.7 vs. 752.1 ± 199.1, P=0.02), but that of remifentanil was not different (622.9 ± 199.6 vs. 716 ± 301.5, P=0.36). HR and BIS of Group D was significantly lower at T1, T2 and T3 compared to Group S. But, FAC, EF, E/E'-MA and E/E'-TA of both groups did not change at each time periods without intergroup differences.
Conclusion(s): Dexmedetomidine infusion during general anesthesia did not affect systolic and diastolic function in healthy patients.

7AP11-4

The role of esmolol in coronary artery disease in arterial hypertension

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Background and Goal of Study: Our group previously demonstrated that esmolol therapy improves coronary artery remodeling (1). However, the nature of this cardiovascular effects following short-term use of this agent have not been analyzed to date. The goal of our study was to determinate the effect of esmolol on structure, morphology and function of coronary artery in an experimental model of arterial hypertension.
Materials and Methods: Adult male spontaneously hypertensive rats (SHRs) were randomly divided into two groups according to whether they received esmolol (SHR-E, n= 10) or not (SHR, n=10). Wistar Kyoto rats (WKY) were used as normotensive controls (n= 10). After 48 hours of treatment, anterior descending coronary arteries were dissected to study vascular structure by confocal microscopy (wall thickness, media and adventitial layers). Segments of each artery were mounted on a wire myograph and concentration-response curves to 5-hydroxytryptamine (5-HT) were performed. To compare the contracting responses of 5-HT in coronary segments, some results were expressed as differences in the area under the concentration-response curves (AUC). All the data were expressed as mean ± SEM. Comparisons between groups were made by Student's t-test for independent samples. P< 0.05 was considered as significant.
Results and Discussion: Wall thickness (p< 0.05) and media thickness (p< 0.01) were decreased in SHR-E compared to SHR. No differences were ob-

served between SHR-E and WKY. Esmolol decreased the number of smooth muscle cells in media layer ($p < 0.001$) and decreased the cell number in adventitial layer ($p < 0.01$) in SHR-E compared to SHR. AUC was higher in SHR than in SHR-E ($p < 0.001$) and no differences were observed between SHR-E and WKY.
Conclusion: Esmolol produces early regression of coronary artery remodeling because it improves vascular wall (structure and morphology) and normalizes contracting responses in SHR-E compared to the control SHR.
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7AP11-5

Beta-blockers impact on hemodynamic effect of inotrope in patients with coronary artery disease

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Background: Relationship between the concomitant use of beta-agonist and beta-blocker is unclear, but sometimes short-acting beta-blocker is required to treat tachycardia in patients receiving inotropes. The goal of this study was to investigate the esmolol effect on hemodynamics of patients under inotropic stimulation.
Materials and Methods: 14 patients undergoing elective isolated coronary artery bypass grafting with preoperative Euro Score less than 8, no significant valve pathology and no pulmonary hypertension were included.
Dopamine infusion start at 4 μg/kg/min [2;5] with no influence to heart rate (HR) ($p=0,2$). At this moment the first measure (M1) was performed. Then the infusion rate increased to achieve HR 10% higher than baseline, and the second measure (M2) was performed. Then esmolol was titrated to achieve baseline HR, and the third measure (M3) was performed. Measures were made during 20 minute episodes of hemodynamic stability and absence of significant surgical manipulations. Data were obtained by invasive monitoring via radial arterial line, central venous line and Swan-Ganz catheter. Data are presented as median and [interquartile range, IQR].
Results and Discussion: Increase of HR was achieved at infusion rate of dopamine of 8,5 μg/kg/min. The total dose of esmolol of 40 mg [20;80] was required to achieve initial HR.
The data are summarized in the table.

	M1	M2	M3
HR min-1	71,5 [65;82]	83 [73;92]*	74 [68;80]#
MAP mmHg	66,5 [62;74]	83 [72;93]*	78 [68;84]*#
SAP mmHg	97 [91;109]	128 [110;138]*	110 [103;127]*#
DAP mmHg	53 [50;57]	63 [54;69]*	62 [53;68]*
CI L/min/m2	2,7 [2,4;3,2]	3,1 [2.7;3.6]*	2,85 [2,5;3,2]
SVI mL/m2	37,6 [31,3;45,5]	37,2 [30,1;43,4]	37,8 [34,8;47.8]
SVRI dynes•sec•cm-5•m2	1703,5 [1389;2089]	1768 [1463;2463]	2019,5 [1554;2472]*

[Parameters of systemic hemodynamics]

HR, heart rate; MAP, mean arterial pressure; SAP, systolic arterial pressure; DAP, diastolic arterial pressure; CI, cardiac index; SVI, stroke volume index; SVRI, systemic vascular resistance index.
*Different from M1 $P<0,016$. #Different from M2 $P<0,016$.

Pulmonary arterial pressure, pulmonary vascular resistance index, central venous pressure and pulmonary capillary wedge pressure didn`t change significantly.
Conclusion: Dopamine increases cardiac index by increase of HR only. SVI doesn't change. Esmolol removes chronotropic effect of dopamine and leaves only its vasopressor effect on systemic hemodynamics.

7AP11-6

Efficacy and safety of landiolol for the management of postoperative tachyarrhythmia in patients treated with the Fontan procedure

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Background and Goal of Study: The onset of tachyarrhythmia after the Fontan procedure (total cavopulmonary connection: TCPC) should be considered a medical emergency, and conventional drug therapy is often ineffective. Landiolol is an ultrashort-acting β1-selective blocker whose effect on tachyarrhythmia after TCPC is unclear. The goal of this retrospective study was to evaluate the efficacy and safety of landiolol for tachyarrhythmia after TCPC, retrospectively.
Materials and Methods: This was a single-center retrospective study conducted in a pediatric intensive care unit (PICU) at a university-affiliated hospital. Consecutive patients undergoing TCPC were enrolled from January 2007 to December 2011. We investigated the type of tachyarrhythmia, dose of administration, efficacy of treatment and hemodynamics, retrospectively.
Results and Discussion: Among 435 pediatric open heart surgeries, 28 patients underwent TCPC. Of the 28 TCPC patients, 13 were treated with landiolol for critical tachyarrhythmia in the perioperative period. Excluding three patients who received landiolol during surgery, we investigated the remaining 10 patients. The mean age was 4.5 ± 2.3 years. The subjects included five patients with sinus tachycardia, four patients with junctional ectopic tachycardia and one patient with paroxysmal supraventricular tachycardia. The initial dose was 6.3 ± 5.6 μg/kg/min without a loading dose. Rate control was obtained within one hour in nine patients and two hours in one patient. Landiolol reduced the heart rate from 149.4 ± 23.1 at the start of treatment to 131.6 ± 25.8 at one hour and 122.1 ± 26.7 at two hours after treatment ($P<0.01$ and $P<0.01$, respectively, according to Dunnett's test), whereas the systolic blood pressure did not change ($P=0.231$).
Conclusion(s): Landiolol is effective in treating critical tachyarrhythmia without causing hemodynamic deterioration. We believe that landiolol is a promising option for the management of postoperative tachyarrhythmia in patients treated with the Fontan procedure.

7AP11-7

Impact of Hydroxyethylstarch 6% 130/0.4 administration on renal function after cardiac surgery

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Background and Goal of Study: Recent studies show an increased risk of mortality and renal replacement therapy (RRT) in patients receiving Hydroxyethylstarch (HES) in the intensive care unit. However, these trials were mostly in non-surgical patients. It is not known whether these results should be applied to cardiac surgical patients, a population at risk of renal dysfunction.
Materials and Methods: We analysed the intra- and postoperative volume therapy of 1564 cardiac surgical patients between January 2011 and April 2013(Ethics committee2014/505). The primary endpoint was Acute Kidney Injury (AKI) based on RIFLE criteria. As urinary output was not available from these retrospective data, only creatinine concentrations and the creatinine concentration changes were analysed. The secondary endpoint was intrahospital or 30 day mortality.The total dose of administered HES 6% 130/0.4 was considered as well (low dosis < 30ml/kg; high dosis ≥30ml/kg). A binary logistic regression analysis was conducted to predict AKI. The included predictive variables were:use of HES 6% 130/0.4,cardiopulmonary bypass (CPB) time, aortic crossclamp time (ACC) and the EuroSCOREII. A second regression analysis was conducted with the volume of HES as dummy variable. Exclusion criteria were:heart transplantation, extracorporeal life support and ventricular assist devices,preoperative RRT and patients revised for bleeding or tamponnade.

Results and Discussion:

	N = 1564
On pump surgery	1310(84%)
AKI	316(20.2%)
Patients who received HES	1501(96%)
Total volume HES/kg;median(P25-P75);ml	25(16-35)
EuroSCOREII;median(P25-P75)	2.27(1.26-4.89)

[Patients' characteristics]

	P	Odds Ratio	95% CI for Odds Ratio
EuroSCORE II	0.000	1.045	1.028-1.062
CPB time	0.000	1.008	1.004-1.013
ACC time	0.207	0.996	0.990-1.002
HES 6% 130/0.4	0.997	0.999	0.513-1.944

[Logistic regression anlysis]

The Hosmer and Lemeshow test showed a chi-square statistic of 5.626 with a p-value of 0.689.

	No HES(N=63)	Low dosis(N=983)	High dosis(N=518)	P
AKI	14(22%)	183(19%)	119(23%)	0.125
Mortality	2(3%)	30(3%)	24 (5%)	0.285

[Effect of HES dosis on study endpoints]

Conclusion(s): In this large cohort of surgical patients, the administration of HES 6% 130/0.4 did not predict AKI as defined by RIFLE criteria. This was also true when the total volume of HES administered was taken into account.

7AP11-8

The use of hydroxyethyl starch 130/0.4 (HES) in cardiothoracic surgery and acute kidney injury, safe or not? A retrospective cohort study

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Introduction: Adverse effects of hydroxyethyl starches (HES) on renal outcomes such as acute kidney injury (AKI) have recently been suggested in studies employing critically ill patients. However, concern about the use of HES is currently not restricted to the group of the critical ill . The development of AKI after cardio-thoracic surgery is a major concern and associated with substantial morbidity and mortality. We hypothesized that there is a possible relation between the amount of perioperative administered HES and the incidence of AKI in cardiothoracic patients.
Methods: We included all patients older than 18 years who underwent CABG and/or valve replacement surgery between April 2008 and December 2013 in a single center retrospective cohort study. Patients with pre operative dialysis dependent renal failure, re-thoracotomies, re-CABGs, minimally invasive and those undergoing emergency surgery were excluded. The main study endpoint was acute kidney injury (AKI). We compared the incidence of AKI between patients who received one unit HES (group 1), two units HES (group 2) and more than two units HES (group 3) by calculating absolute risk differences (ARD) and relative risks (RR). Confounding factors were corrected for with logistic regression and subgroup analysis.
Results: 3746 patients were included who underwent cardiac bypass surgery and/or cardiac valve replacement of whom 396 (10.6%) developed AKI. In group 1 (n=1719) 176 (10.2%) patients ,in group 2 (n=1217), 123 (10.1%) and in group 3 (n=810) 97 (12.0%) patients developed AKI. Absolute risk differences (ARD) in overall AKI between the groups were not statistically significant. These results were confirmed after adjusting for ASA classification, duration of intraoperative mean arterial pressure below 55 mmHg and type of surgery. Statistically significantly more severe AKI (stage 3) was observed in group 3 compared to group 1, ARD 1.73% (95%CI 0.36 to 3.39) and RR 1.73 (95%CI 1.14 to 2.93).
Conclusion: In this retrospective cohort study HES appeared not to be an independent risk factor for the overall incidence of postoperative AKI. However, we did find a volume dependent relationship after stratification for the severity of AKI. Patients who received more than two units HES developed more severe AKI. So it seems that the amount of HES does not affect the overall incidence AKI but possibly does affect the severity of AKI.

7AP11-9

The effect of priming of the extracorporeal circulation with Hydroxyethylstarch 6% 130/0.4 (Volulyte®) or gelatine (Geloplasma®) on microvascular reactivity

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Background and Goal of Study: During acute haemodilution, blood viscosity and functional capillary density change considerably, leading to microscopic maldistribution of blood flow.[1] It has been suggested that the latest generation colloids might enhance tissue perfusion. This is suggested by the improved rheology of the blood and by the attenuated responses to injury of the endothelial glycocalyx.[2]
Therefore, we conducted a prospective, randomized, blinded study to evaluate the effect of hydroxyethylstarch (Volulyte®) as a priming solution of the extracorporeal circulation (ECC) on microvascular reactivity, and compared it with the standard ECC priming in our department, gelatine (Geloplasma®). The experimental hypothesis was that Volulyte® would provide better microcirculatory perfusion than Geloplasma®.
Materials and Methods: After ethical committee approval and informed consent, 40 elective cardiac surgery patients were randomized to receive either Volulyte® (n=20) or Geloplasma® (n=20) as the exclusive priming solution. Only crystalloid solutions were used before ECC was established. To evaluate microvascular reactivity, postocclusive reactive hyperaemia (PORH) measured with near-infrared spectroscopy (NIRO-200NX) was examined before and after ECC. PORH refers to the reproducible transient increase in blood flow after release of an arterial occlusion. The velocity and degree of flow restoration depend on the capacity of the microvasculature to recruit arterioles and capillaries, thereby reflecting the integrity of the microcirculation.[3] Recovery times and rate of recovery were determined. Data are expressed as median [min,max] and were compared using Kruskal-Wallis and Mann-Whitney U test.
Results and Discussion: After ECC, recovery times were significantly shorter in the Volulyte® group (median increase compared to pre-ECC of 1 sec [-25,10] vs 7 sec [-21,37] in the Geloplasma® group, p=0.024). Rate of recovery increased in the Volulyte® group with 28 %/min [-191,332], while it decreased in the Geloplasma® group (-26 %/min [-864,66]), p=0.018.
Conclusion: The shorter recovery times and increased rate of recovery indicate that Volulyte® might provide better microcirculatory perfusion than Geloplasma®.
References:
1. Tsai AG et al. Am J Physiol 1998; 275: H2170-80
2. Standl T et al. Anesth Analg 2003;96:936-43
3. Gerovasili V et al. Int J Ind Ergonom 2010; 40: 218-22

7AP11-10

The association between Hydroxyethyl Starch 130/0.4 and acute kidney injury after cardiopulmonary bypass: a single-center retrospective study

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Background and Goal of Study: Hydroxyethyl Starches (HES) have been shown to increase the risk of acute kidney injury (AKI) in intensive care unit patients suffering sepsis.[1] Whether this risk also applies to patients undergoing elective surgery remains unclear. We investigated whether HES is associated with acute kidney injury after on-pump cardiac surgery.
Materials and Methods: Balanced HES 130/0.4 (Volulyte®, Fresenius Kabi AG, Bad Homburg, Germany) was used as a pump prime and for intraoperative fluid therapy until July 2013 and has been entirely replaced by a balanced crystalloid solution (Plasmalyte®, Baxter, Lessines, Belgium) from August 2013. Data from 697 adult patients undergoing cardiac surgery between April 2013 and June 2014 were reviewed. HES patients were propensity-matched on previously published risk factors for AKI after cardiac surgery to patients treated with crystalloids. The odds of developing a more serious AKI in the HES group was estimated in an ordinal logistic regression using the Acute Kidney Injury Network classification as the outcome variable. Secondary outcomes included renal function at postoperative day 7, 30-day mortality, lengths of ICU and hospital stays and the incidence of postoperative respiratory complications.

Results and Discussion: One hundred and thirty HES patients were successfully matched with 130 crystalloids patients. HES was significantly associated with postoperative AKI (odds ratio=2.12; 95 % CI= 1.35-3.5; P=0.001). No significant association was found between HES and any of the secondary outcomes.
Conclusion(s): This study suggests that using balanced HES 130/0.4 as a pump prime and for intraoperative fluid therapy in adult patients undergoing on-pump cardiac surgery is associated with a higher incidence of AKI during the early postoperative period.
References: 1. Serpa Neto A et al, J Crit Care. 2014 Feb;29(1):185

7AP11-11

Does 6% hydroxyethyl starch (HES) solution (130/0.4) added to prime solution has any effect on bleeding in patients receiving tranexamic acid or not during coronary artery bypass graft (CABG) surgery?

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Background and Goal of Study: The addition of 6% hydroxyethyl starch (HES) into Ringer lactate priming solution may have adverse effects on hemostasis in patients undergoing coronary artery bypass grafting (CABG) with cardiopulmonary bypass (CPB) with or without the use of tranexamic acid.
Materials and Methods: In a prospective, randomized clinical trial, 132 patients were assigned to receive 20 ml/kg of Ringer priming solution with or without tranexamic acid (TA) (Group RS-TA, n=34 and Group RS-noTA, n=32) or 10 ml/kg of 6% HES plus 10 ml/kg of RS priming solution with or without intravenous tranexamic acid (Group HES-TA, n=35 and Group HES-noTA, n=31). Estimated blood loss, chest tube drainage, amount of blood products, hemoglobin, hematocrit, platelet and coagulation parameters were examined before and 24 hour after surgery.
Results and Discussion: For Group HES with tranexamic acid, when compared to other groups, estimated blood loss, postoperative 24 hour drainage loss and blood product transfusions were less (p=0.023; p=0.003; p=0.001; respectively) and hemoglobin, hematocrit values at 12 and 24 hours after surgery increased in comparison to other groups (p=0.041, p=0.034, p=0.004, p=0.001; respectively). Platelet concentrations were similar between groups (p>0.05).
Conclusion(s): In CABG, the administration of tranexamic acid in HES 130/0.4 prime solution study group decreased estimated blood loss and chest tube drainage in comparison to patients receving Ringer prime solution with or without tranexamic acid postoperatively however, no effects on renal functions or postoperative complications were shown.

7AP11-12

The impact of Hydroxyethylstarches in cardiac surgery - a meta-analysis

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Background and Goal of Study: Recent studies in septic patients showed that adverse effects of Hydroxyethylstarches (HES) possibly outweigh their benefits in severely impaired physiological haemostasis or kidney injuries. It remains unclear whether this also applies to patient populations that are less vulnerable, as in cardiac surgery. In this meta-analysis, we evaluated the impact of various HES generations in patients undergoing cardiac surgery on safety and efficacy endpoints.
Materials and Methods: We searched the databases PubMed, Embase and the Cochrane controlled trials register for randomised controlled trials in English or German language comparing HES to any fluid besides fresh frozen plasma during open heart surgery. Following data were collected in predesigned data extraction sheets by two reviewers: Total blood loss, blood transfusions, total volume infusion, length of stay in ICU and in hospital, need for reoperation, acute kidney injury and mortality. The inverse-variance approach and the Mantel-Haenszel approach were applied. Results are expressed as standardized mean difference (SMD) or risk ratio (RR) and 95% confidence interval (CI).
Results and Discussion: We included 51 eligible trials (3,439 patients) comparing HES to crystalloids, albumin, or gelatin. Blood loss and transfusion requirements were higher for older starches with mean molecular weights >200 kDa compared to other volume substitutes. In contrast, this effect was not observed with latest generation tetrastarches (130/0.4), which even performed better when compared to albumin (blood loss of tetrastarch *vs.* albumin: SMD -0.34; 95%CI -0.63, -0.05; p=0.02; *vs.* gelatin -0.06; 95%CI -0.20, 0.08; p=0.39; *vs.* crystalloids: -0,05; 95%CI -0.20, 0.10; p=0.54). Similar results were found for transfusion needs (blood transfusion of tetrastarch *vs.* albumin: RR 0.70; 95%CI 0.56; 0.89). Length of stay in the ICU or in hospital were significantly shorter with tetrastarches compared to gelatin (ICU: SMD -0.10; 95%CI -0.15, -0.05; p= 0.0002) and crystalloids (Hospital: SMD -0.52; 95%CI -0.90, -0.14; p=0.007).
Conclusion(s): This meta-analysis showed no evidence with the third generation of HES compared to other colloid or crystalloid solutions for a higher risk in terms of blood loss, transfusion requirements or hospital length of stay following cardiac surgery. Future trials are needed to evaluate the adverse effects of third generation of HES on high-risk surgical patients.

7AP12-1

A case of severe decrease in cerebral oxygen saturation during implantation of a baroreceptor stimulator

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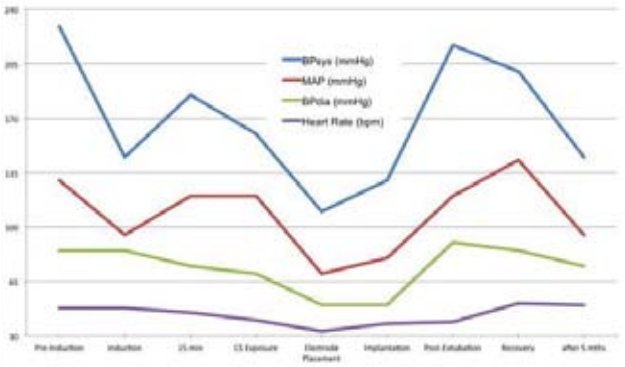
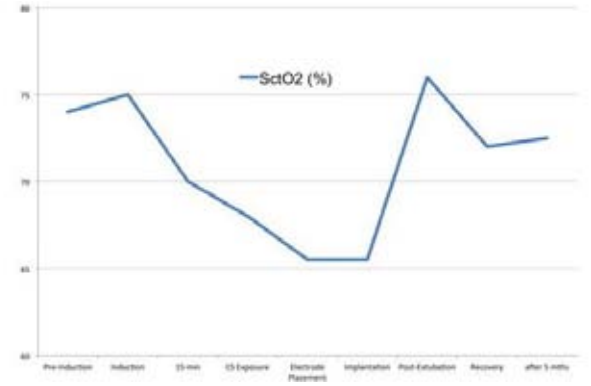
Background: Implantation of a baroreceptor stimulation electrode (Barostim neo™) in the carotid artery sinus (CS) in order to control malignant hypertension is a novel and promising procedure (1). However, for optimal placement of the electrode, anesthesiological management may not interfere with compensating hemodynamic mechanisms, such as the baroreceptor reflex. Therefore, due to CS stimulation during the mapping process, blood pressure (BP) is extremely volatile, and no data have been reported about the impact on cerebral oxygenation and potentially harmful effects.
Case report: We report a case of a 67yrs, 97kg old male patient with malignant hypertension (229/85 prior to induction). Anesthesia was induced with 9mg midazolam, 0.2 mg/10min fentanyl, 20mg etomidate, 50mg rocuronium and maintained after intubation with midazolam 0.1 mg/kg/hr and fentanyl 0.05-0.2 mcg/kg/min. Cerebral oxygenation saturation ($SctO_2$) was determined by Near Infrared Spectroscopy (ForeSight™). CS mapping by stimulation caused both a very strong decrease of BP (graph 1) and $SctO_2$ (graph 2), and was paused whenever $SctO_2$ dropped < 60% until values returned to normal.
After extubation, BP and $SctO_2$ returned to preoperative values, and after 5 months of treatment, hypertension was significantly less pronounced; the patient was in full recovery and showed no neurological or other damage.



[Graph 1 - hemodynamics]



[Graph 2 - SctO2]

Discussion and Learning Points: This case report shows that the implantation of a baroreceptor stimulator to treat refractory malignant hypertension may lead to a dangerous decrease of cerebral oxygenation with potentially harmful outcomes. While this procedure is a promising novel therapy, the optimal anesthesiological management is yet to be determined and may require the continuous monitoring of SctO2.

Reference:

1. Doumas et al; Expert Rev Cardiovasc Ther 2013; 11(6):683-8

7AP12-2

Upper lung left lobe torsion after video-assisted thoracoscopic lower lobectomy

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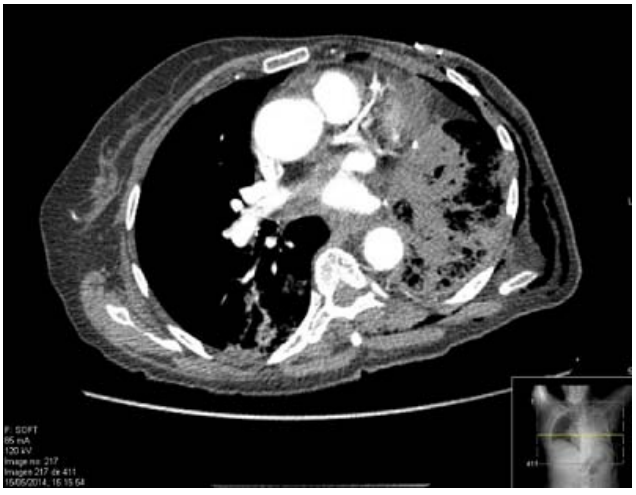
Background: Pulmonary lobe torsion is a rare and potentially life-threating complication following thoracic surgery. The reported occurrence rate is 0.089-0.3%[1].

Case report: A 72-year-old female patient underwent a VATS left lower lobectomy under combined general/epidural anesthesia. The operation and early postoperative period was unremarkable. During the second night after surgery the patient developed dizziness and vomiting followed by dyspnea and hemoptysis, on chest X-ray a sudden well-demarcated area of consolidation involving the previously normal left upper and middle lung zones was revealed. A subsequent chest angio-CT scan evidenced complete obstruction of left upper pulmonary vessels.



[Angio-CT: Obstruction of left upper lung vessels]

With a high index of suspicion of lobar torsion, the patient underwent open urgent reoperation. Upper pulmonary left lobe was found hepatized and completion pneumonectomy was performed.

Upon arrival in operating room she looked pale and prostrate, tachycardic and tachypneic despite supplementary oxygen. After basic and invasive arterial monitorization a T4-T5 epidural catheter was placed in a right lateral decubitus position. Fiberoptic bronchoscopic positioning of a right double-lumen tube was archived after anesthetic induction with etomidate-suxamethonium, general anesthesia was based on sevoflurane-cisatracurium-remifentanil. Restrictive fluid therapy and high dose phenylephrine were administered; by the end of the surgery epidural Lbupivacaine-fentanyl bolus was administered and continuous infusion was started. Immediate tracheal extubation in the operating theater was achieved; phenylephrine on ICU admission after surgery was suspended following intra venous volume replacement. The patient was discharged home on postoperative day 13 from the initial operation, no respiratory complication was registered.

Reference:

1. Cable DG et al. Lobar torsion after pulmonary resection: presentation and outcome. J Thorac Cardiovasc Surg 2001;122:1091-3

Learning Points: Pulmonary lobar torsion is a rare event; even a short delay in diagnosis can lead to lung infarction and poor prognosis.
High epidural catheter placement before open surgery may have improved our patient's prognosis.

7AP12-3

Nonintubated anaesthesia technique for video - assisted thoracoscopic surgery

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Background: In the recent decade, nonintubated video-assisted thoracoscopic surgery (VATS) has been extensively performed and evaluated. General anaesthesia with single-lung ventilation was always considered a condition for thoracoscopic major pulmonary resections. Here, we present a technique that reduces the surgical access trauma even more: single-incision VATS approach in a nonintubated patient.

Case report: A 42-year old male was admitted to thoracic surgery department for surgery. A computed tomography scan revealed a 1.5-cm nodule in the left 2 segment. The patient was proposed for nonintubated uniportal VATS surgery. Ultrasound guided thoracic paravertebral block (PVB) was performed by an 18G Tuohy needle at the T3 and T5 level (bupivacaini 150mg). Sedation was started by intravenous administration of propofol (10mg/mL) using a target-controlled infusion method, with incremental fentanyl injection to maintain the patient in a mildly sedated. A VATS approach through a single 2.5-cm incision was made at the level of the fifth intercostal space on the left side. A 1,2,3 segmentectomy was performed. The total surgical time was 160 min.

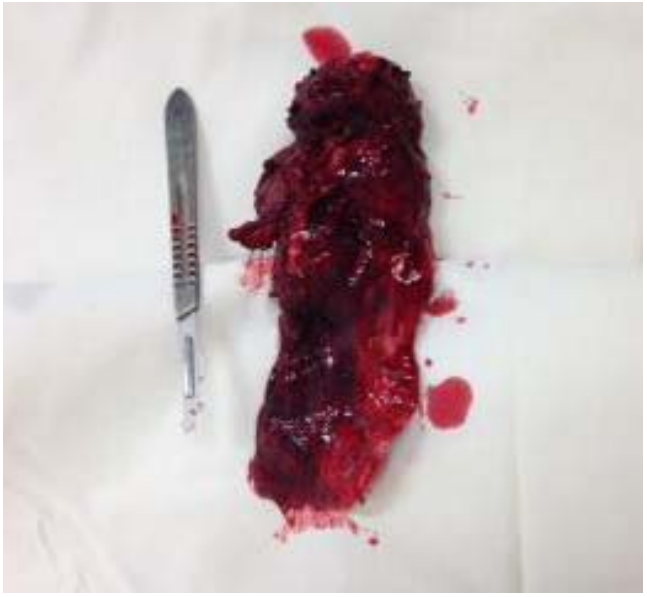
Discussion: Traditionally intubated general anaesthesia with one-lung ventilation has been considered mandatory during thoracoscopic procedures, especially for lobectomy. Pompeo reported awake conventional VATS pulmonary nodule resection in 2004 and Rocco in 2010 by using only one incision. These procedures try to minimize the adverse effects of tracheal intubation andgeneral anaesthesia, such as intubation-related airway trauma, ventilation-induced lung injury, residual neuromuscular blockade, impaired cardiac performance and postoperative nausea and vomiting (1 - 3).

References:

1. Rocco G et al. Awake single-access (uniportal) video-assisted thoracoscopic surgery for peripheral pulmonary nodules in a complete ambulatory setting. Ann Thorac Surg 2010;89:1625-8.
2. Diego Gonzalez-Rivas et al. Single-port thoracoscopic lobectomy in a nonintubated patient: the least invasive procedure for major lung resection? Interactive CardioVascular and Thoracic Surgery (2014) 1-4.
3. Ming-Chang Kao et al. Anesthesia for awake video-assisted thoracic surgery. Acta Anaesthesiologica Taiwanica 50 (2012) 126e130.

Learning Points: With appropriate monitoring, meticulous employment of regional anesthesia, sedation nonintubated VATS is proved to be a safe alternative to the conventional intubated general anesthesia.

[Nonintubated anaesthesia for video]



[Performed segmentectomy]

7AP12-4

Differential mechanical ventilation for vascular plug placement as a gastrobronchial fistula treatment

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Background: Differential mechanical ventilation (HFJV affected lung; volume control in contralateral lung), in the anesthetic management of a gastrobronchial fistula closure.
Case report: We report the anesthetic management of a 50 year old male, with a gastrobronchial fistula in the context of a stage IV gastro-esophageal adenocarcinoma[1] who underwent the endoscopic placement of a prosthesis as treatment.
Discussion: Foreseeing an important leak through the gastrobronchial fistula we perform the intubation with a double-lumen endotracheal tube (Nº 37) following the rapid sequence protocol and the Sellick's maneuver. We check its correct placement by bronchoscope before the beginning of the positive pressure ventilation. We confirm a huge air leak that doesn't allow the ventilation and generate a big gastrointestinal distension that difficult the procedure[2].
Initially we performed conventional mechanical ventilation in the left lung, requiring progressively higher FiO2 and PEEP. When despite a FiO2 of 100% and high PEEP could not get SpO2 greater than 88% and the patient began to suffer hemodynamic compromise by the very high PEEP, we started HFJV (FiO2 100% with humidifier; PEEP 1; 800 oscillations and inspiration-expiration ratio of 1:3) in the affected lung getting better SpO2 and allowing us to decrease PEEP to safe levels.
This type of ventilation in the affected lung facilitated the implementation of the process that included the passage of a hollow guide from the stomach to the mouth, through which the prosthesis (Amplatzer Duck Occluder II) was placed occluding the fistula.
After the successful occlusion of the fistula we get a proper conventional ventilation and extubation without incidents.
Differential mechanical ventilation (HFJV of the affected lung and conventional mechanical ventilation of contralateral lung) is a safe way of managing patients with gastrobronchial fistula and facilitate its endoscopic treatment with vascular prosthesis.
References:
1. M.D. Konstantinos Albanopoulos; Gastrobronchial fistula as a late complication of sleeve gastrectomy. Surgery for Obesity and Relared Diseases; 2013.
2. M.J. Wood, E.S.Lin and J.P. Thompson: Flow dynamics using High-frecuency jet ventilation in a model of bronchopleural fistula. British Journal of Anaesthesia 112(2): 355-66 (2014)

7AP12-5

Alternative site for the placement of totally implantable vascular access device (TIVAD). A case report of two successful TIVAD implantations in the thigh after femoral vein catheterization

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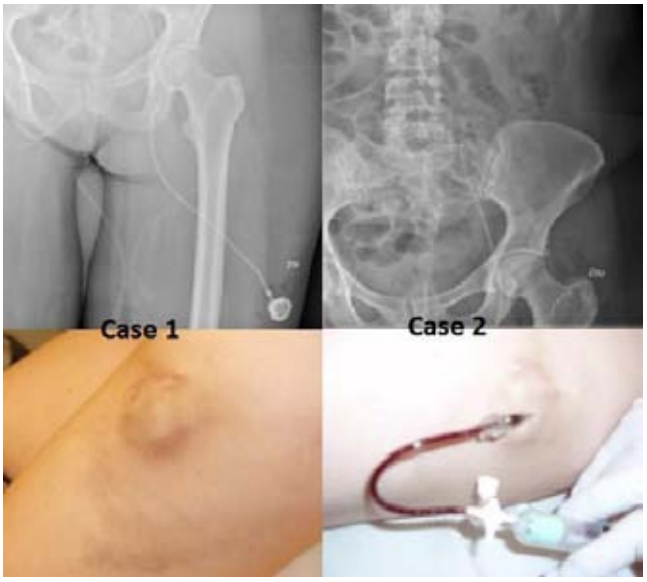
Background: Totally implantable venous access devices (TIVADs) have improved the quality of life for cancer patients. TIVADs represent a convenient option when long-term venous access by a central venous catheter (CVC) is indicated. The subclavian or internal jugular vein has become the most popular vessel for introducing a CVC (including TIVAD) ending in the superior vena cava (SVC), both for short- and long-term use. However, if this choice is contraindicated for any reason, an alternative site for catheter insertion should be chosen (1). Femoral vein is a possible alternative (2).
We report 2 cases of TIVAD implanted in the thigh in a university hospital in Sweden, 2013. We are not aware of any report from Sweden about this surgical approach.
Case report: Case 1, 47-y female, had a locally metastatic breast cancer with infected ulcerations on almost all the anterior chest wall with thrombosis of the proximal veins of both arms. Case 2, 44-y female with lung cancer, had SVC Syndrome with thrombotized big veins proximal to the SVC, indicating high dose anti-coagulant therapy.

Alternative site for the placement of the TIVAD was motivated, and we chose the femoral vein despite a higher risk of complications. We implanted TIVAD in anterior surface of the left thigh.
Due to technical issue with fluoroscopy, verification of catheter's tip was difficult in the first case. This was adjusted later after postoperative X-ray control. This problem was avoided in case 2 by prior consideration of needed instruments. We did not notice any other problem with the use of these TIVADs, and no complications occured. Frequent flushing of the device was recommended. Patients' and staff's satisfaction were gained.



[Case 1 and Case 2, X-rays and pictures]

Discussion: TIVAD placed in the thigh is to be considered when the veins of the neck and upper arm cannot be catheterized, or the the chest wall is not appropriate for implanting the device.
References:
1. Toro A et al TIVAD implanted in saphenous vein 2012
2. Chen S et al Modified femoral vein approach 2008
Learning points:
Clinical considerations should motivate alternative managment
Experience increases with time and more cases
Patients' safety and comfort should be guaranteed

7AP12-6

Undiagnosed tacheaopleural fistula following esophagectomy and tracheostomy

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Background: Tracheoesophageal fistula is an uncommon complication of tracheostomy. In a patient status post esophagectomy, there is another thing we must keep in mind.
Case report: A 78 years old man with esophageal cancer received esophagectomy. Tracheostomy was done for postoperative pneumonia with difficult weaning from ventilator. Poor lung expansion, persistent dirty fluid and air leakage from chest tube were noted, thus the thoracic surgeon decided to perform video-assisted thoracoscopy to treat pneumothorax and empyema.
During the surgery, every lobes/ segments were carefully checked but there was no air leakage from lung. As the air bubbles came from hilar side, we performed bronchoscopy and a fistula was found posterior to tracheostomy after we deflated the tracheostomy cuff. The thoracic surgeon placed a tracheal stent to seal it and tried further repair a few days later. The patient died of repeated infection one month later.
Discussion: Our patient was initially misdiagnosed as common pneumothorax (air leakage form lung) thus thoracoscopy was performed. However, the air leakage was directly from trachea to pleural space. In a patient with esophagectomy, the esophageal posterior to trachea is excised thus the uncommon complication of tracheostomy - tracheoesophageal fistula will become tacheaopleural fistula. The esophageal surgery may cause inflammation and compromised vascular supply, thus it is not surprising the posterior wall of trachea could be more fragile to a tracheostomy cuff.
References:
1. Tracheopleural fistula. A complication of the cuffed tracheostomy tube. J Thorac Cardiovasc Surg. 1972 Mar;63(3):416-8.
Learning points:
1. History is important -- in a patient status post esophagectomy, possible complications associated with trachea and esophageal must be keep in mind.
2. When tracheaopleural fistula is suspected, a detailed bronchoscopy is the choice of diagnostic tools.

7AP12-7

Intravenous sildenafil in the perioperative management of pulmonary arterial hypertension

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Background: Perioperative management of patients with pulmonary arterial hypertension (PAH) is a great challenge for physicians. Guidelines on non-cardiac surgery recommend that patients receiving PAH-specific treatment continue this in the peri-operative period[1]. In 2010, sildenafil (PDE-5 inhibitor), was approved for iv use in adult patients who are taking oral sildenafil and who are temporarily unable to oral intake.
There are limited data for its iv use and no series in non-cardiac surgery have been published.
Case report: 3 cases of non-cardiac surgery in PAH patients stabilized on oral sildenafil and combined therapy.
Case 1: F, 74 y, WHO II, PAH and systemic sclerosis. Surgery: Wedge resection for lung cancer. General anesthesia (GA) lasted 4 h. Inhaled iloprost was used every 2 hours and 3 doses of 10 mg iv sildenafil administrated before oral intake was feasible. The ICU stay was 3 days.
Case 2: F, 59 y, WHO III, PAH and toxic syndrome. Surgery: Jejunum resection for bleeding Dieulafoy's lession. GA lasted 5 h. Multiple transfusions were needed. Epoprostenol infusion was maintained. Inhaled nitric oxide (iNO), dobutamine (DB) and norepinephrine (NE) perfusion were required. 20 mg iv sildenafil intraoperative allowed iNO discontinuation and early extubation in the operating room. The ICU stay was 5 days with iv sildenafil.
Case 3: F, 68y, WHO III, PAH and chronic thromboembolic disease. Surgery: Partial hip replacement. GA lasted 2.5 h. The epoprostenol infusion was maintained perioperatively and low dose DB/NE were required. Single dose of iv sildenafil before oral intake was used. The ICU stay 2 was days.
Perioperative monitoring with arterial line, pulmonary artery catheter and transesophageal echocardiography was performed in the 3 cases. No pulmonary hypertensive crisis happened. The three women were home discharged without adverse outcomes.
Discussion: Iv sildenafil has shown systemic vasodilatory properties and could produce transient hypotension. No clinically relevant changes of blood pressure or symptoms of hypotension were observed in our patients after sildenafil bolus injection.
Even though patient 2 was on continuous infusion of NE and DB, 20 mg iv sildenafil was well tolerated allowing NE/DB interruption.
Reference:
1. 2014 ESC/ESA Guidelines on non-cardiac surgery. Eur Heart J. 2014 Sep 14;35:2383
Learning points: Maintenance of PAH specific therapy in the perioperative period is mandatory.
I.v sildenafil seems to be safe in this scenery.

	Age (years)	Gender	Functional Class WHO	PAH specific therapy	proBNP (pg/ml)	6 min walk test (meters)	mPAP (mmHg)	TAPSE	RAP (cmH2O)
Case 1.	74	Female	II	Sildenafil Iloprost	525	325	36	18	4
Case 2	59	Female	III	Sildenafil Bosentan Epoprostenol	1784	404	52	12	14
Case 3.	68	Female	III	Sildenafil Bosentan Epoprostenol	1117	375	45	14	4

[Table 1]

7AP12-8

Intravenous leiomyoma with extension into the right cardiac chambers: anesthetic management

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Background: Intravenous leiomyoma is a benign smooth muscle cell tumor of uterine origin that may grow into the pelvic veins and the inferior vena cava (IVC), but its extension into the right cardiac chambers is rare [1]. Clinical presentation and compromise of functional capacity may vary. Surgery is the treatment of choice, since its complete removal has a favorable prognosis. We present the anesthetic management of surgical excision of an intravenous leiomyoma extending to the cardiac chambers and the pulmonary trunk in a patient with pulmonary hypertension (PHT).
Case report: Female, 74 years old, previous history of overweight, uterine leiomyomata and hysterectomy 19 years ago. The patient presented a mass in the IVC, extending to the right cardiac chambers and pulmonary trunk, which caused obstruction to venous return and consequentially peripheral edema, dyspnea and asthenia. The invasion and embolization to the pulmonary arteries caused pulmonary embolism and secondary PHT. We used standard monitoring and BIS®, invasive blood pressure, central venous pressure and transesophageal echocardiography (TEE). Fentanyl, propofol and rocuronium were used for intravenous general anesthesia. When leaving extracorporeal circulation, vasopressor perfusion was needed. At the end of the surgery, total removal of the tumor and integrity of the tricuspid valve were assessed by TEE. The patient was admitted to an Intensive Care Unit, sedated, ventilated and hemodynamically stable. She was discharged seven days after surgery.
Discussion: The anesthetic management of a patient with such comorbidities is a challenge. Right cardiac chambers masses contraindicate placement of venous catheters in the right atrium, due to the risk of fragmentation of the mass and subsequent embolization. Regarding PHT, stimuli that increase peripheral vascular resistance (drugs, hypoxia, hypercapnia and acidosis) should be avoided. A marked decrease in blood volume and venous return as well as myocardial depressant drugs should also be avoided.
References: 1. Virzi G, Ragazzi S, Bussichella F, et al. J Cardiothor & Vascular Anesth 2006; 20:94-95.
Learning points: Intraoperative TEE has a significant role in hemodynamic monitoring. The Swan-Ganz catheter was contraindicated in this case. Furthermore, TEE allowed monitoring of additional cardiac emboli.

7AP12-9

Intravascular leiomyoma goes to the heart, a challenge to anaesthetize

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Background: Intravascular leiomyomatosis (IVL) is a rare smooth muscle cell non-malignant tumour, which is usually confined to the pelvic venous system[1]. The extension through the inferior vena cava (IVC) into the right side of cardiac cavities is even weirder and could be life threatening due to mechanical interference with intra-cardiac structures or pulmonary arteries[1]. Surgical treatment is the gold standard and anesthetizing such as complex surgery is a major challenge.
Case report: A 49-year-old woman presented progressive dyspnoea and increased abdominal girth. Transthoracic echocardiogram showed a mobile mass extending from the IVC reaching the right ventricle. The abdominopelvic CT showed an enlarged uterus and an extension of the tumour through pelvic veins, iliac veins and IVC to the heart. A single staged procedure for total excision of the tumour was planned involving tree surgical teams: gynaecologists, cardiovascular and transplant surgeons. General anaesthesia was induced afterwards laparotomy and median sternotomy was performed. Total abdominal hysterectomy and bilateral salpingo-ooforectomy was executed. Subsequently using cardiopulmonary bypass (CPB) without circulatory arrest an atriotomy was created and tumour was removed, as it wasn't attached to any vein or cardiac chambers. The patient was weaned of CPB and transferred to the Intensive Care Unit. Recovery was uneventful and she was discharged on the 7th postoperative day.
Discussion: We present the case of a young woman with IVL originating from the uterus reaching the right ventricle, successfully treated in a single stage surgical approach. Because the infrequency of these disease extension, at de onset it was misdiagnosed as intracardiac mass with intracaval thrombi, but the patient had no symptoms of obstruction of IVC, so we must be careful with the differential diagnoses that may influence the prognosis. Another point to note was the prudently management of central venous access due to the presence of a mass in right cavities and the carefully induced anaesthesia to avoid symptoms of low output.
References:
1. Simon A, et al. IVL: A case report and review of the literature. J Obstet Gynaecol. 2014; 19:1-2.
2. Xu Z., et al. Uterine IVL with cardiac extension: Imaging characteristics and literature review. World J Clin Oncol. 2013; 4(1): 25-8.
Learning points: We emphasize the importance of working at a multidisciplinary team to plan the correct approach of such a complex surgery.

7AP12-10

Severe hypoxemia during carinal resection in the lateral position under one-lung ventilation of a non-dependent lung

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Background: For one-lung ventilation (OLV) in the lateral position, the dependent, ventilated lung receives more blood flow than the non-dependent, non-ventilated lung owing to gravity, improving matching of ventilation and perfusion. Conversely, if OLV is applied to the non-dependent lung, even though it is clinically rare, hypoxemia may be caused by considerable mismatch of ventilation and perfusion. We report a case of severe hypoxemia during carinal resection under OLV of a non-dependent lung.
Case report: A 39-year-old woman was scheduled for carinal resection for the mass which obstructed the left mainstem bronchus (LMB) and extended to the carina and right mainstem bronchus (RMB). In the right lateral position, left bronchi were dissected under right OLV. After changing to the left lateral position, right thoracotomy was done under left OLV. For carinal resection, the LMB was resected and a sterile endotracheal tube was inserted into the separated LMB for ensuing left OLV (Fig. A).
However, oxygen saturation decreased to 70%, so an additional tube was immediately inserted into the right bronchus after RMB resection, and then differential ventilation of both lungs proceeded using two ventilators (Fig. B). The lower trachea was resected, and the separated RMB was anastomosed with the trachea (Fig. C).
However, under OLV of the right lung, which was non-dependent side, oxygen saturation decreased below 80%. Therefore, the left pulmonary artery was ligated, and then oxygen saturation was restored to 100%. After moving the patient to the right lateral position, left pneumonectomy was done under right OLV without hypoxic events (Fig. D).
Discussion: Although the role of gravity on the distribution of pulmonary blood flow is controversial under the supine or prone positions,[1] gravity seems to be a major factor to make the dependent lung more perfused in the lateral position. Thus, in contrast to the dependent OLV, generally performed in thoracic surgery, the non-dependent OLV may induce severe hypoxemia because of substantial right-to-left shunt flow going to the dependent, non-ventilated lung.
Therefore, the hypoxemia can be treated by clamping the pulmonary artery of the non-ventilated lung for reducing shunt flow.
References: 1. Comor Phsyiol. 2011;1(1):39-59.
Learning Points: Hypoxemia caused by the non-dependent OLV in the lateral position can be treated by the strategy for reducing shunt flow, such as clamping the pulmonary artery of the dependent lung.

7AP12-11

Severe re-expansion pulmonary edema induced by one-lung ventilation with high levels of Interleukin-8 and monocyte chemotactic protein-1 in bronchial secretion: two case reports

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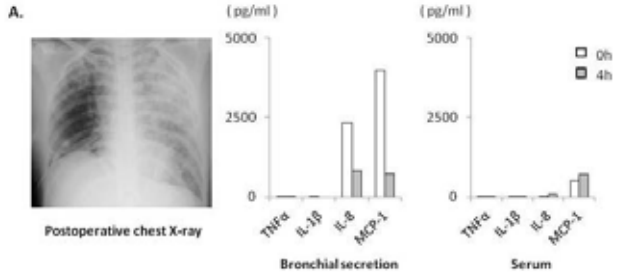
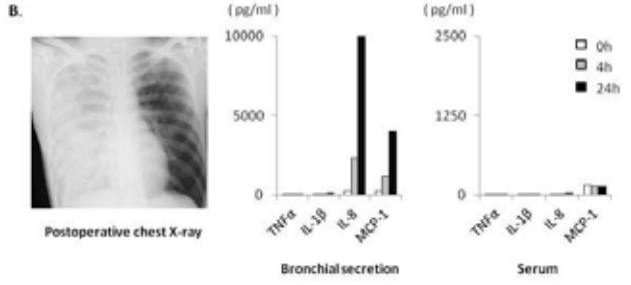
Background: Re-expansion pulmonary edema (RPE) is a rare serious complication after one-lung ventilation (OLV). We measured interleukin-8 (IL-8) and monocyte chemotactic protein-1 (MCP-1) in clinical RPE cases for the first time.
Case report:
Case 1: A 32-year-old woman with metastatic lung cancer developed RPE after video-assisted thoracoscopic surgery. Preoperative pulmonary function test and computed tomography (CT) revealed no abnormality. Partial resection of the left lung under general anesthesia was completed uneventfully. About 1 hour after the re-expansion, bubbly secretion spilled out from the left bronchus. Postoperative chest x-ray showed pulmonary infiltrates in the left lung. The levels of IL-8 and MCP-1 in the secretion were extremely high although the levels of them in serum were low. Tumor necrosis factor (TNF) -α and IL-1β levels were normal. (Figure 1A)
Case 2: A 37-year-old man with infective endocarditis developed RPE after mitral valve plasty with minimally invasive cardiac surgery (MICS). Preoperative pulmonary function test revealed almost normal values and CT revealed no abnormality. MICS using cardiopulmonary bypass (CPB) was performed under general anesthesia. Mitral valve plasty and weaning from CPB with left OLV was achieved uneventfully. Before closing the chest, the right lung was expanded. About 40 min after re-expansion, a large amount of serous bronchial secretion spilled out from the right bronchus. A postoperative chest x-ray showed pulmonary infiltrates in the right lung. The levels of IL-8 and MCP-1 in the secretion were extremely high although the levels of them in serum were low. TNF-α and IL-1β levels were almost normal.(Figure 1B).



[Figure 1A]



[Figure 1B]

Discussion: From animal studies, IL-8 and MCP-1 have been thought to be involved in the development of RPE. These clinical cases indicate that these mediators were also involved in human RPE and leaked into the circulation from re-expanded lung. Systemic inflammation caused by surgery is not considered to be involved in RPE because TNF-α and IL-1β levels were low.
References: Ann Thorac Surg 2001;71(6):1825-1832.
Learning Points: IL-8 and MCP-1 are involved in the development of RPE.

7AP12-12

Urgent paraganglioma of the carotid sinus surgery

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Background: Paragangliomas are rare tumours derived from autonomous nervous tissue and can be classified as functionant or not according to their catecholamine secretion behavior. In the head and neck, they are more frequently parasympathetic, the carotid sinus being the most affected site. 5-10% of them are functionant, and manifest initially by mass effect or cranial nerve palsy. Diagnosis is based on clinical history and physical examination, imaging and blood and urine dosing of cathecolamines and metanephrines. Treatment is surgical.[1]
Case report: 59 year old female patient, ASA II. Past medical history of controlled arterial hypertension and dyslipidemia, on Olmesartan/Hydroclorothiazide (40/25mg) and sinvastatin 20mg. Diagnosed with a cervical tumor suggesting paraganglioma, and presenting for urgent surgery due to the tumor's rapid growth and hemorrhagic potential. Blood and urine testing for cathecolamines, metanephrines and vanilmandelic acid were taken, but results were not expected to be available in the next month. Under standard and invasive blood pressure monitoring, general anesthesia was induced with midazolam, fentanyl, etomidate and rocuronium. Tracheal intubation was performed successfully, and a central catheter was placed without complications. Anesthesia was maintained with sevoflurane/O_2, continuous remifentanyl infusion, and rocuronium. There were no intra-operative hemodynamic changes due to the tumor's surgical manipulation. Acetaminophen and tramadol IV were given.The procedure lasted 4h30m. Blood losses were 800mL. Reversal of neuromuscular blockade was performed with Sugamadex 2mg/Kg. The patient was transferred to the ICU hemodynamically stable, with no major neurological defficits and without symptoms.The patient was discharged at post-operative day 6, without complications.
Discussion: In this patient, the tumor was not a functionant type, but all the anesthetic approach, including monitoring, venous accesses and drug choice, was done as if it was functionant, and the worst case scenario was expected.
References:
1. PIMENTA, Tania A. et al. **Paraganglioma funcionante do pescoço.** *Arq Bras Endocrinol Metab*. 1998, vol.42, n.6, pp. 478-482.
Learning points: Unaware of tumor functionality, measures should be taken to the worst possible scenario and therefore assume that it is functioning. In this case all preparation should be like in a pheochromocytoma.

7AP13-1

Frailty as a risk factor of cardiovascular surgery

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Background and Goal of Study: The creation of clinical risk assessment score systems was essential in surgical risk stratification and thus the reduction of mortality and postoperative complications. The experience, that patients of the same age and risk admitted for the same procedure react differently and have a wide deviation of complications and length of recovery, suggest that the current scoring systems need to assess new risk factors. Frailty, as a new concept of interest shifts towards such factors that are beyond the scope of clinically measured parameters and patient anamnestic data, taking into account psychosocial background as a vital factor in healing and rehabilitation. The aim of this study is to assess the relationship between preoperative physical, psychological and psychosocial risk factors and the outcome of adult cardiovascular surgery.
Materials and Methods: In this preliminary analysis of our prospective study, we used the data of 64 consecutive adult patients admitted to elective cardiac and vascular surgery between September and December 2014. We assessed psychosocial and neuropsychiatric factors via questionnaires using the Hungarostudy, BDI, GDS, STAI, Type D, and MMS queries. We also used quantifiable anamnestic data including weight loss, gait speed, smoking and alcohol consumption. Furthermore, we examined the perioperative laboratory values, medication use, surgical parameters, blood loss, and fluid balance. Primary study endpoints were postoperative complications (acute kidney injury, low output syndrome, infection, arrhythmia, respiratory failure, periph-

eral vascular insufficiency, reoperation due to bleeding), length of hospital stay and mortality.
Results and Discussion: Patients with postoperative arrhythmia had higher scores on the Beck Depression Inventory (p=0.013). Length of mechanical ventilation was longer in patients with postoperative infection (p=0.001). When comparing patients undergoing cardiovascular surgery with a representative control group of healthy individuals, we found that the surgical patients were more happy and satisfied with their lives (p=0.01, p=0.04, respectively) and were more religious (p<0.001).
Conclusion(s): The use of psychosocial and neuropsychiatric queries is a promising addition to existing clinical risk stratification score systems for the assessment of patient frailty. The identification of new risk factors can help improve patient safety and the quality of hospital care.

7AP13-2

Implementing a multimodal infection control program reduces the incidence of deep surgical site infections (DSSI) and changes the pattern of micro-organisms involved

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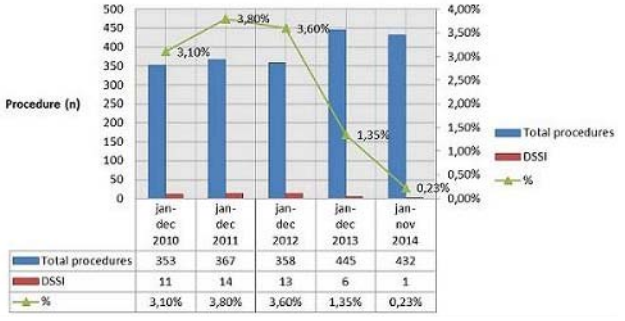
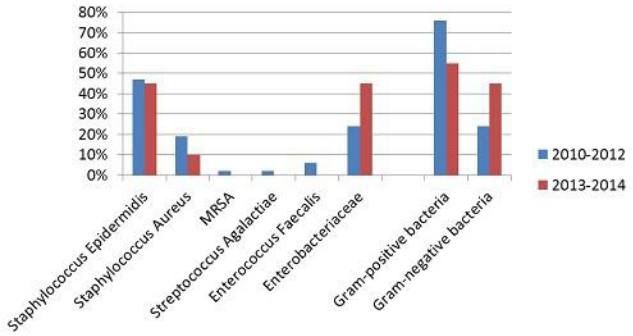
Background and Goal of Study: DSSI is a major complication after cardiac surgery with a high mortality rate. Incidences of DSSI vary from 0.5 % to 5 % and implementing a comprehensive infection control program reduces this incidence [1].
We evaluated the impact of introducing a multimodal ICP on the incidence of DSSI and the involved micro-organisms.
Materials and Methods: We noticed a too high incidence of DSSI after cardiac surgery caused by gram positive as well as gram negative bacteriae (Figure1+2).
In 02/2013 we introduced a bundle of interdisciplinary infection control measures.These guidelines were developed and implemented by the medical and nursing staff of all involved departments.
Besides emphasizing the importance of existing guidelines (antiseptic shower, hair removal by clipper, strict hand hygiene, prophylactic ant]ibiotics, tight glycemic control (80-110 mg/dl), …), new strategies were introduced.Most important new strategies were nasal decolonisation with mupirocin twice daily 48 hrs peri-operatively, preoperative antiseptic skin preparation twice (Chlorhexidine gluconate 0.5%), applying topical skin adhesive to the sternal wound postoperatively and in case of CABG-procedures maintaining a strict barrier between the vein harvesting procedure and the chest procedure.



[Incidence DSSI]



[Bacteria involved in DSSI]

Results and Discussion: We observed not only a significant reduction in DSSI rates in cardiac surgery following implementation of a multimodal ICP from 3,1% in 2010 down to 0.23% in 11/2014 (Figure 1) but also noticed a change in micro-organisms involved (Figure 2).
Conclusion(s): Implementing a multimodal ICP significantly reduced the incidence of DSSI in our hospital, primarily by reducing infections caused by gram positive bacteriae.
References:
1. Apic Guide. Guide for the prevention of mediastinitis surgical site infections following cardiac surgery (2008). www.apic.org

7AP13-4

Treatment of accidental catheterization of the internal carotid by the establishment of an Angio-Seal® before performing CABG with extracorporeal circulation

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Background: There is no evidence-based recommendations about what to do in case of accidental carotid catheterization especially in the situation where cardiopulmonary bypass (CPB) is urgently needed. We report an illustrative case.
Case Report and Discussion: We report the case of a man of 79 years who needed coronary bypass surgery in emergency. During the establishment of an invasive monitoring of pulmonary artery by the Seldinger technique without an ultrasound marking, the introduction of the 16 gauge catheter cordis was accidentally performed in carotid.
The literature highlights the potentially serious complications of such an incident if the intervention is not postponed of at least 24 hours in case of elective surgery (arteriovenous fistula, cervical hematoma with airway compression, stroke, dead)[1].
Regarding the need for coronary revascularization in emergency, a multidisciplinary decision (cardiac surgeon, interventional cardiologist and anesthetist) lead to the setting up of an Angio Seal ® before removal of the catheter.
The surgery could proceed with CBP and heparin. No bleeding or cervical hematoma was highlighted. Neck ultrasound with Doppler of the vessels was performed two weeks after the incident and was normal.
Conclusion: The treatment of carotid arterial catheterization by Angio Seal ® could be an alternative to conventional surgical treatment in case of CPB in emergency.
References:
1. Guilbert M-C and al : Arterial trauma during central venous catheter insertion:
Case series, review and proposed algorithm. J Vasc Surg 48:918-985, 2008
2. Ezaru, C.S. and al : Eliminating arterial injury during central venous catheterization
using manometry. Anesth Analg 109, 130-4 (2009)
Learning Points: The American Society of Anesthesiologists published In 2010 draft central line insertion recommendations that include pressure transduction as one method to confirm venous access of the introducer needle and the catheter, based in part on evidence provided in the paper by Ezaru et al. [2] showing that pressure measurement can prevent inadvertent arterial cannulation.
Despite training and experience, the installation of Such catheters is not risk-free; Ultrasound and pressure waveform measurement are two commonly used methods to reduce the chances of injury to the carotid artery.

7AP13-5

Perforation of the left ventricle wall due to the insertion of a pulmonary artery catheter. A case report

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Background: Since 1970, the Pulmonary Artery Catheter (PAC) has been routinely used in the management of critically ill patients. Indications include: management of myocardial infarction, respiratory distress, shock, cardiac surgery or cardiac tamponade, asseessment of the therapeutic effects and perioperative monitoring of patients with unstable cardiac function.
Case report: We present a complication due to the use of PAC not described before. A perforation of the interventricular septum and free wall of the left

ventricle (LV) due to a strong layering of the PAC that was not suspected or diagnosed except by direct vision of the heart after pericardial opening.
77 yo woman scheduled for Bentall surgery due to dilated aortic root, 49 mm ascending aorta and severe aortic regurgitation. She had normal LV and right ventricle (RV) anatomy and function. After induction PAC 7.5 french Baxter was placed. Curves, pressures and values for RV, Pulmonary Artery (PA) and wedge pressure were normal. There was no resistance to the passage of the catheter. Transesophageal echocardiogram showed CAP in right cavities and apparent correct placement. No septal defects were observed.After sternotomy and dissection we found contained perforation of the LV free wall. Once extracorporeal circulation was performed, PAC was removed and the defects in septum and LV apex were repaired. After 14 days the patient was discharged.
Discussion: The CAP has the same risks as any other central venous cannulation with some specific by its greater length. Those described in the literature include: pulmonary infarction, perforation of the RV or PA, balloon rupture, thromboembolism, arrhythmias, valve damage, knots and loops catheter, infection and transitory pulmonary lobar collapse, but we find no publication of LV perforation.
Despite the widespread and frequent use of PAC in our environment, particularly in patients after cardiac surgery, currently still raises doubts about the need for its use. It must assess the risk / benefit of placement and consider its possible complications, which while rare can become potentially serious.
References:
1. Chatterjee K. The Swan-Ganz catheters: past, present, and future. A viewpoint. Circulation. 2009 Jan 6;119(1):147-52.
2. Hadian M. Evidence-based review of the use of the pulmonary artery catheter: impact data and complications. Crit Care. 2006;10 Suppl 3:S8
Learning points: Other complications produced by the use of PAC apart from those published.

7AP13-6

Management of acute peritonitis surgery in a patient with severe cyanotic heart disease

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Background: Particular attention is needed in the anesthetic management of patients with complications such as severe cyanotic heart disease.
Case report: The patient was a 43-year-old man with acute cholangitis. His condition was complicated by previously corrected transposition of the great arteries, Pulmonary Atresia with Ventricular Septal Defect, major aortopulmonary collateral artery, and atrial septal defect.
Abnormal cardiac sounds had been noted on medical examination at age 3 months. Detailed examination yielded the above diagnosis. Due to poor pulmonary artery growth, radical operative correction was not feasible.
He was initially asymptomatic. At age 33 years, however, he began to gradually experience numerous symptoms, such as arrhythmia, dizziness, orthopnea and dyspnea due to heart failure. His cardiac condition was treated with an adaptation of heart-lung transplantation. He was consistently in a NYHA-III state and SpO2 was 60-70 % (on room air).
At age 43years, he was scheduled to undergo cholecystectomy due to a gallstone diagnosis in July. However, his status suddenly deteriorated to acute cholangitis. An emergency open cholecystectomy and abdominal drainage, after urgent hospitalization, were necessary, with transfer from another hospital on November 5.
He developed severe orthopnea, his vital signs indicated a shock state: BP 130/76 mmHg, HR 130/min, KT 38^{o}C, SpO_2 65 %(with O_2 at 10 L/min). Blood gas analysis results were: PH 7.275, PCO2 51.3 mmHg, PO2 41.6 mmHg, BE -4.1 mmol/L, Lactate 2.6 mmol/L. Anesthesia was induced with midazolam 3mg and fentanyl 100μg, then maintained with oxygen, sevoflurane, fentanyl and remifentanil. We used transesophageal echography (TEE) to evaluate cardiac function and cardiac support drugs to maintain circulation. The only perioperative heart complication was arrhythmia, and he was extubated on postoperative day 3. Beta blockers were administered to control his cardiac function and he was discharged on the 14th day of hospitalization.
Discussion: We experienced a case with untreated severe cyanotic heart disease requiring emergency surgery for peritonitis. Monitoring with TEE during surgery was a useful management strategy for maintaining normal BP and cardiac contraction in this case.
References: Renforth GL, et al: Diagnosis and Management of Adult Congenital Heart Disease. New York, Churchill Livingstone, 2003, pp 19-24.
Learning Points: Management for maintaining condition while surgery

7AP13-7

Emergent management of ventriculo-cutaneous fistula

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Background: Ventriculo-cutaneous fistulas are rare, potentially lethal and can complicate diagnostic or therapeutic procedures. We describe the emergent anesthetic management for surgical repair of an acute bleeding ventriculo-cutaneous fistula.
Case report: 80-year-old female, submitted to radical mastectomy and radiotherapy 37y before, with jet hemorrhage from a precordial lesion . She was at Vascular Surgery ward for study of recurrent mild bleeding over an area of radiodermitis. Rapid sequence anesthetic induction was performed with Etomidate and Rocuronium. Anesthetic maintenance: Sevoflurane and Remifentanil under standard ASA plus invasive arterial pressure (IAP), central venous pressure, diuresis, central temperature, BIS® and blood gas monitoring. Cardiac surgeon was called and hemostasis was achieved. This procedure lasted for 90min. Hemodynamic stability was maintained (minimum MAP 50 mmHg, adequate diuresis) with no ECG signs of myocardial ischemia. Blood loss: 700ml; transfusion of 3U of packed red cells (PRC) and 1U of FFP guided by conventional and viscoelastic tests. The patient was transported to Cath lab, where a fistula from the left ventricle apex to the thoracic wall was shown. The patient was then transported to Cardiac Surgery OR, where anesthesia was maintened with sevoflurane and remifentanil. Extracorporeal circulation was established. Fistula was repaired with a dacron patch and thoracic wall was reconstructed with a vertical rectus abdominis muscle flap (plastic surgeon). Surgery was uneventful and lasted for 6hrs. It was needed to administrate 3U PRC, 3U FFP, 2pools of platelets and 2g of tranexamic acid. She was weaned from ventilator and extubated in Cardiac Surgery ICU in the next morning and discharged to ward 3 days after.
Discussion: This situation represented a challenge to the anesthesiologist due to hypovolemic shock, myocardial ischemia, dysritmia threats and the need to transport an unstable patient. The mainstay of anesthetic management was careful selection of anesthetic agents, control of arterial pressure with goal directed fluid therapy and vasopressors and rational use of blood products in order to assure hemostasis and coronary, cerebral and graft perfusion.
References: J Comput Assist Tomogr. 2009 Mar-Apr;33(2):215-7
Learning points: Ventriculo-cutaneous fistulas are rare and may manifest many years after the triggering event, so suspicion must be raised.

7AP13-8

Acute pulmonary oedema in the anaesthetic induction room: an undiagnosed case of atrial myxoma causing dynamic mitral stenosis in a patient presenting for scheduled gynaecological surgery

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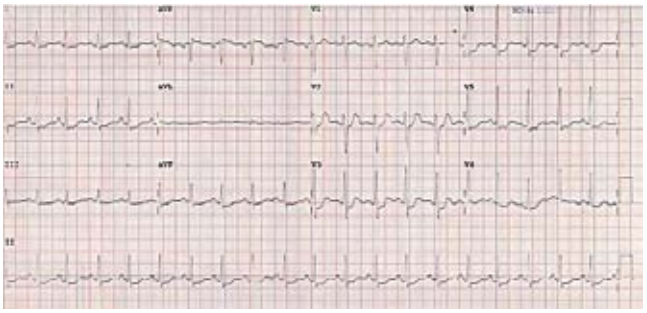
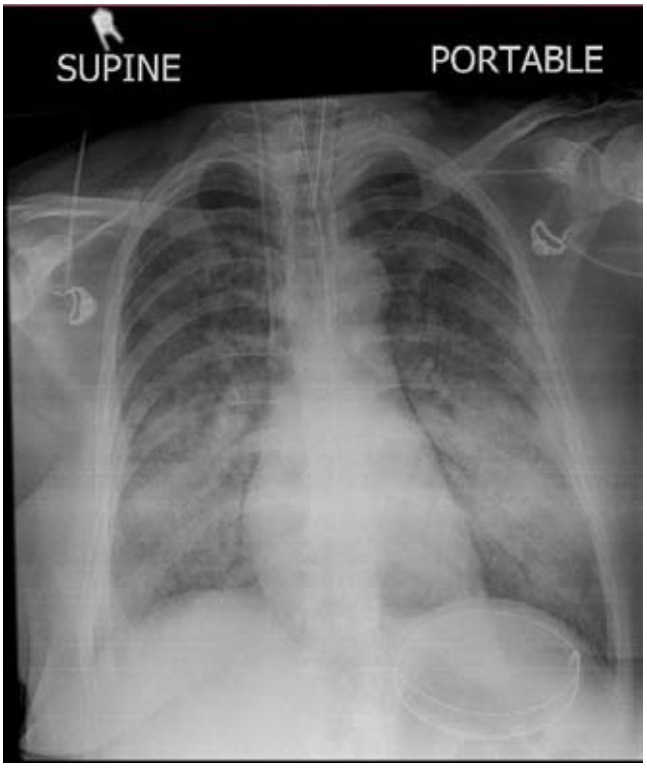
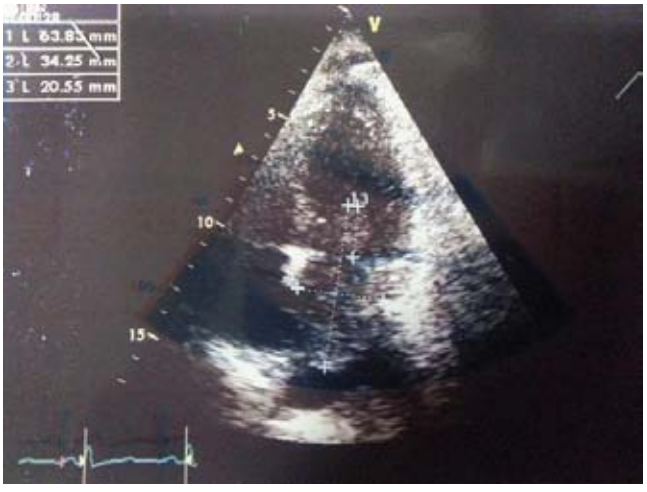
Background: A previously asymptomatic 50-year-old woman with an undiagnosed large left atrial myxoma, presented with acute cardiac decompensation just prior to anaesthetic induction for scheduled gynaecological surgery. We discuss her management.
Case report: Pre-operatively, our patient was deemed well with normal vital signs and investigations. Just prior to anaesthetic induction, she complained of acute dyspnoea with bilateral coarse crepitations on chest auscultation and ischaemic changes on routine lead II monitoring. A chest radiograph and 12-lead electrocardiogram confirmed pulmonary oedema and global ST-segment depression. A non ST-elevation myocardial infarction with heart failure was suspected and surgery was cancelled.
Initial treatment in intensive care unit was difficult due to hypoxia and cardiac instability, requiring aggressive mechanical ventilation, glyceryl trinitrate (GTN) and furosemide therapy. A transthoracic echocardiography (TTE) revealed a large left atrial mass that protruded into the left ventricle during diastole, causing intermittent mitral stenosis (MS) and pulmonary hypertension. Treatment was altered to promote LV filling, euvolemia and a slower heart rate. GTN infusion and diuresis were discontinued, but she required inotropic support. The myxoma was surgically excised the same day, with good postoperative recovery.



[ECG in Induction Room]



[Chest X-ray in Induction Room]



[2D Echo Showing LA myxoma]

Discussion: Primary cardiac tumours are rare, with an incidence of 0.0017 - 0.19%. Their symptoms mimic many non-cardiac and cardiac conditions like infarction, making diagnosis difficult. The classical triad of constitutional symptoms, intra-cardiac obstruction and embolism are also not always present. Diagnosis is usually made on a TTE performed for other indications. In our patient, an atrial myxoma with intracardiac obstruction was not considered, as dynamic MS occurs in only 10% of myxomas. We postulate that preoperative anxiety and resultant tachycardia triggered a dynamic mitral valve obstruction and subsequent pulmonary oedema. Only treatment is surgical excision.

References: Reynen K. *Cardiac myxomas*. NEJM 1995

Learning Points: This case of atrial myxoma highlights rarer causes of acute pulmonary odema. It also makes a case that TTE, the diagnostic tool of choice for atrial myxomas, should be a routine preoperative investigation in patients undergoing major surgery. Anaesthetists should acquire this skill to make anaesthesia safer and to circumvent the manpower constraints currently preventing this.

7AP13-9

Intermittent sinus pauses in cardiac tamponade

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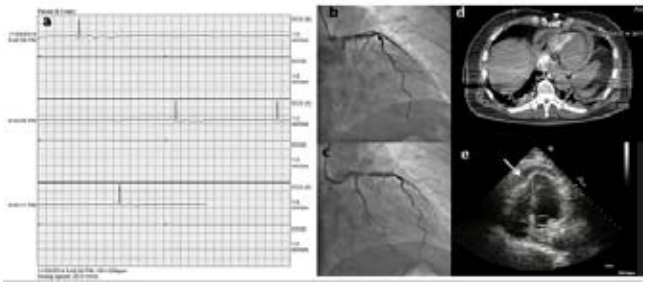
Background: Among the known characteristic hemodynamic parameters in cardiac tamponade is sinus tachycardia. Sinus pauses has not been previously reported in human subjects at the onset of tamponade but was only found in experimental studies. We describe a case of post-PCI coronary perforation leading to cardiac tamponade manifesting at onset with intermittent sinus pauses.

Case report: A 71-year-old gentleman presented to the ED with NSTEMI. Coronary angiogram showed a totally occluded circumflex and an everolimus-eluting stent was deployed (panel b, c). There was a subtle evidence of coronary perforation evident as contrast leak into the pericardium that was initially missed. 9-hours later, he became bradycardic with intermittent sinus pauses up to 8.3 seconds (panel a) followed by circulatory collapse. After CT showed moderate pericardial effusion (panel d) an echocardiogram confirmed tamponade physiology (panel e, video 1) which was not present on the initial echocardiogram (video 2). He was found to have cardiac tamponade due to coronary perforation. Pericardiocentesis initially retrieved 100 mL of hemorrhagic fluid with improvement of hemodynamic status.



[Tamponade figure]

Discussion: Although it is usually emphasized that reflex tachycardia occurs in cardiac tamponade due to cardiogenic shock and severe hypotension, paradoxical bradycardia may also be encountered. This occur in two phases: early bradycardia within few minutes of cardiac tamponade and late bradycardia leading to cardiac arrest. A possible explanation for bradycardia during tamponade is vagal stimulation from pericardial stretch. Nonetheless Kostreva and colleagues demonstrated the continued development of bradycardia in mongrel dogs due to cardiac tamponade despite vagotomy and atropine injection and suggested that pacemaker shift due to ischemia of the SA node might be in-part responsible for this phenomenon

References:
1. Kostreva DR et al. Nonvagally mediated bradycardia during cardiac tamponade or severe hemorrhage. Cardiology. 1981.

Learning Point: Sinus bradycardia or pause in post-PCI patients may be an early sign of cardiac tamponade warranting immediate investigation to confirm or refute the diagnosis.

7AP13-10

Carcinoid heart disease: the role of adecuate management

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Background: Carcinoid tumours are neuroendocrine tumours derived from enterochromaffin cells of the gastroduodenal tract. Carcinoid heart disease develops in between 20-60% of patients with carcinoid syndrome and increase morbidity and mortality of these patients. We report a case with carcinoid heart disease and carcinoid syndrome.
Case report: 50 year old male patient with intestinal carcinoid tumor, liver metastasis, carcinoid syndrome, treated with everolimus and somatuline,and carcinoid heart disease with severe involvement of the tricuspid valve who was proposed for scheduled valve replacement. The somatostatin analogs were started intravenously at least 2 hours befeore surgery and continued during the operation.Tricuspid valve was replaced with a biological tissue valve, aortic valve was replaced with prosthetic mechanical valve and pulmonary valve was replaced with cryopreserved pulmonary homograft. During the surgery the patient was stable but low doses of dobutamine and noradrenaline were needed to wean the patient off CBP. In spite of this the patient still remained with severe hypotension, so an additional bolus of octeotride was administered.
The evolution was favorable and was discharged 48h after surgery.
Discussion: Surgical valve replacement is the only effective treatment for carcinoid heart disease.The anaesthesic goal for managing patients with carcinoid syndrome is to avoid drugs or situations that may trigger a carcinoid crisis.The carcinoid crisis is a rare complication but It can be a serious complication, that consists of a massive release of neuroendocrine substances during induction of anesthesia, surgery or even spontaneously resulting in a severe hipotensive response refractory to amines, bronchospasm and cardiac arrhythmias.Somatostatin analogues represent standard treatment for carcinoid syndrome and it is demonstrated the effectiveness of intravenous bolus of octreotide especially for the control of severe hypotension.
References: Castillo JL et al. Management of patients undergoing multivalvular surgery for carcinoid heart disease: the role of anaesthetist. BrJ Anaest 101: 618-26
Learning points: The management of patients with carcinoid heart disease poses two major challenges for the anaesthetist: carcinoid crisis and low cardiac output secondary to right ventricular (RV) failure. Anesthetic management in these patients involves prevention of mediators release.

7AP13-11

Facing an unusual complication in transaortic valve replacement (TAVR) procedure

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Background: We report a case of diffuse alveolar hemorrhage as a fatal complication in a TAVR procedure. The case involved a male patient taking clopidogrel.
Case report: A 76 years old man's medical story was significant for hypertension, peripheral arterial disease, right coronary disease, ulcerative colitis, tracheal cancer resection and tracheotomy, COPD and severe symptomatic aortic stenosis (aortic valve area: 0.8 cm2, mean gradient: 48 mmHg). After an accurate risk estimation, he was selected for TAVR procedure. Laboratory standard findings were normal.
He received 300 mg of clopidogrel before the procedure. His daily treatment included 75 mg of clopidogrel for the last two years. No hemoptysis episodes were ever reported.
After general anesthesia a heparin dose was administered. A Medtronic Core Valve ® was delivered in a retrograde fashion from the left subclavian artery. Before leaving the theatre, SpO2 fallen down from 98% to 89% and an extensive hemorrhage through the tracheal tube produced peak pressures higher than 45 mm Hg. Vasoactive drugs were mandatory. A bronchoscophy within jet ventilation determined massive alveolar hemorrhage. The patient died after advanced cardiopulmonar resuscitation.
Postmorten studies just confirmed diffuse bilateral alveolar hemorrhage and chronic vasculitis.
Discussion: Complicatios of TAVR during and after deployment include: shock, low cardiac output, coronary artery obstruction, annular rupture, vascular complications, myocardial injury, heart block aortic regurgitation and stroke.
Most common reported side effects for patients taking clopidogrel include: chest pain, hypertension, abdominal pain, headache, chest pain, epistaxis, rash.
Diffuse alveolar hemorrhage is a complication of antiplatelet therapy (1 y 2).
Between January 2004 and October 2012, 17 individuals taking clopidogrel reported pulmonary alveolar hemorrhage to the FDA. Percentage of clopidogrel patients where pulmonary alveolar hemorrhage is a reported side effect is: 0.15%.
References:
1. Vaughn C, Mychaskiw G II, Sewell P.Massive hemorrhage during radiofrequency ablation of a pulmonary neoplasm. Anesth Analg 2002 May; 94(5): 1149-51.
2. Ikeda M, Tanaka H . Diffuse alveolar hemorrhage as a complication of dual antiplatelet for acute coronary syndrome. Cardiovasc Revasc Med. 2011 Nov-Dec; 12(6):407-11
Learning points: TAVR procedure makes mandatory the use of potent inhibition of platelet aggregation agents, with some uncommon complications to be considered.

7AP13-12

Considerations for the periprocedural anesthetic management of transfemoral aortic valve implantation (TAVI)

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Background: There has been widespread discussion as to which anesthetic management of TAVI-procedures offers the most favorable benefit-risk ratio. Mainly, general anesthesia or conscious sedation are being used. Currently, there is not enough data to support one or the other. General anesthesia provides a secure airway, controlled ventilation and the possibility to use TEE throughout the procedure. With conscious sedation the risks of positive pressure ventilation can be avoided and cognitive deficit may be less frequent. However, it is unclear if general anesthesia or conscious sedation represent independent risk factors for the outcome of TAVI.
Case report: An 82-year old female suffering from severe aortic stenosis was scheduled for TAVI under general anesthesia with endotracheal intubation. The procedure went uneventful until the aortic valve prosthesis was expanded. While the patient remained hemodynamically stable and there were no abnormalities during angiography TEE showed a new pericardial effusion. Subsequently, this was found to progress and the cardiologist prepared for cardio-pulmonary bypass. By the time pericardial tamponade was manifest cardio-pulmonary bypass could be instituted. Sternotomy was performed 8 minutes after the first signs of the complication had been recognized. The patient then underwent conventional aortic valve replacement. She was extubated in the ICU a few hours later. Physical exam did not reveal any neurologic sequelae and she was taken to the intermediate care unit two days later.
Discussion: As it is standard at our institution this patient underwent elective TAVI under general anesthesia with extended hemodynamic monitoring and TEE throughout the procedure. Diagnosing aortic annular rupture was facilitated by TEE as it detected a new pericardial effusion while angiography showed no abnormalities and the patient remained hemodynamically stable. Thus a high index of suspicion was raised and measures to convert to cardio-pulmonary bypass could be taken in a very controlled manner early on. With conscious sedation delay of diagnosis and management may have led to catastrophic outcome.
Learning points: Using general anesthesia instead of conscious sedation for TAVI may facilitate early recognition of complications if TEE is used throughout the procedure and may avoid hemodynamic compromise if conversion to cardio-pulmonary bypass and sternotomy become necessary.

7AP14-1

Myocardial tolerance of rapid right ventricular pacing during endograft deployment in the thoracic aorta: a comprative retrospective study

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Background and Goal of Study: Rapid right ventricular pacing (RRVP) induces ventricular tachycardia that produces cardiac output and blood pressure (BP) collapses. This low BP allowed better conditions during endograft deployment in the thoracic aorta (EGDTA) (1). The effects of the RRVP on BP started and stopped quickly than effects of drug as nicardipine. The aim of this retrospective, "before and after" type study was to compare myocardial tolerance at low BP during EGDTA induced by RRVP or by nicardipine.
Materials and Methods: From 2002 to 2012, after patients' approval, all patients treated by EGDTA in our center were retrospectively included. Untreated coronary heart disease, digoxin treatment, LVEF < 30%, pace-maker (PM), implanted defibrillator, myocardial contusion and heart block were exclusion's criteria. Patients treated by RRVP during EGDTA from 2009 to 2012 (RRVP Group) were compared to patients treated without RRVP from 2002 to 2009 (Control Group). Demographics, procedure characteristics and cardiac complications (mortality and reoperation at 1 month, rhythm troubles, troponin Ic (TnI) > 0.04 ng/mL, myocardial ischemia symptoms) were assessed.
Results and Discussion: Among the 61 treated patients (24 in the RRVP Group; 37 in the Control Group), 19 had aneurysms, 14 pseudo-aneurysms, 12 isthmus ruptures, 11 dissections, 3 coarctations and 2 endoleaks. There were significantly more men in the RRVP Group. Others demographics data were comparable.
In postoperative period, 3 rhythm troubles (13%) occured in the RRVP Group: 2 ventricular and 1 atrial fibrillations, reduced without complication. One heart block required PM in the Control Group.
During the first 72 postoperative hours, 83% of the patients presented a TnI>0.04 ng/mL in the RRVP Group *vs.* 41% in the Control Group (p=0.0013). The evolution was spontaneously good, without EKG modification or thoracic pain.
After 1 month, mortality and reoperation's ratio in RRVP and Control Groups were respectively 0% *vs.* 3% (p=0.99) and 0% *vs.* 11% (p=0.15).
Conclusion(s): Despite more frequent postoperative rhythm troubles and TnI elevation in the RRVP Group, complications at 1 month were not different in both groups. Considering better operative conditions in EGDTA (1) and good clinical tolerance, the RRVP might be a technique of interest in patients without major cardiac pathology.
References: 1. *J Endovasc Ther* 2007;14 : 506-12

7AP14-2

Use of rapid right ventricular pacing as a new method for distal aortic arch endografts deployment

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Background: The percutaneous placement of a stent graft in the distal aortic arch is now the first choice for treatment for most cases of aneurysmal disease.
Traditionally, the blood pressure is lowered pharmacologically. However, the onset and offset of action times and the possible side effects make these methods less desirable.
Rapid right ventricular pacing (RVP) is an alternative effective method of lowering aortic flow and pressure, thereby minimizing the "windsock effect" to facilitate accurate deployment of stent grafts in the thoracic aorta.
Methods: 3 consecutive patients requiring endografts emplacement in distal aortic arch for aneurysm or dissection reparation were included. We used placement of RVP trough femoral punction by surgeons with rapid stimulation in all cases.
All the patients experienced rapid onset of pacing and offset of action (average of 2 seconds) and accurate endograft deployment. Pacing was achieved in all cases with low intensity thresholds, less than 2mA, to reach ventricular tachicardia at an average heart rate of 145 beats/min and pressure lowering (average mean systolic pressure of 35 mm Hg) enough to allow graft deployment. The mean duration of the pacing episodes was 30 secondS, in which patients were maintained with FiO2 1. Only one episode of pacing was needed for each patient. Deployment precision was checked with continuous fluoroscopy and transesophageal echocardiography (TEE). As expected, no serious complications were observed. In all cases pacemaker leads were removed at the end of the procedure.
Discussion: In those procedures, controlled hypotension allows exact positioning of the device during deployment. RVP is a method that results reliable, easy to perform, applicable and reproductible if needed for most patients. The onset and offset of action should be immediate with minimal side effects. All that goals are better fulfilled with RVP than pharmacologically.
Femoral or internal jugular vein access is used to introduce pacemaker wire without significantly increasing of the complexity and duration of the complete procedure time.
Learning points: TEE and arterial invasive monitoring allows the anesthesiologist to have a real time monitoring of hemodynamic and cardiac status of the patient and possible complications as well as good results. It is also useful to control the correct positioning of all devices and the success of the procedure by correct sealing of the aneurysm.

7AP14-3

Prediciting death in patients with infective endocarditis treated surgically in a tertiary hospital

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Background and Goal of Study: Infection of native and prosthetic heart valves still remains a disease associated with significant morbidity and mortality in the modern antibiotic era. The risk of death and complications of infective endocarditis (IE) treated medically has to be balanced against those from surgery in constructing a therapeutic approach.
The aim of this study is to analyze prognostic factors and mortality associated with surgery for IE in our hospital.
Materials and Methods: A retrospective review of consecutive patients with IE according to the Duke criteria who underwent surgery for native (NVE) and prosthetic valve endocarditis (PVE) between January 1, 2008, and December 31, 2012, was conducted. Surgical outcomes were reviewed to include survival and postoperative complications. Survival was evaluated at end of hospital stay, 30 days and a year.
Results and Discussion: The cohort included 100 patients (65% men), with a mean age of 68 years. There were 57% with NVE and 38% with PVE. 25 patients (26%) died, 10 (38%) and 16 (62%). The main baseline factors associated with mortality caused by IE were sepsis, mitral surgery, presence of diabetes and S. aureus IE. Patients with NVE had better hospital (93.5% versus 84%; $p<0.01$) and 30-day survival (94.4% versus 87%; $p<0.01$). Long-term survival for patients who underwent surgery for NVE was not significantly different from that of PVE patients . Patients with *S aureus* IE had significantly worse survival, including higher hospital (15% versus 8.4%; $p<0.05$) mortality compared with patients with non-*S aureus* IE.
Conclusion(s): Surgical treatment of IE was associated with 88% hospital survival. Outcomes within the 30 days were better for native valve than for prosthetic valve endocarditis. Long-term outcomes were similar. Finally, S aureus was associated with significantly higher mortality compared with other pathogens.

7AP14-4

Four-year analysis of mitral valve surgery in Valencia. A predicitive model for length of stay in ICU based on preoperative and intraoperative variables

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Background and Goal of Study: Assessing length of stay (LOS) in Intensive Care Units (ICU) after mitral valve surgery is challenging due to wide spectrum of comorbidities and cardiovascular procedures. A global measure of performance would be helpful in order to know and predict the expected resources consumption for better monitoring for caregivers and patients.
Materials and Methods: During 2009 and 2013, we studied all consecutive adult patients (≥ 18 years) who underwent elective mitral valve surgery in our unit. We enrolled 211 patients. Our outcome variable was length of stay (LOS) in ICU. Comorbidities and morbimortality variables were collected during the perioperative period up to date of discharge.
Multivariate analysis was used and data was studied as an additive model to assess the associations between the variables and the presence of correlations between them. Generalized additive model was fitted with least squared means estimated by the additive model due the non linearity of Euroscore I. Histograms of the residuals were examined visually to assess the fit of the models above.
The model was selected using the statistical software R version 3.0.2 (R Foundation, Vienna, Austria).
Results and Discussion: The median for the LOS in ICU was 4 days (Interquantile range 2 to 4 days). The model for LOS in ICU includes: infection post surgery ($p<0.05$), cardiogenic shock ($p<0.05$), Euroscore I ($p<0.05$), valvular replacement ($p<0.05$), double valvular disease ($p<0.05$), mitral and tricuspid valve replacement ($p<0.05$), liver disease ($p>0.05$) and clamp time ($p>0.05$). The adjusted r squared for this model is 0.74, which implies a high predictive value for LOS in ICU. In this model the ponderate weights for the main variables are 36.3% for infection post surgery, 15.2% for clamp time, 6.9% for cardiogenic shock and 5.4% for the Euroscore I.
Conclusion(s): Longer length of stay in ICU is strongly affected by post surgery infection, cardiogenic shock in ICU, mitral and tricuspid replacement and Euroscore I. *Achieving lower rates of infection post surgery in our unit should be our first goal after this study*. Clamp time was not statistically significant likely due to sample size. This model is being validated prospectively in more patients.

7AP14-5

Sevoflurane anaesthesia provides downregulation of TLR receptors in patients scheduled for aortic valve replacement under cardiopulmonary bypass

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Background and Goal of Study: Cardiopulmonary bypass is essential in surgery for aortic valve replacement but collateral effects have been widely described. One of these effects concerns to a well known inflammatory response. Toll Like Receptors (TLRs) are transmembrane structures that primary recognize signals (derived from pathogens or from cellular damage) that could threat healthy organ function. TLRs initiate synthesis of Interleukin, necrosis tumor factor and other inflammatory mediators.
We hypothesized if sevoflurane anesthesia could act as a modulator of the inflammatory response by regulating TLRs expression.
Materials and Methods: 25 patients scheduled for aortic valve replacement under cardiopulmonary bypass.
Total inhaled anesthesia, total intravenous anesthesia and balanced anesthesia were compared for TLR expression in monocytes and lymphocytes of the patients.
Blood samples were obtained in five moments: basal, after surgery, 24 hours after surgery, 72 hours after surgery and before discharge from hospital.
Results and Discussion: TLR2 expression in monocytes was downregulated in patients receiving only sevoflurane as anesthetic agent and inflammatory mediators showed inferior plasmatic levels in this group of patients.
Conclusion(s): Sevoflurane anesthesia seems to have immunomodulatory effects by regulating TLRs expression. Inflammatory response is also reduced by this agent.
References:
1. Chao, Am J Physiol Heart Circ Physiol 296:H1-H12, 2009
2. Schilling T, Anesthesiology 115:65-74, 2011
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Acknowledgements: To Prof. J. B. García-Bengoechea

7AP14-6

Gerbode defect: unusual complication after aortic valve surgery

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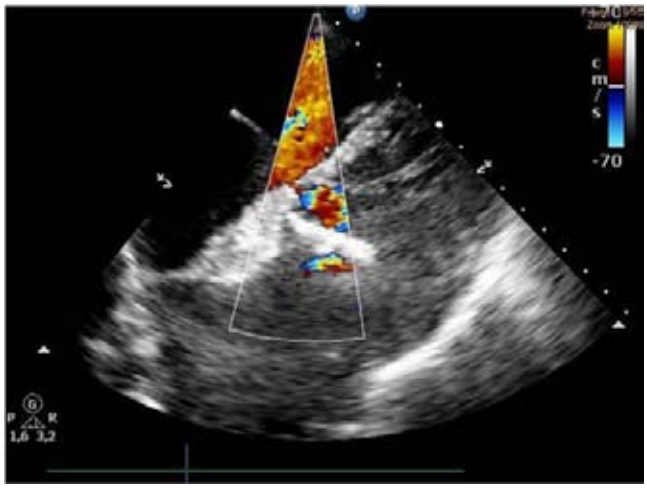
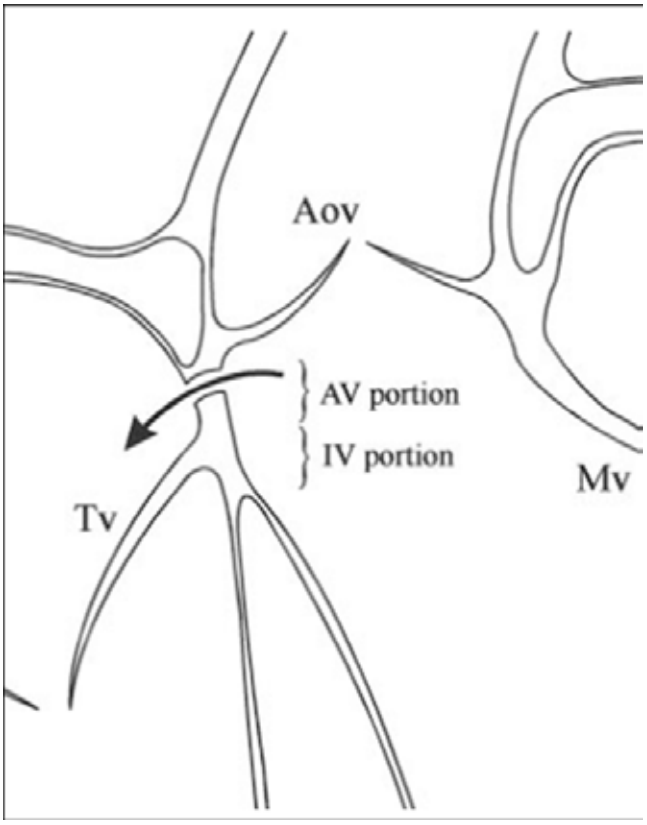
Background: Gerbode defect is caused by a LV (left ventricle)-RA (right atrial) shunt. The congenital form accounts for less than 1%. Acquired LV-RA communications arise from intrachameral cardiac surgery and occurs through the communication because of the greater systolic pressure in the LV than in the RA resulting in blood flow to both ventricles, causing high central venous pressure, biventricular volume overload, four-chamber enlargement, and decreased arterial oxygen saturation.
Case report: 77 year old female scheduled for Aortic Recostruction of a stenotic prosthetic valve placed 14 years before. The transesophageal echocardiogram (TEE) confirmed the presence of severe gradient, with normal biventricular function. Once general anaesthesia was induced and esophageal probe was impossible to place despite that the surgeon feeling was that the prosthetic valve was in poor condition and after a difficult repair trial the decision was made to replace the prosthetic aortic valve. The surgery followed uneventful until weaning of cardiopulmonary bypass (CPB) which was impossible due to significant hemodynamic compromise with a sudden and maintained increased central venous pressure. Clinical deterioration continued despite high doses of vasodilator and catecholamine infusion. An epicardic echocardiogram (EEE) disclosed a fistulous communications between the LV outflow tract and the RA. Doppler examination showed a high-velocity jet flowing from the LV into the RA during systole. The fistula was easily identified and closed. Hemodynamic parameters remained stable. The patient convalesced uneventfully.
Discussion: LV-RA communications are rare intracardiac shunts that may become clinically apparent as a result of changes in chamber pressures. These defects should be closed. Gerbode defect is easily diagnose with ultrasound and in those patients that present unexpected CBP weaning difficulties can be performed epicardic if TEE is contraindicated or impossible. This unusual complication after aortic valve surgery is a rare condition and should be kept in mind.



[Epicardic echocardiogram with color flow Doppler]



[Diagram showing anatomic relationships]

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Uslu N. Detection by transthoracic colour Doppler echocardiography. Can J Cardiol. 2007
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Learning Points: Acquired LV-RA shunts arise from intrachameral cardiac surgery. A few cases descriptions of Gerbode defect have been reported in literature.

7AP14-7

On-pump mitral valve replacement in a conscious patient using high thoracic epidural anesthesia as a sole anesthetic technique

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Background: We present a case of on-pump cardiac surgery in an awake spontaneously breathing patient with severe pulmonary dysfunction using high thoracic epidural anesthesia as a sole anesthetic choice.
Case report: 66 yrs old female patient presents with severe stenosis of the mitral valve. Pre-operatory evaluation had some conditions that would make difficult our choice of anesthetic technique. Spirometry showed a severe mixed disventilatory syndrome with obstructive dominance and no reversibility to salbutamol. She had also moderate renal insuficiency and altered thyroid function. She was sent home with a therapy including seretide, furosemide, metoprolol and levothyroxine. 2 weeks after her pulmonary function was not improved so we decided to chose an anesthetic technique that would spare the lungs. One day before surgery an epidural catheter was inserted. In the operating room before the application of local anesthetics BP was 90/60 mmHg. Noradrenaline and phenylephrine infusions were applied in order to maintain BP 120 mmHg systolic with a MAP of 70-80mmHg. Bupivacaine 0.06 mg/cm/h was applied as a continuous infusion. Patient was assisted with a facial mask with CPAP for 10 min after sternotomy until the extracorporeal circulation(EC) began. The EC lasted for 69 min and meanwhile the patient was in apnea and asystole but conscious. She started spontaneous ventilation immediately after EC. No complications were encountered during the procedure and the patient was very satisfied with the short period of recuperation and the final outcome.
Discussion: The advantages of awake on-pump cardiac surgery have already been reported by Karagoz et al. [1]. However several contradictions rise up regarding the use of the technique as a routine. It is well known that there are studies recommending the use of the technique in selected patients as a sole or combined with general anesthesia with encouraging results(2).
References:
1. Coronary artery bypass grafting in the conscious patient without endotracheal general anesthesia. Ann Thorac Surg 2000;70:91—6
2. Meta-analysis of thoracic epidural anesthesia versus general anesthesia for cardiac surgery. Anesthesiology. 2011 Feb;114(2):271-82. doi:10.1097/ALN.0b013e318201d300.
Learning Points: Regional anesthesia is particularly well suited in respiratorily compromised patients.Thoracic epidural block has no deleterious effect on lung function and can be used for cardiac surgery in respiratory compromised patients.

7AP14-8

Anesthetic challenge: heart surgery in a patient with acute infective endocarditis with neurological complications

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Background: Infective endocarditis (IE) is a systemic disease associated with significant morbimortality. Neurological complications (NC) are frequent, occurring in 12-40%[1]. Frequently, surgical intervention is needed acutely to prevent progression of neurological lesions[2]. This approach implies a carefully risk-benefit evaluation of cardiac surgery in a patient with recent stroke. We present the anesthetic management for mitro-aortic valves replacement surgery, in a patient with cerebellar hemorrhage and active IE.
Case report: 52 year-old male, with severe mitral regurgitation, moderate to severe aortic disease (mainly stenosis) and 2-vessels coronary disease. Admitted for methicillin-resistant Staphylococcus aureus acute IE, with septic embolization to the brain, originating cerebellar hemorrhage and frontal ischemic lesion. Proposed for urgent valvular replacement surgery, he was monitored according to ASA standards, with additional monitoring of invasive blood pressure (BP), central venous pressure, BIS®, cerebral oximetry (INVOS®), transesophageal echocardiography and activated clotting time. INVOS® baseline was determined previously to induction. Propofol and remifentanil in target controlled infusion and rocuronium bolus were used to induce and maintain anesthesia. Unfractionned heparin was administered before entering extracorporeal circulation (ECC); protamine was used to reverse anticoagulation. Vasopressor support was needed after ECC exit, to ensure hemodynamic stability and adequate cerebral oxygenation. Sustained variations >20% of INVOS® values were not observed.In postoperative brain CT, worsening of pre-existing lesion was not documented and major neurological deficits were not observed.
Discussion: Heart surgery involves considerable risks in patients with IE and NC.BP drops during ECC and full heparinization, might worse pre-existing ischemic or hemorrhagic lesions[3]. Previous studies suggests that intraoperative reduction of INVOS® values correlates with impaired results, and prompt intervention may improve outcomes[4]. In the present case, we used cerebral oximetry to monitor and guide the procedure.Worsening of preexisting of neurological lesions was not documented.
References:
1. J Neurol. 2004;251:1220-26.
2. J Thorac Cardiovasc Surg 130:765-771, 2005.
3. Ann Thorac Surg 1996;61:1125-30.
4. J Cardiothorac Surg. 2010; 5:41.
Learning points: Monitoring cerebral oxygenation is of great value in order to avoid worsening of pre-existing neurological lesions.

7AP14-9

Fungal infection in prosthetic pulmonary valve endocarditis

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Background: Infective endocarditis (IE) of the pulmonary valve is uncommon and usually occurs in conjunction with tricuspid and/or left-sided valvular endocarditis. Fungal endocarditis is also rare, comprising <10% of all endocarditis cases and is a serious disease. There have only been sporadic reports of isolated pulmonary valve endocarditis caused by Candida.
Case report: A 35 year-old female was admitted to the intensive care unit with fever, dyspnoea, and thoracic pain for four days. She had a history of tetralogy of Fallot and 6 months before this admission she developed progressive pulmonary regurgitation caused by homograft degeneration and underwent surgical pulmonary valve replacement. She was tachypnoeic and hypotensive with left and right lower lobe consolidation on chest X-ray. She was intubated in the emergency room for hypoxia. A CT scan of the chest revealed multiple ischaemic lesions in the lungs. Empiric treatment with meropenem and linezolid was started.The echocardiogram showed a large and pedunculated mass on the monocusp and a hyperechogenic tubular mass inside the right pulmonary artery. The diagnosis of probable infectious endocarditis and bilateral septic pulmonary embolism was established. Candida albicans was grown from blood culture, and B liposomal anphotericin and voriconazol were administered. Seven days later, she underwent new surgery. Valve cultivation was positive. After completing 6 weeks of treatment with both antifungals she was discharged from treatment with fluconazole, which was maintained for three years.
Discussion: Although left-sided IE is common, right-sided IE comprises only 5-10% of the total number of cases [1]. Right-sided IE is generally seen in patients with predisposing conditions, such as drug abuse or structural heart diseases. Regardless of antifungal treatment, surgery remains the mainstay of treatment, probably due to the high embolic risk and difficulty to sterilize fungal vegetation.Suppressive therapy with fluconazole for a minimum of two years is recommended.Patients should be monitored closely for signs of treatment failure on medical therapy alone, such as septic embolization.
References: Lefort A et al. Diagnosis, management and outcome of Candida endo- carditis. Clin Microbiol Infect 2012; 18:E99-E109.
Learning Points: While surgery should be considered in all cases of Candida endocarditis, cure may be achieved with antifungal therapy alone. Postoperative follow-up is mandatory.

7AP14-10

A challenging case of extensive aortic valve, aortic root and aortic arch surgery

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Background: Aortic arch aneurysm is a relatively rare entity in cardiac surgery. Repair of such aneurysms, either in isolation or combined with other cardiac procedures, remains a challenging task.
Case report: A 73 year old lady was seen in cardiorespiratory clinic for exertion related breathlessness which had reduced her exercise tolerance. She also had chest tightness on exertion and paroxysmal nocturnal dyspnoea with hoarseness of voice. ECHO showed significant aortic regurgitation and severely dilated left ventricle. CT scan showed the aortic root diameter of 76mm along with severe dilatation of the ascending aorta and arch of aorta. The LV was 6.6cm in diastole with moderate impairment.
The large ascending aorta was pressing the main pulmonary trunk hence there was very poor flow through the pulmonary trunk to the lungs.
Her pre induction ABG showed pH 7.4, pCO2 4.82, pO2 6.7 with a SpO2 of 83%.
Operative findings - Initially right subclavian-femoral artery bypass was established. The left common carotid artery was exposed for antegrade cerebral perfusion.
On sternotomy nearly 8 cm aneurysm of ascending aorta and proximal arch which was compressing the pulmonary trunk with dense adhesions with the pulmonary trunk.
CPB was instituted using venous return through the femoral veins and right subclavian artery. The arch was replaced by composite graft. Patient came off bypass with very small amount of inotropic support and transferred to Cardiac Intensive care intubated and ventilated where she was extubated next day and made a good recovery.
Discussion: This case highlights a very complex aortic pathology which was treated with corrective surgery and the patient did well. There are very few similar cases reported in the literature and this case is unique in view of the low saturations reported preoperatively.
References:
1. McKusick VA. The cardiovascular aspect of Marfan's syndrome: a heritable disorder of connective tissue. Circulation. 1955; 11: 321-342.
2. Surgery for Aneurysms of the Aortic Root: A 30-Year Experience. Kenton J. Zehr et.al. Circulation. 2004;110:1364-1371
3. Girardi LN, Talwalkar NG, Coselli JS. Aortic root replacement: results using the St. Jude Medical/Hemashield composite graft. Ann Thorac Surg 1997;64(4):1032-5. [PubMed]
Learning points: This case highlights the associated issues with aortic root dilatation and how a patient can present with low oxygen saturation and the dramatic improvements seen on correction of the pathology surgically.

7AP14-11

Three dimensional localization of the tricuspid valve in hemodynamic monitoring

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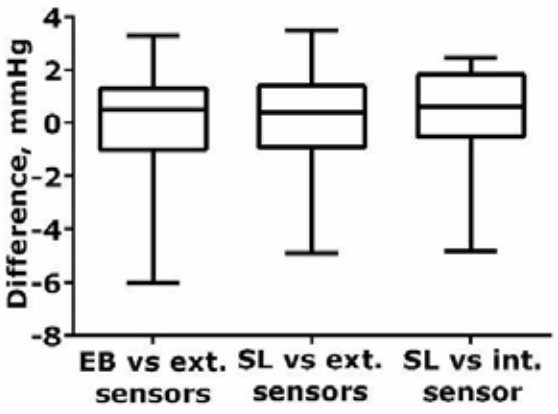
Background and Goal of Study: The central venous pressure (CVP) has a checkered history from useless to pivotal paralleling prevailing appreciation of its physiological role. Its dual function in the Starling cardiac and the Guyton venous return curves makes it fundamental to cardiovascular regulation in ICU and the operating room. Minute changes influence, e.g., assessment of heart efficiency, drainage of renal blood flow and hemorrhaging pressures during liver surgery. CVP measurement must be exact and continuous to be useful in decision support. The pressure transducer must be at level of the tricuspid valve, the phlebostatic axis (PA). This step is performed by eyeballing (EB) or a spirit level (SL) and is difficult if the patient changes position. We wanted to develop a 3D positioning device locating PA and to compare its performance with leveling by EB and SL
Materials and Methods: An electromagnetic generator (EMG) was mounted underneath the patient's thorax, creating an electromagnetic dome. Two electromagnetic sensors were placed bilaterally at intersection of IC4 and 40-45% of the anteroposterior thoracic diameter. One sensor was introduced into a blinded lumen of a central venous catheter (CVC) and one on the pressure transducer. Anesthetic personel was asked to eyeball and spirit level the vertical position of the pressure dome vis-à-vis the PA. The differences between the height above the EMG of pressure transducer and the mid height of the two lateral and the difference between pressure transducer and internal sensor were registered in dedicated software.
Results and Discussion: During 16 operations 82 measurements of the CVP by EB and 67 measurements by SL were performed. At five operations 24 measurements were made with the internal sensor . While the EB, SL and internal CVPs were normally distributed with mean±SD, 95% CI of 7.4±3.6, 6.6-8.2; 7.4±3.5, 6.6.-8.3 and 6.7±3.7, 5.2-8.3, the differences were not. These are displayed in graph.



[Differences]

Conclusion: EB and SL were too imprecise to warrant reliable use of CVP in goal directed hemodynamic treatment.
Acknowledgements: Vygon's contribution of CVCs is very much appreciated.

7AP14-12

Minimally invasive mitral valve surgery through right thoracotomy is a protective approach for blood transfusion. A propensity score analysis

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Background: Minimally invasive (MI) mitral valve surgery has grown in popularity. Starting a minimal access mitral valve program is challenging. We sought to compare short term outcomes of mitral valve surgery performed through a MI via right thoracotomy vs median sternotomy (MS) in an initiating program.
Method: From 2009 to 2013, 212 patients underwent consecutive mitral valve surgery. 44 underwent MI approach and 168 underwent MS. Patients receiving other concomitant procedures, emergent surgery and reoperations were excluded. A propensity score matching was performed to identify appropriate matched pair patients between groups by building a binary logistic regression model with the main preoperative risk variables and comorbidities. Mayor morbidity, transfusion rate and length of stay(LOS) were collected. Univariate and multivariate logistic regression analysis were performed to assess predictors of transfusion.
Results: Forty four patients were included in each group. There was no in hospital mortality. Mitral valve repair was performed in 70.5% patients in MI group vs 68,2% in the MS group and mitral replacement in 29,5% and 31,8% respectively. No statistically significant differences were found in mayor complications between groups:Cardiovascular 0 vs 2,3%, neurological 0 vs 2,3%, renal 0 vs 2,3% in MI vs MS group respectively. Reoperation for bleeding was more frequent in MI 6,8% vs 0% (p=0,08). The incidence of pneumothorax and pleural effusion that required drainage was 11,4% vs 0 (p=0,05) in the MI group vs MS group. 38% of patients in the MI group received a blood transfusion vs 59% in the MS group (p=0,01).
Transfusion rate was: blood units 0(0-9) vs 1(0-7), p=0,03, platelets pool 0(0-1) vs 0(0-2), p=0,35 and fresh frozen plasma units 0(0-3) vs 0(0-5),p=0,01 in MI vs MS approach respectively. ICU and hospital LOS were shorter in the MI group, 2.1±0,9 vs 2.8±1,2(*p*=0.001) and 6±3,4 vs 7,2±2,9 (*p=0,08*). In both uni-and multivariate analysis MI approach was an independent predictor of less blood transfusion requirements.
Conclusion: MI approach through thoracotomy is not inferior to MS in terms of morbidity and is associated with less blood transfusion requirements, shorter ICU LOS.Therefore a cost reduction is possible in a starting minimally invasive mitral valve repair programme. The higher observed rate of reintervention for bleeding and pneumorthorax and pleural effusion is likely related to the learning curve of the programme.

Perioperative Medicine

8AP1-1

Differences between pre, intra, and post-operative data according the fate of patients after surgery (critical unit vs not critical unit). A prospective study of 764 patients in a university hospital

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Background and Goal of Study: Analyze the differences between the medical history, intra-operative problems and postoperative complications of surgical patients according the post-operative drive destination (Critical Unit Vs Not Critical Unit).
Materials and Methods: We performed a prospective study over surgical patients during 2013. It included a survey of the 10% of all patients operated by different services: Digestive Sg-256, Thoracic Sg.-61, Vascular Sg.- 91, Maxillo-facial Sg.-58, Otolaryngology-98 and Urology-200.
A comparative analysis evaluating Pre, intra, and post-operative data according the post-operative drive destination (Critical Unit-304 patients Vs not Critical Unit-460 patients) was made.
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at $p<0.05$
Results and Discussion:

DATA	CRITICAL UNIT NOT	CRITICAL UNIT YES	SIGNIFICATION (P=)
PREOPERATIVE			
Urgent Surgery=Yes	18.9%	19.4%	0.86
Cardio-vasc. Dis.	47%	64%	4.1e-06
ASA	2.01 +/- 0.85	2.34 +/- 0.78	1.18e-10
Low complexity of surg	54%	3%	1.88e-48
INTRAOPERATIVE			
Respiratory problems = Yes	5%	18%	4.58e-08
Time Surgery	2.06 +/- 0.96h	3.62 +/- 1.65	2.16e-08
Card-vascular problems = Yes	30%	70%	2.13e-05

[Pre and intraoperative data by postop. destination]

DATA	CRITICAL UNIT NOT	CRITICAL UNIT YES	SIGNIFICATION (P=)
Postoperative Stay	5.03 +/- 7.75 days	16.2 +/- 16.97d	1.01e-08
Bleddy=Yes	6%	39%	1.86 e -05
Card-vascular comp=Yes	6%	37%	4.5 e -05
Reoperation=Yes	4%	18%	0.018
Infection=Yes	3%	18%	0.006

[Postoperative data by postop.destination]

Conclusion(s): The main data to admit surgical patients in ICU after surgery were: The complexity of surgery and the preoperative existence of cardiovascular disease. No differences for admission to ICU between emergency surgery and elective surgery
Patients admitted in ICU were marked with more risk of morbidity by different preoperative risk scales (ASA, Charlson, and SRS).
Those patients who were admitted in ICU had significantly more intra and post-operative complications, were more subjected to general anesthesia, and surgery time was higher.

8AP1-2

Risk factors affecting inhospital mortality after proximal femoral fracture

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Background and Goal of Study: Proximal femoral fracture is a serious injury related to bone fragility caused by osteoporosis, and it has emerged as a public health burden in an ageing society, such as that of Portugal. Proximal femoral fracture leads to impaired function, loss of independence and increased mortality. It has been reported that the increased mortality is associated with many factors, such as advancing age, comorbidity and prefracture functional disability.
The aim of this study is to determine the preoperative factors associated with inhospital mortality in patients with proximal femoral factures.
Materials and Methods: A prospective, observational, clinical study, was carried out from 1st July 2012 to 30th June 2013 in Gaia/Espinho Hospital Center. The study included all patients who were admitted to the Emergency Department with proximal femoral fracture. The patients were assessed with regard to age, gender, clinical comorbidities (Systemic Arterial Hypertension, Diabetes mellitus, atrial fibrillation, dyslipidemia, Chronic Renal Failure), method of treatment (surgical or conservative), time to surgery, and ASA classification. The outcome variable was death during the hospital stay. Statistical analysis was performed using the SPSS Statistics V.21.0. The chi-square test and the Student's t test for independent samples (significance level of 0.05) were performed to analyse the effects of various preoperative factors on inhospital mortality.
Results and Discussion: Of the 252 patients admitted, we excluded one patient who was transferred to another hospital. Of the 251 patients included in the study, 5.98% (15) died during hospitalization. The mortality rate was identical with that in previous reports (3.6-6.0%). The most prominent factors associated with in-hospital mortality were advancing age, systemic arterial hypertension and atrial fibrillation ($p<0.05$). Surgical delay of more than 48 hours was not significantly associated with inhospital mortality. There was no association between high ASA score, gender, diabetes mellitus, dyslipidemia, chronic renal failure, conservative treatment, and inhospital mortality.
Conclusion(s): This study has shown that advancing age, systemic arterial hypertension and atrial fibrillation were associated with higher rates of inhospital mortality in patients with proximal femoral fractures.

8AP1-3

Stratification of anesthesiological and surgical risk in patients undergoing carotid endarterectomy - preliminary data of an observational study

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Background and Goal of Study: The study was aimed to define clinical and humoral factors affecting short-medium-and long-term outcomes of carotid thrombo-endarterectomy, in addition to usual anesthesiological scores: ASA, Revised Cardiac Risk Index (RCRI) and Vascular Study Group of New England Cardiac Risk Index (VSG-CRI)
Materials and Methods: This observational study enrolled all consecutive patients candidates to TEAC under general (GA) or regional (RA) anaesthesia. Anaesthesiological risk was stratified according to ASA(1-5), RCRI (1-5) and VSG-CRI (0-14) criteria. Markers of organ damage (Natriuretic Brain Peptide (NBP), Troponin I, were assessed at 24 and 48 hours after the procedure. All patients were reached by phone call after one, three, six and twelve months from the procedure in order to assess neurological and cardiac complications.
Statistical analysis was descriptive. Independent samples were compared by Mann-Whitney U test and Wilcoxon signed rank test for paired data. Logistic

regression was used to analyze predictors of 30-days major adverse cardiovascular events (MACE).
Results and Discussion: A total of 201 patients undergone elective TEAC were studied. The anesthetic procedure was RA in 179 patients (89%) and GA in 22 (11%). Common anaesthesiological scales (ASA, RCRI) as well as more recent ones (VSG-CRI) apparently failed to correctly stratify the risk of major adverse events The most unfavourable outcomes were observed in patients affected by ischemic cardiac disease not previously treated either with coronary angioplasty or coronary by-pass surgery ($p< 0.02$) in patients with chronic obstructive pulmonary disease (COPD) ($p< 0.04$), and impaired renal function ($p=0.008$) Similarly, complications were more unfavourable in patients unable to compensate with at least 20 mmHg the blood pressure change after clamping during surgical procedure. ($p=0.008$)
Humoral markers tended to increase after surgical procedure; troponin correlates with MACE ($p=0.04$) and NBP correlates with MACE incidences too. ($p=0.04$).
Conclusion(s): The study indicates that some clinical factors usually neglected in clinical practice, when adequately evaluated in the pre-operative phase, may improve clinical outcomes in patients after TEAC.

8AP1-4

The use of POSSUM scoring system to predict postoperative morbidity and mortality after colorectal elective surgery at a tertiary hospital center - a exploratory study

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Background and Goal of Study: POSSUM remains the most internationally validated risk scoring system for predicting individual patient risk. Morbidity remains the most common complication following colorectal surgery and the original POSSUM model is still the only model designed to predict morbidity. The objective of this study was to evaluate the performance of POSSUM in predicting the 30-day postoperative morbidity and mortality in patients submitted to colorectal surgery at a tertiary hospital center.
Materials and Methods: In this retrospective study, adult patients submitted to elective colorectal surgery between 2009 and 2013 were randomly selected from the hospital database. The following data was extracted from the patient's medical record: age, gender, surgical diagnosis and procedure, physiological and operative variables necessary to calculate the patient's POSSUM score, postoperative 30-day morbidity and mortality. The ratio between observed and expected (O:E) overall mortality and morbidity was obtained. Subsequent categorization of morbidity into different classes was done and O:E ratio determined. An O:E ratio above 1.0 indicates the risk is being underestimated and an O:E ratio under 1.0 that the risk is being over-estimated. X^2 test was used to find if the morbidity (overall and classes) and mortality O:E difference was statistically significant ($p< 0,05$). Statistical analysis was performed using SPSS ® software package, version 21.0 (SPSS Inc., Chicago, IL, USA) for Windows®.
Results and Discussion: From a total of 310 patients, 271 patients fulfilled the criteria to calculate POSSUM. On this sample 58.7% were male and 41.3% were female and average age was 67.5±13.92 years. The most common diagnosis was adenocarcinoma (70,5%) and the most frequent procedure was right hemicolectomy (41%). A total of 5 deaths (1.8%) were observed. The morbidity rate was 45.8%
(124 patients). The POSSUM over-estimated overall mortality (O:E=0.115; $X^2=46.23$, $p< 0.01$) and morbidity (O:E ratio=0.88; $X^2=4.48$; $p< 0.05$). The analysis of each POSSUM morbidity class showed that for scores < 60% the O:E difference was not statistically different ($p>0.05$) and for higher risk patients the risk prediction was over-estimated (O:E< 1; $p< 0.05$).
Conclusion(s): In this study the POSSUM model over-estimated mortality and in high-risk patients over-estimated morbidity. However, for patients with POSSUM score < 60% it might be a good morbidity predictor.

8AP1-5

Development and validation of an electronic Comorbidity Index and ASA physical status score calculator for preoperative assessment clinic use

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Background and Goal of Study: Commonly used perioperative risk stratification systems [1-3] have been validated in a variety of patients. Assessment by Preoperative Assessment Clinic (PAC) Anesthesiologists and Anesthesiology Physician Assistants/Nurse Practitioners is often not standardized, frequently incomplete, inconsistent, and time-consuming, making preoperative grading difficult to interpret [4]. My goal was to develop and validate an easy to use Comorbidity Index and ASA PS score calculator available by Internet or Smartphone application.
Materials and Methods: Using Excel for Mac 2011 with the addition of an add-on application (Spreadsheet Converter (Framtidsforum I&M AB, Uppsala, Sweden), I developed a Comorbidity Index calculator based upon published data employing preoperative comorbidities (Surgical Risk Scale, Charlson Score, Portsmouth POSSUM (P-POSSUM). In addition, this calculator was developed to help formulate a formalized, objective ASA PS Score result.
A form listing 20 cases with a variety of patient health status was sent to 25 randomly selected members of our Department of Anesthesiology Clinical Faculty and Staff. I analyzed the responses of these subjects for distribution, mean score, and variability of the following responses:
- Ease of use of the Calculator
- Need for a PAC visit by the patient
- Need for referral to our Internal Medicine physician.
- ASA PS Score assessment

Results and Discussion:
- Ease of use ratings averaged 4.6/5 on a Likert scale.
- Calculated need for a PAC visit agreed with 96% of respondents
- Estimated need for Internal Medicine consult agreed with 80% of respondents
- Both of these results were statistically significant for agreement using Fisher's Exact Test
- The ASA PS Score calculated mean results was statistically significantly similar to that estimated by the group of respondents (t-test, $p< 0.05$).

Conclusions:
- This Index and Physical Status Calculator was well liked by preoperative providers.
- The ASA PS score generated from this calculator agrees closely with ASA scores estimated by a group of PAC providers.

It helps determine:
- A standardized Comorbidity Index
- Need for Preoperative Assessment Clinic visit
- Time needed for the visit (consultation)
- A standardized and validated ASA PS Score

References:
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8AP1-6

Allergy - North West regional critical care audit

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Background and Goal of Study: Patients should not be given drugs to which they have a known intolerance or allergy. Due to the nature of critical care allergy history may not always be available or sufficiently communicated by staff. In the absence of a national standard the RiCON medication group ran a project in August 2013 to reduce adverse event potential. This was repeated in April 2014 after an online education package, awareness campaign and production of allergy tools (drug chart stickers, "A" posters, penicillins posters and segregation in drug cupboards).
Materials and Methods: Local auditors were contacted by email and at meetings. Powerpoint instructions for data collection and input into an Excel proforma were given. Data was collected on all patients in critical care on 2 days

separated by approximately one week. Included whether the trust was using allergy tools and /or wristbands. Each patient's allergy status was sought from the notes and compared with information available at the bedside including staff knowledge of the allergy.
Any potentially allergenic drugs given, were recorded as was any reaction to them.
Results and Discussion: 152 patient episodes were captured across the region. Across the region allergies were most likely to be recorded on drug charts than any other method of identification. Only 85% were recorded on current critical care record. Trusts who use wristbands have a 93% rate of use in appropriate patients. Units who use "A" posters have only a 17% rate of having them at the appropriate bed space.
Crucially, only 65% of bed space staff, likely to be involved in prescribing or administering drugs, could name the allergy present. Future work could consider if these results are reflected in critical incident reporting regionally and try to establish a consensus on root cause and prevention of drug allergy incidents.
Conclusion(s): Of all the tools evaluated the wristband was most likely to be used. The most important end-point could be seen as staff knowledge of allergy as this was only 65% it will be the focus of future interventions.
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***Critical Care Consultant, Salford Royal Foundation Trust.

8AP1-7

6MWT for the preoperative risk evaluation

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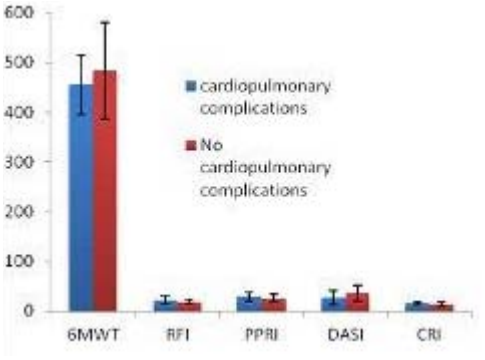
Background and Goal of Study: A prospective, pilot study was conducted to assess the possibility to apply a functional test, the 6 Minute Walk Test (6MWT) (1), to the preoperative risk evaluation of a population of patients scheduled for major upper abdominal surgery.
Materials and Methods: At the preoperative visit, 4 risk indexes, namely Respiratory Failure Risk Index (RFRI)(2), Postoperative Pneumonia Risk Index (PPRI)(3), Duke Activity Status Index (DASI) and Cardiac Risk Index (CRI) were calculated; 6MWT was performed and the total distance travelled in meters recorded. Postoperative cardiopulmonary complications were monitored for 28 days after surgery.
Results and Discussion: 45 patients were operated and completed the follow up (25 males, 20 females, aged 61,8 ±11,4 years). Postoperative pulmonary complications were the most frequent:
8 pneumonia,
2 respiratory failure,
1 pulmonary oedema,
1 pleural effusion,
4 hypoxemia;
3 patients developed atrial fibrillation The distance travelled during the 6MWT by patients who developed any cardiopulmonary complication is shorter than that walked by patients who had an uneventful postoperative course. Mean values of the risk scores and the distance travelled of the two groups are shown in table 1 and figure 1.

	Complications	No complications	p value
Number of patients(%)	16 (35.6%)	29 (64.4%)	
RFI	22 ± 7.9	18.7 ± 4.6	0.14
PPRI	28.4 ± 8.4	26.1 ± 7.2	0.37
DASI	27.6 ± 14.4	35.6 ± 16.0	0.08
CRI	15.9 ± 2.5	13.6 ± 3.7	0.01
6MWT (meters)	455.2 ± 59.1	483.7 ± 96.8	0.27

[Table 1]



[Figure 1]

Conclusion(s): 6MWT by itself or in combination with other tests may be useful in clinical practice: a focused multi-centre clinical trial has been planned to evaluate this possibility.
References:
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8AP1-8

Comparison of different preoperative risk scales: Charlson index, ASA, surgical risk scale (SRS) and a new scale (NS). A study of 764 patients at a university tertiary hospital

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Background and Goal of Study: Analyze the intra and post-operative behavior of surgical patients according they were rated as low or high risk for various risk scales; ASA, SRS, Charlson index and a new scale (NS).
Materials and Methods: We performed a prospective study over surgical patients during 2013. It included a survey of the 10% of all patients operated by different services: Digestive Sg-256, Thoracic Sg.-61, Vascular Sg.- 91, Maxillo-facial Sg.-58, Otolaryngology-98 and Urology-200.
We made a comparative analysis evaluating pre, intra, and post-operative data according patients were rated as low or high risk for various risk scales; ASA, SRS, Charlson index and a new scale (NS).
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at $p<0.05$
Results and Discussion:

DATA	SRS (low risk Vs high)	ASA (low risk Vs high)	Ch.INDEX (low risk Vs high)	NEW SCALE (low risk Vs high)
PREOPERATIVE				
Urgent surgery = Yes	14% Vs 50% (p=6.1e-06)	23% Vs 39% (p=0.07)*	39% Vs 27% (p=0.25)*	16% Vs 56% (p=8.4e-06)
Card-vascular dis. = Yes	33% Vs 66% (p=5.7e-06)	36% Vs 70% (p=0.0003)	21% Vs 62% (p=0.0001)	31% Vs 87% (p=9.5e-09)
Full Stomach = Yes	1% Vs 12% (p=0.02)	3% Vs 9% (p=0.16)*	7% Vs 6% (p=0.83)*	1% Vs 14% (p=0.005)
Low complexity of surgery	54% Vs 6% (p=4.7e-12)	41% Vs 21% (p=0.006)	50% Vs 26% (p=0.03)*	44% Vs 12% (p=9.2e-10)
INTRAOPERATIVE				
General anesthesia = Yes	79% Vs 90% (p=0.009)	75% Vs 94% (p=0.01)	92% Vs 80% (p=0.24)*	75% Vs 92% (p=0.007)
Surgery time	1.9 Vs 3.7h (p=1.2e-09)	2.1 Vs 3.4h (p=8.4e-05)	2.1h Vs 2.9h (p=0.001)	2h Vs 3.8h (p=9.2e-10)
Intraop. Disorders = Yes	21% Vs 56% (p=0.0001)	30% Vs 45% (p=0.1)*	32% Vs 40% (p=0.16)*	21% Vs 63% (p=9.7e-06)

[Pre and intraop. data according low or high risk]

DATA	SRS (low risk Vs high)	ASA (low risk Vs high)	Ch.INDEX (low risk Vs high)	NEW SCALE (low risk Vs high)
Postoperative Stay	6d Vs 14.4d (p=2.3e-06)	5d Vs 14.4d (p=6.7e-05)	7.3d Vs 10.6d (p=0.01)	5d Vs 16.8d (p=9.4e-07)
Bleddy = Yes	5% Vs 40% (p=0.6e-06)	10% Vs 30% (p=0.002)	3% Vs 26% (p=0.009)	2% Vs 51% (p=1.29e-09)
Multi-organic failure = yes	0% Vs 20% (p=0.0002)	3% Vs 18% (p=0.02)	0% Vs 12% (p=0.05)*	3% Vs 19% (0.003)
Respiratory compl = Yes	0% Vs 14% (p=0.002)	1% Vs 11% (p=0.02)	7% Vs 6% (p=0.83)*	0% Vs 17% (p=0.0003)
Card-vascular compl = Yes	3% Vs 48% (p=1.3e-06)	6% Vs 35% (p=0.0001)	7% Vs 24% (p=0.05)*	5% Vs 44% (p=1.1e-06)
Reoperation = Yes	6% Vs 16% (p=0.11)*	6% Vs 15% (p=0.12)*	7% Vs 12% (p=0.46)*	4% Vs 22% (p=0.003)
Infection = Yes	3% Vs 18% (p=0.009)	5% Vs 15% (p=0.06)*	3% Vs 12% (p=0.19)*	4% Vs 19% (p=0.009)

[Postoperative data according low or high risk]

Conclusion(s): There was a significant relationship between all studied risk scales. When a low risk was indicated, the rest kept a low risk also and conversely.
For all scales, those patients who had been marked with higher surgical risk were significantly older, surgery time was higher, and postoperative stay was greater.
There was no statistically significant relationship between the occurrence of intraoperative problems and being labeled as high risk by the ASA or the Charlson index.
There was significantly higher association between high risk and postoperative complications when risk was labeled by SRS or the NE than when was did by ASA or Charlson.

8AP1-9

1 and 2 years-mortality predictors in abdominal aortic aneurysm surgery

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Background: Abdominal aortic aneurysm surgery is associated with major complications especially in some patient groups. The evidence in this topic is controversial. Our study is the first one in preoperative, anesthesia and surgery-related factors in mortality after abdominal aortic aneurysm surgery. Our goal is determine the relationship between these factors and mortality.
Materials and Methods: We conducted a retrospective observational study in preoperative, anesthesia and surgery-related factors using a multivariate analysis to determine 1 and 2 years mortality after abdominal aortic aneurysm surgery.
After ethical committee approval we retrospectively reviewed the medical records of patients who had abdominal aortic aneurysm surgery and available data on 1 and 2 years after surgery. We use the multivariate logistic regression analysis to establish the relationship between age, sex, peripheral arterial disease, chronic obstructive pulmonary disease, chronic renal failure, cerebrovascular disease, ASA status, anesthesia type, surgery type and length, intraoperative hemorrhage and clamping time with 1 and 2 years mortality with a 95% confidence interval.
Results: We reviewed the medical records of 142 patients eligible for our study. The median age was 77 years old (range 54 to 91), male sex (95%), ASA physical status III (47%) and II (30%), open (54%) and endovascular (46%), scheduled surgery (86%) with intraoperative hemorrhage less than 500 ml (71%), under combined general and regional anesthesia (61%), with median surgery length of 3 hours (range 1 to 6 hours) and median time of clamping of 1 hour 30 minutes (range 35 minutes to 3 hours). The mortality at 1 and 2 years was 16% and 2%, respectively.The multivariate logistic regression analysis in 1 year mortality show significant coefficients in urgent (β1 -1,9) with intraoperative hemorrhage higher than 1000 ml (β2 -1,19) and longer than 5 hours surgery (β3 0,03) under general inhalatory anesthesia (β4 0,02) in ASA physical status IV (β5 0,02) male patients (β6 0,01). The ASA III physical status showed significant coefficients in 2 years mortality (β1 0,03). The significance level of all results was α 5%.
Conclusion(s): We outline some important intraoperative factors in mortality after abdominal aortic aneurysms surgery to highlight the importance of its careful management by the anesthesiologist, although larger prospective studies are needed to confirm our results.

8AP1-10

Inter-rater variability in the ASA physical status classification system

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Background: The objective of the current study is to determine the inter-rater agreement among anesthesia providers when assigning ASA physical status. We analyzed the degree of agreement in the assignment of ratings among all raters across 10 hypothetical scenarios.
Methods: Questionnaire with 10 hypothetical patient scenarios were administered to 85 providers. Respondents were asked to assign ASA scores in each scenario and provide rationale for their decision. The data was summarized and stratified by provider groups. The Fisher's exact test was used to test for associations between nominal factors and the Wilcoxon rank-sum test for continuous variables and the exact Mantel-Haenzel test for ordinal factors. Inter-rater agreement is described by the Light's kappa for n raters. The Light's kappa is weighted such that the pair-wise agreement measure is penalized more if the pair of ratings is further apart (e.g., ASA score of IV vs. I is penalized more than ASA score of II vs. I)[kst1].
Results: We collected survey responses from 85 raters: 35 (41%) anesthesiologists and 50 (59%) CRNA. Years of practicing anesthesia ranged from 4 to 34 years in the anesthesiologist group and 2 to 38 years in the CRNA group. Anesthesiologists have longer years of training compared to CRNA in our sample (median 18 vs. 11 years, p=0.04). There were no significant differences between the provider groups in terms of attitudes toward the usefulness of the ASA for daily practice, or as an anesthesia or surgical risk indicator. The overall kappa, κ, among all 85 raters is 0.41, indicating fair to moderate agreement. The kappa is similar between anesthesiologists (κ=0.42) and CRNA (κ=0.40). In the anesthesiologist subgroup, those with greater than 30 years of experience had the highest agreement (κ=0.62), compared to ≤10 years (κ=0.39), 11-20 years (κ=0.40) and 21-30 years (κ=0.38). Conversely, in the CRNA subgroup, we observed that the agreement decreases with longer training: ≤10 years (κ=0.42), 11-20 years (κ=0.41) and 21-30 years (κ=0.17) and >30 years (κ=0.30). Attitude toward the usefulness of ASA does not have a significant relationship with agreement.
Conclusions: These results provide preliminary evidence that there is little inter-rater agreement in the ASA classification system and draws into question the effectiveness of the current scheme. The ASA PS definitions are broad, vague, and non specific. Larger studies are needed to confirm these results.

8AP2-1

A retrospective analysis investigating patient morbidity and combined low bispectral index spectrum (BIS) and mean arterial blood pressures (MAP) scores during major cancer-related surgery

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Background: Previous studies have shown an association between increased mortality and excessive depth of anaesthesia, and or low intra-operative blood pressure (BP) during major surgery Recommendations are to maintain Bispectoral Index Spectrum (BIS) between 40-60, during general anaesthesia (GA).
Method: This was a retrospective study analysing electronic anaesthetic records where BIS and MAP were documented during GA and the patient was admitted to Critical Care (CCU) post-operatively. These patients had cancer-related surgery at the Royal Marsden Hospital during the last 4 years.
The aim was to investigate any association between low BIS readings (< 40) or low MAP (< 75mmHg) during GA and increased patient morbidity. The latter was measured by the presence of delirium (confusion assessment method (CAM)), or presence of post-operative morbidity survey (POMS). Additional endpoints included length of CCU stay and 6 months mortality.
Threshold readings of BIS 40 and MAP 75mmHg were used. Patients were grouped according to whether readings were above or below threshold values for more than 50% duration of the procedure (BIS_{t50} and MAP_{t50}). We hypothesized that patients with low BIS (BIS_{t50} < 40) and low MAP (MAP_{t50} < 75mmHg) had worse morbidity outcomes. Analysis of incidence of CAM and

POMS was performed using chi-squared method. Length of CCU stay was analysed using the Mann-Whitney method. A p-value < 0.05 (5%) was considered to be statistically significant.
Results: A total of 3022 patients were eligible. 420 patients had CAM assessments within 72 hours of surgery. We found no statistical difference between CAM scores and low BIS and or low MAP. 360 patients had POMS performed at 24 hours post CCU admission. Again, no statistical difference was found between patient groups. No statistical difference in 6-month mortality was seen between the groups. Finally, low BIS and low MAP scores were not associated with increased CCU stay.
Conclusion: This study found no statistical differences in morbidity, assessed by CAM and POMS, with low BIS and or low MAP scores. There was no statistical difference in 6-month mortality between the groups, contrary to previously published data. This study provides new data that low BIS and MAP scores do not influence morbidity in cancer-related surgery. Further studies are warranted to confirm these interesting preliminary findings demonstrating a lack of association between patient morbidity and low BIS and MAP scores.

8AP2-2

Anesthetic factors influence outcome of patients undergoing body contouring surgery after massive weight loss

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Background: Body contouring (BC) surgery for massive weight loss (MWL) is a developing field of complex and long procedures in a heterogeneous patient population. The association between anesthesia factors and surgical outcomes in BC surgery has not been evaluated to date.
Aim: To investigate the influence of anesthetic factors on postoperative outcomes in BC surgeries for MWL.
Methods: Following IRB approval, 218 consecutive patients undergoing BC surgery after MWL in the Tel Aviv Medical Center between January 2007 and May 2012 were prospectively evaluated. Data were collected using the electronic medical records and anesthesia information management systems, with follow-up data collected manually. Data included patients' characteristics, clinical measures (e.g., operation magnitude, IV fluids administration, use of vasopressors), intraoperative physiological parameters (vital signs, ventilation parameters) and postoperative clinical outcomes (various surgical site complications, hypertrophic scar, anemia, infections and a composite outcome), and were analyzed using univariate and multivariate analysis methods.
Results: Median patient age was 41 years.Seventy percent of patients were males, 80% were non-smokers and 75% had ASA scores of I-II. Higher volumes of intraoperative fluid administration were significantly associated with formation of seroma (p=0.01), hematoma/bleeding (p=0.03), surgical site complication (p< 0.01), hypertrophic scar (p=0.01) and a composite of the above mentioned negative outcomes (p=0.0001). Patients who suffered hematoma formation had an average core temperature lower than 35.6°c for a significantly longer intraoperative time compared with those who did not develop hematoma (72% vs. 50%, p< 0.05). In addition, the average temperatures measured were marginally lower in this group (35.2°c vs. 35.5°c, p=0.075).Intraoperative drop in oxygen saturation below 90% for longer periods was significantly associated with surgical site infection (4.2% vs. 0.9% of surgery time,
p< 0.01). Others assessed factors, as noted in methodology, did not show significance.
Conclusion: In patients undergoing BC surgery after MWL several anesthetic factors may adversely affect surgical outcome. Hypothermia, hypoxemia and excessive fluid administration should be strictly avoided to limit surgical site complications.

8AP2-3

Comparison of surgical and medical outcomes between open and laparoscopic radical cystectomy

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Background and Goal of Study: Open Radical Cystectomy(RC) is the gold standar treatment of muscle-invasive bladder cancer(MIBC) and NoMIBC high risk tumors. Laparoscopic technique has shown at least same oncological results with probably less morbidity. Our objective is to compare pre-, intra- and postoperative characteristics between patients undergoing open versus laparoscopic radical cystectomy.
Materials and Methods: A retrospective study of 243 consecutive patients who undergoing RC (172 open vs 83 laparoscopic). Demographic, perioperative and hospital complications data were recorded. U Mann-Whitney and Chi-Squared test were used to compare means and percentages respectively.
Results and Discussion: Intraoperative blood loss (300 ml vs 600 ml, P=0.008)and blood transfusion requirements were statistically significant less in the group that underwent laparoscopic RC. Fewer patients in laparoscopic group received postoperative nutritional support. (Table 1)

	LAPAROSCOPIC N= 71 (29.6)	OPEN N=172 (70.4)	P
Age.(yr.)	66.1 (63.5-68.6)	70.7 (69.2-72.2)	0.001
ASA physical status (I/II/III/IV),(%)	16.7/48.6/25/9.7	2.3/40.4/50.9/6.4	<0.001
Type of anaesthesia (general/ combined),n(%)	21(29.2)/51(70.8)	21(12.3)/150(87.7)	0.003
Blood transfusion,n(%)	17(23.6)	92(53.8)	< 0.001
Duration of procedure median (IQR)	387.5(281.3-453.8)	345(290- 05)	0.022
Postoperative nutritional support,n(%)	28 (38.9)	111 (64.9)	< 0.001
Re-operation, n(%)	16 (22.2)	37 (21.6)	0.920
Mortality, n(%)	4 (5.6)	22 (12.9)	0.113
Hospital stay (days), median (IQR)	10(9-14)	13(9-17)	0.048

[Differences between laparoscopic and open approach]

No significant differences in postoperative complications (respiratory, cardiac, neurologic and septic events) between groups were found.
Conclusions: Laparoscopic technique seems associated with less intraoperative bleeding, transfusion requirements and postoperative length of stay than open surgery. Patients undergoing laparoscopy and open approach have similar postoperative complications at hospital discharge.
References:
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8AP2-4

Comparison of minimally invasive and open esophagectomy procedures for perioperative management and outcome

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Background and Goal of Study: A minimally invasive esophagectomy (MIE) technique has been increasing utilized with video-assisted thoracoscopy and laparoscopy as surgery for esophageal cancer instead of an open procedure. The goal of this study was to determine whether MIE has benefits for perioperative management as compared to an open procedure.
Materials and Methods: We retrospectively analyzed patients who underwent surgery for esophageal cancer from May 2012 to October 2014 at our hospital. They were divided into the video-assisted surgery (V) (n=14) and thoracotomy as an open procedure (T) (n=13) groups. The same procedures including subtotal esophagectomy, gastric tube reconstruction via a retrosternal route, three-field dissection, and laparoscopic surgery were performed for all patients in both groups. Statistical analysis between the two groups was performed using student-t test and chi-square test to compare variables. Differences were considered significant when p<0.05.
Results and Discussion: Anesthesia, operation, and one lung ventilation times in the V group were significantly longer as compared to the T group (785±96 vs. 596±98 minutes, P<0.001; 692±82 vs. 506±87 minutes,

P<0.001; 364±78 vs. 179±54 minutes, P<0.001, respectively), while total infusion volume and intraoperative fluid balance were significantly greater (5844±1273 vs. 4037±1081 mL, P<0.001; 4551±1123 vs. 3191±833 mL, P<0.001, respectively). On the other hand, the V group showed a significantly lower incidence of atrial fibrillation during the postoperative period (10% vs. 50%, P=0.008). No differences were observed regarding other postoperative outcomes or mortality between the groups. Our MIE technique with video-assisted thoracoscopy may contribute to reduce cardiac complications such as atrial fibrillation, because of its lower level of invasiveness.
Conclusion: We found that MIE was associated with a lower incidence of postoperative atrial fibrillation, though it required a longer operation time and greater fluid volume as compared to a thoracotomy.

8AP2-5

Morbidity and mortality after esofagectomy: 8 years in review

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Background and Goal of Study: Morbimortality after esophagectomy remains high. Predicting risk is important to improve management of the perioperative period. Our aim was to measure outcomes and potential causes of complications after esophagectomy.
Material and methods: Retrospective, observational study including patients submitted to esofagectomy at our hospital between 2006 and 2013. We collected demographic characteristics, ASA physical status, previous medical history, surgical/anaesthetic techniques, parameters on admission to the post-anesthesia Care Unit (PACU) (APACHE score, arterial blood sampling, cardiac, hemodynamic, respiratory parameters), length of stay and in-hospital morbimortality. Descriptive analysis was performed and the student t, Mann-Whitney, Chi-square or Fischer's exact tests were used for comparisons. Uni and multivariate analyses were done using logistic binary regression with calculation of an OR and its 95% CI. Data is summarized as median [IQ25-75] or mean (SD). We considered p<0.05 as statistically significant.
Results: We included 80 patients, 85% were male. Age was 60 [51-70] years, BMI 22.3 [19.7-25.1] kg/m^2, 9% ASA I, 40% ASA II and 28% ASA III. Smoking (55%), alcohol abuse (40%) and arterial hypertension (29%) were the main comorbidities. Preoperative radio/chemotherapy was done in 60% of cases. Surgery lasted 8.5 [7.5-10.0] hours, 24% required vasopressors and 50% were transfused. PACU stay was 4 [2-5] days and hospital stay after surgery was 14 [10-24] days. In-hospital mortality was 10% (5% at PACU) and 85% had at least 1 complication. Patients who died at PACU had lower blood pressure (mmHg) on admission: systolic 117 (28) vs. 82 (3), p<0.001; diastolic 63 (15) vs. 34 (8), p=0.008; mean 81 (18) vs. 50 (4), p=0.018. ARDS (p=0.042), pneumonia (p=0.026), sepsis (p=0.015), mesenteric ischemia (p=0.009) and stroke (p=0.025) after surgery were associated with in-hospital mortality. Patients with circulatory (p=0.025), cardiac (p=0.019) and total (p=0.003) complications presented lower APACHE scores on PACU admission. In multiple logistic regression analysis, pCO_2 on admission to PACU was considered a risk factor for in-hospital mortality (OR 1.18, p=0.029).
Conclusions: In-hospital mortality was 10%. ARDS, pneumonia, sepsis, mesenteric ischemia and stroke were associated with in-hospital mortality. Lower blood pressure or APACHE score on PACU admission were associated with increased morbimortality.

8AP2-6

Total intravenous anaesthesia and breast cancer surgery, a postoperative cohort outcome analysis

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Background: Pain and postoperative nausea and vomiting (PONV) are common following day case breast cancer surgery. Patients with pain and PONV utilise more postoperative hospital resources, experience unanticipated hospital admission and incur higher healthcare costs. We prospectively evaluated pain and PONV as outcomes following a bespoke anaesthesia pathway (Theatre 4 Total Intravenous Anaesthesia [T4 TIVA]) in a cohort of women undergoing day case anaesthesia for breast cancer surgery.
Methods: Following ethics approval and informed consent, women were invited to participate in this study. The T4 TIVA pathway has 5 concepts: 1 replace volatile anaesthesia with target controlled infusion of propofol; 2 avoid the use of opiates, favouring local anaesthesia and multimodal systemic analgesics; 3 use dual therapy antiemetic prophylaxis during anaesthesia; 4 avoid unnecessary patient movement and manipulation; 5 encourage early oral fluids and early ambulation. Post operative pain and PONV were assessed in the recovery room using verbal rating scales (0-10 pain; 0-3 PONV). Recovery from anaesthesia at 24 hours was assessed using a 40 item questionnaire, the Quality of Recovery 40 (QoR40) score.
Results and Discussion: Out of 200 women,190 completed the assessment on day 1 (95%) and 129 on day 2 (64.5%). See Table 1 for baseline demographics. The median pain VRS was 0 [0-2 IQR]. 26 patients (14%) had a VRS score of >3 and required rescue analgesia in PACU. The median PONV VRS was 0 [0-3]. 2 patients complained of nausea and received additional antiemetics. No patient required inpatient admission as a result of pain or PONV. At 24 hours, the QoR 40 score demonstrated a high level of independent functioning;median 189 [180-194 IQR].

Weight (kg)	74.66 (14.785) Mean (SD)
Age	56 [51-60.25] Median [IQ Range]
Length of Procedure (minutes)	65 [42-96] Median [IQ Range]
Smoker (n)	43
Non-Smoker (n)	148
Previous General Anaesthesia (n)	141
Previous PONV (n)	38
Previous Motion Sickness (n)	35

[Table 1]

Conclusion: This pathway for patients undergoing breast cancer surgery permits reliable management of pain and PONV. Patients function well and independently following discharge. No patient required prolonged in-hospital management of pain or PONV. The T4 TIVA pathway is a viable alternative to vapour based anaesthesia for breast cancer surgery.

8AP2-7

OS-MRS: a useful tool for perioperative risk stratification in laparoscopic bariatric surgery?

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Background and Goal of Study: Obesity is becoming increasingly prevalent,leading to innumerous advances in the bariatric surgery's field. The most frequent procedure in this context is laparoscopic gastric bypass (LGB), which has low mortality risk but still considerable morbidity. Only few articles have approached the utility of mortality scores to predict also morbidity in this population.[1,2] This study aims to evaluate the role of the Obesity Surgery Mortality Score (OS-MRS) in preoperative mortality's prediction in bariatric surgery and, as a secondary goal, analyze its usefulness to predict postoperative complications.
Materials and Methods: The study is being performed with all patients undergoing primary LGB at a single hospital, from February 2014 to February 2015. An intercalary analysis was done until September 2014. The OS-MRS scale was applied pre-operatively and morbimortality at 90 days after surgery was registered. Complications were classified as proposed by Clavien-Dindo. Adequacy between expected and observed mortality was studied with binomial test. Relative risk calculation was used to analyze the relationship between OS-MRS and the complications found.
Results and Discussion: During the study 35 patients were included, 29 (83%)female, medium age 44 years (range 21-64). Concerning ASA classification, 25 patients (71%) were ASA II, and the remaining ASA III. The medium body mass index was 44,6kg/m^2. Using OS-MRS scale 17 patients were classified as class A (48,6%), 13 as B (37,1%) and 5 as C (14,3%). There were no cases of mortality, which seems consistent with the expected values (binomial test A: p=0,95, B: p=0,80, C:p=0,85) and also with the low mortality rates described in literature. Complications occurred in 10 patients: 2 (12%)of class A, 5 (38%)of B and 3 (60%)of C. When comparing patients classified as class A with those from classes B and C the risk of presenting complications seems 3 times higher in the latter(RR=3,8 with 95% CI [0,93-15,32]).Further work is needed with larger samples, and this study will be continued in order to validate the trends found.
Conclusions: OS-MRS might be a useful tool to predict mortality but also the risk of postoperative complications. It could be used as a simple score for helping decision-making in the perioperative period of patients undergoing LGB.
Reference: 1. Cir Esp 2014;92:316-323;[2]Obes Surg 2011;21:1698-1703

8AP2-8

Does time affect survival in emergency laparotomy?

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Background and Goal of Study: Recognition of factors that have influence in outcome is essential in the perioperative management and may improve quality of care within emergency abdominal surgery. Early operative laparotomy is vital and any delay before surgery may adversely affect outcome.
The aim of this study was to identify the impact of delay on outcomes after emergency laparotomy.
Materials and Methods: A prospective observational survey of all adult patients undergoing emergency laparotomy was conducted over a six month period. Time from surgical admission to induction of anaesthesia, operative duration, length of postoperative stay and thirty-day mortality were evaluated. The Mann-Whitney test was used in statistical analysis and a p value of less than 0.05 was considered statistically significant.
Results and Discussion: Sixty nine laparotomies were performed and the thirty-day mortality rate was 13%. The median time from arrival in the emergency department to induction of anaesthesia was 2 days (from 73 minutes to 15 days) and the median operative duration was 100 minutes (from 20 to 305 minutes). When mortality was evaluated, no significance was found between different admission times (p=0,978) or operative durations (p=0,436).
The length of postoperative stay (median of 5 days for patients who died *versus* median of 18 days for the remaining group), was statistically significant (P<0.001).
Conclusion(s): In this small observational study, delays from surgical admission to induction of anaesthesia or operative durations don't appear to adversely affect 30-day mortality. Still, an early decision to operate remains a dilemma and is particularly challenging in critically ill patients.
The impact of shorter hospital stays in mortality is probably related with the fact that the majority of deaths occurred in the first postoperative week.
In conclusion, the time in perioperative pathway may be a modifiable risk factor, which should be investigated in larger studies.
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8AP2-9

Urgent surgery vs elective surgery. Differences between pre, intra, and post-operative data. A study of 764 patients operated in a university tertiary hospital

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Background and Goal of Study: Analyze the differences between the medical history, intra-operative problems and postoperative complications of surgical patients according the type of the surgery: Urgent surgery Vs Elective surgery.
Materials and Methods: We performed a prospective study over surgical patients during 2013. It included a survey of the 10% of all patients operated by different services: Digestive Sg-256, Thoracic Sg.-61, Vascular Sg.- 91, Maxillo-facial Sg.-58, Otolaryngology-98 and Urology-200.
A comparative analysis evaluating Pre, intra, and post-operative data according the type of surgery (Urgent surgery-146 patients Vs Elective surgery-618 patients) was made.
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at p<0.05

Results and Discussion:

DATA	ELECTIVE SURGERY	URGENT SURGERY	SIGNIFICATION (P=)
PREOPERATIVE			
ASA	2.33 +/- 0.75	2.7 +/- 1.03	0.048
Surg.Risk Scale	6.57 +/- 2	9.04 +/- 2.22	8 e -07
Card-vascular dis. = Yes	45%	67%	0.03
Full Stomach	1%	17.6%	0.001
Cancer	37%	17%	0.036
INTRAOPERATIVE			
Time Surgery	2.4 +/- 1.19h	3.5 +/- 1.87h	0.001
Intraop. disorders	28%	56%	0.005

[Pre and intraop. data according the type of surg]

DATA	ELECTIVE SURGERY	URGENT SURGERY	SIGNIFICATION (P=)
Postoperative Stay	6 +/- 8.5 days	18.5 +/- 18.6 days	0.0001
ICU Stay	0.41 +/- 1.3d	5.79 +/- 11	8.35 e -06
Bleddy = Yes	14%	35%	0.01
Kidney complic. = Yes	8%	44%	6.6 e -06
Reoperation = Yes	6%	20%	0.02
Infection = Yes	3%	23%	0.001

[Postoperative data according the type of the surgery]

No significative differences between others preoperative data(preoperative mean stay or toxic habits) and intraoperative data.
Conclusion(s): Patients undergoing emergency surgery had significantly higher risk for all scales (except Charlson index, that is not a surgical index), and had significantly more preoperative diseases. Cancer was more frequently operated in elective surgery.
Emergency surgery had significantly more intraoperative complications and surgery time was longer, but general anesthesia was not used more than in the elective.
Emergency surgery had a postoperative more torpid, with significantly more postoperative complications and increased number of reoperations causing increased length of hospital stay and ICU.

8AP2-10

Pre, intra, and postoperative differences of surgical patients according the surgery time. A prospective study of 764 patients in a university tertiary hospital

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Background and Goal of Study: Analyze the differences between the medical history, intra-operative problems and postoperative complications of surgical patients according the surgery time is longer or shorter than 2 hours.
Materials and Methods: We performed a prospective study over surgical patients during 2013. It included a survey of the 10% of all patients operated by different services: Digestive Sg-256, Thoracic Sg.-61, Vascular Sg.- 91, Maxillo-facial Sg.-58, Otolaryngology-98 and Urology-200.
A comparative analysis evaluating Pre, intra, and post-operative data according the surgery time (< 2 hours-431 patients Vs >2hours-333 patients) was made.
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at p<0.05
Results and Discussion:

DATA	SURGERY TIME <2 HOURS	SURGERY TIME >2 HOURS	SIGNIFICATION (P=)
PREOPERATIVE			
Urgent surgery=Yes	17%	45%	0.001
ASA	2.15 +/- 0.81	2.77 +/- 0.8	0.0003
Card-vascular dis.=Yes	38%	48%	0.001
Full Stomach	3%	20%	0.004
Low complex.of surg.	55%	75%	6.9 e -10
INTRAOPERATIVE			
General anesthesia=Yes	79%	89%	0.002
intraop.disorders=Yes	12%	64%	1.35 e -08

[Pre and intraop. data according the surgery time]

DATA	SURGERY TIME <2HOURS	SURGERY TIME >2HOURS	SIGNIFICATION (P=)
Postoperative Stay	5.17 +/- 10.3 days	15 +/- 15.13 days	2.03 e -10
ICU Stay	0.24 +/- 1.36 days	4.05 +/- 9.09 days	9.7 e -06
Bleddy=Yes	7%	35%	0.0001
Card-vascular compl.=Yes	8%	32%	0.002
Respiratory compl.=Yes	1%	13%	0.004
Multi-organic failure=Yes	1%	17%	0.005
Reoperation=Yes	3%	19%	0.009
Infection=Yes	1%	19%	0.002

[Postoperative data according the surgery time]

Conclusion(s): Those patients whose surgery lasted more than two hours were significantly older, had undergone significantly more emergency surgery, generally suffered greater number of pathological antecedents, and had been tagged with a higher surgical risk by different rating scales.
When surgery lasted over 2 hours was used significantly more general anesthesia and significantly increased the number of intraoperative disorders.
The occurrence of postoperative complications, and length of stay in ICU and hospital stay, were very significantly related to surgical time greater than 2 hours. These patients required reoperation significantly more.

8AP2-11

Cardiac arrest during liver transplant, due to hypercoaguablity in end stage liver disease

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Background: End stage liver disease (ESLD) is commonly viewed as a hypocoaguable state due to decreased production of clotting factors. Prophylactic infusion of antifibrinolytics s is often used intraoperatively to reduce blood loss and decrease blood transfusion. This report describes a patient who experienced pulseless electrical activity (PEA) arrest with thrombosis of the atria, ventricles and pulmonary artery during orthotopic liver transplant (OLT), likely related to administration of antifibrinolytics.
Case report: A 51 year old female with a history of ELSD, and a MELD score of 40, presented for OLT. Her preoperative course was complicated by severe hemodynamic instability, requiring intensive care and a high dose of catecholamine. Due to renal failure, continuous renal replacement therapy was established. After two weeks in the ICU, the patient received an offer of a liver, donated after brain death. In the operating room, due to significant coagulopathy, she received blood products and a tranexamic acid infusion. During the pre-hepatic phase, the patient experienced a sudden PEA arrest. Advanced cardiovascular life support protocol was initiated. A transesophageal echocardiogram revealed diffuse thrombosis throughout the atria and ventricles. The patient had no response to resuscitation and the extracorporeal membrane oxygenation team was consulted, but in light of the echocardiographic findings, the decision was made to discontinue resuscitation.
Discussion: Intraoperative pulmonary embolism (PE) is a rare, devastating complication of LT. The incidence of PE varies from 0.37% to 4% (1-2). PE might be associated with undiagnosed hypercoaguability, caused by ESLD. In ESLD, the levels of non-liver dependent clotting factors, such as factor VIII, von Willebrand factor and Plasminogen Activator Inhibitor-1, are elevated in a compensatory manner.
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Learning Points: The incidence of PE during OLT is high. Antifibrinolytic agents must be used with caution to avoid potentially disastrous consequences.

8AP2-12

The influence of intraoperative fluid transfusion on postoperative pulmonary complications in liver-transplant patients

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Background and Goal of Study: Fluid management is one of the key elements for a successful liver transplantation (LT) and continues to be a challenge for anaesthesiologists. Perioperative pulmonary complications can contribute significantly to the morbidity and mortality of the patients. The aim of this study was to assess the influence of intraoperative fluid management on postoperative pulmonary complications, extubation time and length of Post Anaesthesia Care Unit (PACU) stay.
Materials and Methods: We retrospectively analyzed 40 consecutive patients who underwent liver transplantation at Fundeni Clinical Institute over a 4 months period between January 2014 and April 2014. The patients were divided into two groups based on whether they developed pulmonary complications (group 1) or not (group 2). Analysis of data included perioperative variables as follows: demographic data, laboratory results, volume of intraoperative blood and fluid transfusion, intraoperative blood loss and fluid balance, duration of surgery, postoperative pulmonary complications, extubation time and length of PACU stay. Radiographic analysis was standardized in order to assess the presence of pulmonary edema, acute respiratory distress syndrome or pneumonia.
Results and Discussion: Our study included 26 men (65%) and 14 women (35%). Mean (±SD) age was 49.5 (±13.4). 23 patients (57.5%) developed pulmonary complications after LT. The study revealed that intraoperative fluid transfusion exceeded 100ml/kg in patients with pulmonary complications compared to those without pulmonary complications ($p=0.02$). Plasma transfusion in group 1 was higher than in group 2 ($p=0.05$) and group 1 received more crystalloid solutions than group 2 ($p=0.04$). We found that intraoperative fluid balance >45ml/kg correlates with postoperative pulmonary complications ($p=0.01$), longer PACU stay ($p=0.01$) and longer extubation time ($p=0.04$). The Meld and Meld Na scores were not significantly different between the two groups ($p=0.26$).
Conclusion(s): Excessive intraoperative fluid transfusion is associated with postoperative pulmonary complications, prolonged PACU stay and extubation time. This could lead to other important complications that could impact survival and hospitalisation costs. Future studies are needed to evaluate the impact on morbidity and mortality.

8AP3-1

Usefulness of blood salvage in total knee arthroplasty: which patients get ahead?

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Background and Goal of Study: Postoperative bleeding and blood transfusion (BT) after total knee arthroplasty (TKA) are frequents. The present study attempts to clarify if postoperative Blood Salvage (BS) is useful in decreasing BT and which kind of patient may get advantage by its use.
Materials and Methods: A retrospective cohort study was performed on patients scheduled for TKA. BS was used in 50%. Demographic, comorbidity, surgical and anesthetic data were recorded. Analytical values about hematology and coagulation pre and postoperatively (at 6, 24, 48 hours) and at hospital discharge were collected. Volume of blood drained, blood re-infused and BT requirement were recorded. Statistical analysis was performed using parametric and non-parametric tests, $p< 0,05$ was accepted as significant.
Results and Discussion: 260 patients were included in the analysis. Groups have been checked for homogeneity. Patients who received BT (26,5%) presents lower preoperative hemoglobin (Hb) and hematocrit ($p< 0,001$). The most of BT were performed in the late postoperative period (>24 hours). Transfused patients presented longer post-anaesthetic recuperation time and overall hospitalization ($p=0,026$ and $p< 0,001$). BS reduced BT by 13,1% ($p=0,024$), with a relative risk ratio of 1,65 (1,085-2,52). BS group presented higher Hb at 24 and 48 hours than no-BS group ($p=0,029$ and 0,009 respectively). Hb at hospital discharge was higher in BS group with substantial signif-

icance (p=0,059). A stratified analysis indicated that patients without BS and treated with anti-platelet therapy (APT) received more BT (58,3%) versus those without APT (27,4%, p=0,007). There was no difference about BT requirement for patients treated or not with APT where BS was employed (25% vs. 18,9%). The low molecular weight heparin therapy (LMWHT) affected as well BT in no-BS group (66,7% transfused with LMWHT vs. 30,6% without LMWHT) with substantial significance (p=0,59). TKA replacement received more BT than primary TKA (45,5% vs. 24,8%, p=0,45). Anaesthesia or analgesia did not influenced BT.

Conclusion(s): Postoperative BS is useful to decreased BT in TKA and improves postoperative Hb. All patients would benefit from the use of BS, in particular those in treatment with APT and LMWHT and those undergoing TKA replacement. BS might be useful in longer and complicated surgeries. However, preoperative optimization of Hb appears as the most reasonable strategy to reduce BT.

8AP3-2

A logistic regression model to predict the probability of transfusion in total hip arthroplasty surgery

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Background and Goal of Study: Total hip arthroplasty (THA) is one of the most bleeding surgeries (1). Therefore these patients have a high risk of transfusion. The purpose of this study was to quantify blood loss in THA and obtain a predictive model to identify patients in risk of blood transfusion.

Materials and Methods: A prospective observational study with 118 patients scheduled for THA, excluding patients with hip fracture.Clinical data were collected: age, weight, height, sex, model of THA, medical history. A blood test (Hbg,INR,aPPT) was performed preoperatively and on the 5th day. Blood loss was determined by the method specified by Biarnes et al (2).

The statistical analysis was performed to establish the relationship between the variables and the need for postoperative blood transfusion with IBM® SPSS® Subsequently a predictive model of transfusion was assessed with logistic regression. The area under the ROC curve (AUC) was determined to define the discriminatory power of this model

Results and Discussion: 80 women and 38 men were studied, mean age 67.34 (SD 14.79).

The mean blood loss was 1649 cc (women 1493 cc; men 1993 cc p = 0.02). The 37,4% of patients required blood transfusion.

Univariate analysis showed that initial hemoglobin (Hgbi) is the most related with blood transfusion needing (p = 0.000043).

We obtained a predictive model:

$Y = 15'395 - (0'044 \times Kg) - (0'96 \times Sex) - (0'879 \times Hgbi)$

The AUC of this model was 0'819 (95% CI: 0'732-0'987).

Using equation $p = 1/(1 + e^{Y})$ we obtain the probability of being transfused to the patient.

Increased hemoglobin (1g/dl) has an odds ratio of 0'415 (0'271-0'636) after adjusting for the variables sex and weight.

Conclusion(s): This predictive model has a good accuracy to identify patients with high risk of transfusion. Identifying these patients we could improve their Hgb presurgery in order to reduce transfusion requirements.

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8AP3-3

Examining the use of blood tests in the pre-operative period

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Background: The National Institute of Clinical Excellence (NICE) has provided guidelines in order to rationalise the use of investigations in the pre-operative period. In this they have suggested that blood tests in ASA 1 patients, aged 16-40 years undergoing minor or intermediate surgery are unnecessary. NICE also advise sickle cell testing in patients of specific ethnic origins. We noted that many ASA1 patients were having multiple pre-operative blood tests and sickle cell tests were performed inappropriately in patients of low-risk ethnicity. It became apparent that our pre-assessment nursing staff found NICE guidelines difficult to interpret. We undertook this project to investigate our hospitals compliance with NICE guidelines, with an aim to improving efficiency, cost saving and patient satisfaction.

Methods: We assessed the patient records of all ASA1 patients that underwent surgery at Croydon University Hospital in a three month period (n=1772). We examined the records of those patients aged 16-40 that underwent minor or intermediate surgery (n=237) in order to determine if blood tests were performed pre-operatively. We performed a cost analysis based on information from our finance department.

Results and Discussion: We found that 65.8% of patients had routine blood tests as part of their pre-operative assessment. In addition 30% of patients had a sickle cell test, of which 59% were performed inappropriately. Inappropriate tests were performed at a cost €2,298 over three months which equates to €9,193 when projected over one year. This has significant cost and patient satisfaction implications. We have developed an education session and are implementing a web-based clinical decision support system http://www.pre-op.uk which simplifies the current NICE recommendations for pre-assessment staff.

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8AP3-4

Patient blood management in third level hospitals in Madrid

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Background: The accumulating evidence that restricting blood transfusions improve outcomes, inventory troubles and costs have promoted A. Shander1,*, H. Van Aken2,et al. recommendations for its restriction as well as a growing interest in alternatives, collectively termed ‚patient blood management'(PBM).Institution based initiatives are still variable and inconsistent in this sense. We analyzed the implementation of a PBM program in Anaesthesia Departments of the third level hospitals in Madrid, Spain.

Materials and Methods: Data were collected from Anaesthesia Departments in 8 tertiary hospitals in Madrid (Puerta de Hierro, La Paz, Ramón y Cajal, La Princesa, Clínico de San Carlos, Fundación Jiménez Díaz, 12 Octubre and Gregorio Marañón). The 3 different pillars of Patient Blood Management were studied using a brief questionnaire of 17 questions.

Results and Discussion: The first pillar in the PBM is to optimize haemopoiesis. 7 of 8 tertiary hospitals in Madrid considered preoperative anaemia a contraindication for the surgery, except oncological patients, and treated those cases with IV iron, erythropoietin and vitamins to optimize preoperative haemoglobin levels. 5 hospitals considered patients unfit for scheduled surgery when hemoglobin values are below 13 and 12 mg/dl in men and women respectively. 2 centers only do if below 10mg/dl for both sexes.87, 5% of Anaesthesia Departments have implemented a protocol for management of preoperative anaemia.

The second pillar is to minimize blood loss and bleeding. 5 out of 8 centers use tranexamic acid in a standardized way in cardiac and orthopedic surgery. Only 3 of 8 hospitals have an autologous blood options program in selected cases. Postoperative filtered blood salvage is used in 6 of 8 centers. 6 departments have a POC bedside coagulation device (ROTEM). However, although available, only two of them actually guide blood products transfusion by ROTEM in cardiac surgery.

The third pillar is directed to optimizing tolerance of anaemia and using a restrictive transfusion trigger. Perioperative transfusion trigger varies between 7 (50% of the tertiary hospitals) and 8 (50% of those hospitals) and only 1 of them still transfuse RBC in a 2 by 2 basis.

Conclusions: There is still variability in clinical practice of transfusion and alternatives management. However, a great change in transfusion paradigm is being made in the third level Anaesthesia Departments of third level hospitals in Madrid.

8AP3-5

Prevalence of postoperative anaemia in colorectal cancer surgery and iron therapy management

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Background and Goal of Study: Postoperative anaemia in colorectal surgery is even more frequent than preoperative mainly caused by perioperative blood loss. Treatment with intravenous iron has been shown to be effective in reducing the number of transfusions, although no publications to date have examined its usefulness in the postoperative setting. The main objective of this study was to determine the prevalence of postoperative anaemia in patients undergoing colorectal cancer surgery and the current practice in iron treatment in our hospital.
Materials and Methods: We performed a retrospective observational study. Clinical data from all patients who underwent surgery for colorectal cancer during 2013 at our hospital were retrieved from medical records. The following data were collected: gender, age, type of operation, serum haemoglobin (Hb) level prior to surgery and at the first and 30th postoperative days, number of transfusions after surgery and prescription of oral iron at discharge. Also, intravenous iron therapy information was obtained for each patient from the hospital pharmacy database.
Results and Discussion: A total of 160 patients were registered between January and December 2013. The median age was 69,9 (38-89) years old, and 66,3% were male. The majority (60,6%) were ASA 2. The most common surgery was left colon resection (38,1%). Laparoscopic surgery was conducted in 92 patients (57,5%). The serum Hb value before surgery was < 11g/dl in 29 (18%) patients and < 12g/dl in 64 (40%) patients. 72 (45%) patients had a Hb value < 11g/dl on the first postoperative day, and 109 (68,1%) < 12g/dl. At day 30 after surgery, 41 (25%) of patients had no Hb control, 16 (10%) had Hb concentrations < 11g/l, 38 (24%) < 12g/dl and 39 (24%) ≥13 g/dl. 11 patients (6,9%) were transfused before discharge, 27,5% of all patients were treated with intravenous iron in the postoperative period with a mean dosage of 425 mg. Only 37 (51,4%) patients with Hb < 11 were treated. Only 4 (2,5%) patients were prescribed oral iron treatment after discharge.
Conclusion(s): The prevalence of postoperative anaemia after colorectal surgery was high, but a significant number of anaemic patients did not receive iron treatment, and this fact was associated to persistent anaemia at 30th postoperative day. We need to improve our clinical practice in treating anaemia with iron therapy.

8AP3-8

Improving adherence to preoperative anaemia protocol though a clinical audit

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Introduction: Anaemia is a frequent finding in the surgical patient and it is an independent risk factor for increased perioperative morbimortality. Our aim was to evaluate and improve the adherence to the preoperative anaemia protocol through a complete clinical audit cycle.
Methods: We accepted the World Health Organization haemoglobin (Hb) threshold for anaemia (13g/dL for males and 12g/dL for females). As a standard of care we decided to follow the elective surgery anaemia protocol published by the "Society for Blood Management"(1) and the local institutional protocol, developed by a multidisciplinary commission that included anaesthesia, haematology and surgery. We included patients undergoing elective mayor surgery in a three month period in our centre and recorded the Hb at the preanaesthesia clinic and immediately before surgery and the actions taken to correct the anaemia if present.After analysing the data, we proposed actions to improve the adherence to the protocol:clinical sessions, protocol discussion and diffusion and visible cognitive aids placed at the preanaesthesia clinic office. A year later, we performed a second data collection for the same conditions to evaluate the changes.
Results: We included 190 patients or each audit data collection periods. The incidence of anaemia for each period was 17.7% and 11.6% respectively. The 33,3% anaemic patients received any treatment to improve Hb during the first audit period. A 39% of oncologic patients received treatment for anaemia whereas the percentage dropped to 20% for non-oncologic patients.After implementing the changes described, the percentage of anaemic patients that received treatment for anaemia increased to 45,4%. Subgroup analysis still showed that the treatment of anaemia of oncologic patients was 50% and non-oncologic patients was 37,5%. Despite the fewer treated patients, the anaemia was more frequently corrected in the non-oncologic patients than in the oncologic patients, probably due to shorter waiting time for surgery and multifactorial causes of anaemia registered in these later patients.
Conclusion: We achieved a moderate improvement of adherence to the preoperative anaemia protocol after this first complete audit circle. We have detected room for improvement especially in the non-oncologic patients where the protocol may be more efficient to revert anaemia before surgery.
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8AP3-9

Intravenous iron supplementation in acute postoperative anaemia after major orthopedic surgery in elderly patients

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Background and Goal of Study: Perioperative anaemia is a risk factor for mortality and morbidity in major orthopedic surgery, especially in elderly patients. Perioperative intravenous iron supplementation can be a solution to reduce perioperative transfusion requirements. Aim of the study was to investigate whether giving an intravenous iron preparation (Ferinject®) to anaemic patients one day before traumatic hip surgery improves their anaemia and reduces the need for blood transfusion.
Materials and Methods: Out of 410 elderly pts (>65 y) who underwent traumatic hip surgery during one year only 139 had preoperative anaemia, with Hb at admission < 10.0g/dl. 69pts received 500-1000mg ferric carboxymaltose one day before surgery- study group; the control group included 70pts without iron supplementation. Blood tests included full blood count (FBC), serum iron, serum ferritin, transferrin saturation, coagulation screen, renal and liver tests and CRP at admission. FBC have been repeated twice in the operation day and once the second day (D1). We monitor intraoperative blood loss and perioperative transfusion rates. We try to minimize blood loss during surgery by using low blood pressure technique, perioperative blood salvage technique, warming technique. The study was approved by the ethics committees and written informed consent was obtained.
Results and Discussion: No significant difference in demographic data-mean age in study group was 78.4 +/- 7.4 vs 74.9+/-6.2 in control group, sex ratio male: female - 1:1.6, 1:1.7 respectively. Mean operating time was 60 min±15 with 450±50ml perioperative bleeding in study group vs 66min±15min, respectively 500ml±50ml in control group ($p>0.05$). Initial Hb level was 8.2±1.3 g/dl in study group, 8.6±1.4 g/dl in control group ($p=0.5$). In D1 we found a significant increase in Hg level in the first group - 10.1 +/- 1.4 g/dl comparing with control group- 8.4±1.4 ($p<0.001$). 15% of pts from study group received blood transfusion in the operation day, but only 1URBC of comparing with 25.4% of pts in the control group (one third received 2U of RBC, 66% received 1U of RBC). Additional transfusion in the first day after the operation was necessary for 5% of pts in study group comparing with 12% in the control group ($p<0.05$).
Conclusion(s): Routine iron supplementation even only one days before traumatic hip surgery in elderly patients increases Hb values in anaemic patients, and reduces the need for perioperative transfusion.

8AP3-10

Is timing of blood transfusion associated with delay on mobilization?

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Background and Goal of Study: Enhanced recovery program for total knee arthroplasty (TKA) should provide early rehabilitation, minimizing risks and allowing discharge in 4 days.
Although, severe blood loss and blood transfusion (BT) requirement are common, there is no evidence comparing timing of BT and outcomes after TKA.

Aim of this study: evaluate if BT and timing of BT are associated with delay on mobilization and hospital discharge (HD).
Materials and Methods: Data from patients submitted to TKA between February 2013-November 2014, were retrospectively obtained from electronic clinical charts. Favourable opinion on methodology was obtained from by the ethics committee. Variables included: demographic data, surgical duration, preoperative and postoperative haemoglobin (Hb), anaesthesia technique, existence and timing of BT, timing of first mobilization and discharge date. Exclusion criteria: postdural puncture headache, postoperative delirium, cardiovascular, infectious, hepatic or renal complications and patient refusal to discharge or transfusion.
Outcomes considered were: time to first mobilization and to discharge.
All analyses were calculated with software SPSS version 20.0. Ordinal and continuous data were tested for normal distribution. Descriptive analysis was performed and the Mann-Whitney U, Fischer's exact or Chi-square tests were applied. A P-value< 0.05 was considered to be statistically significant.
Results and Discussion: 412 patients enrolled: 107 excluded. 3 groups: No blood transfusion (NBT)-258; blood transfusion≤6h (BT≤6)-9; blood transfusion>6h (BT>6)-38.
Average Hb decrease was 3,43g/dl with a standard deviation 1,35 (minimum 0,20g/dl; maximum 8,30g/dl).
Comparing the knee mobilization in the first 24h: in NBT-72,9%, in BT≤6-66,7%, in BT>6-39,5%. NBT was associated with earlier mobilization (p<0,001)
Comparing the incidence of delay on HD:in NT 66,3% have HD until 4 days, in BT≤6 66,7% and in BT>6 65,8%. Transfusion and timing of transfusion didn't delay HD (p=0,998).
Trying to find some causes of severe loss of Hb, there were no statistically significant differences between the anaesthesia technique (p=0,858); duration of surgery (p=0,951); post operative analgesia technique (p=0316).
Conclusion: In TKA, no transfusion is associated with earlier mobilization.
The absence of differences on hospital discharge, is probably correlated with the objective of the early recovery program and less with patient physical status.

8AP3-11

Transfusion in orthopedic oncologic surgeries: observational study in a tertiary university hospital over a two-years period

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Background and Goal of Study: Orthopedic oncologic surgeries (OOS) are at risk for massive bleeding and transfusions in the peri-operative period. This retrospective observational study was designed to identify transfusion associated factors (TAF) in this population.
Materials and Methods: Medical records of patients undergoing OOS in our hospital were revised for a two-year period. Data were collected about preoperative evaluation, oncologic parameters, anesthetic and surgical management, transfusion and outcome of the patients. Data were compared using Chi-2 or parametric tests when appropriate. A multivariate analysis was performed to identify independent risk factors. p< 0,05 was considered significant.
Results and Discussion: 48 patients were operated of undifferentiated tumors (35,1%), chondrosarcoma (22,9%), liposarcoma (22,9%), and osteosarcoma (10,4%), located mainly in the inferior (68,8%) and superior (20,8%) extremities, and associated with metastasis in 16,7% of cases. 35,4% and 39,6% received pre and postoperative oncologic treatment. Interventions were performed under general, associated with regional anesthesia (29,2% and 35,4%), spinal anaesthesia, combined with epidural block (20,8% and 10,4%), and peripheral block (4,2%).
In the perioperative period, 45,8% patients received blood transfusion. All received 3,5±2,1 RBC concentrates, 40,9% fresh frozen plasma, 4,2% pools of platelets, and 18,2% fibrinogen. Hospital stay was 14,5 [4;81] days, 8,5 and 48% patients required early and late re-interventions, 20,8% presented postoperative metastasis and total one-year mortality was 6,3%. TAF were: lower pre-operative haemoglobin (p=0,005), high neutrophiles/Leucocytes ratio (p=0,007), long duration of intervention (P=0,001), a selective resection (OR: 0,076 [0,009;0,658]; p=0,006), an osteosintesis (OR: 7,7 [1,8; 33,2]; p=0,004), general anaesthesia (OR: 13,64 [2,62;70,9]; p< 0,001) and spinal block (OR:0,16 [0,04; 0,59]; p=0,005), and the need for an early reintervention during hospital stay (OR: 0,40 [0,27;0,57] ; p=0,034). The presence of an osteosarcoma (AOR 0[0;0,290] p=0,021), a longer duration of surgery (AOR: 1,027 [1,009; 1,046]; p=0,004), and a selective resection (AOR: 0,026[0,001; 0,96] ; p=0,047) were independently associated with the risk of transfusion.
Conclusion: In this cohort of patients, some factors could be controlled to improve the outcome concerning transfusion, even if this would not improve the outcome of the patient.

8AP3-12

Impact of the application of a patient blood management programme in a third level hospital

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Background and Goal of Study: Patient Blood Management (PBM) is an evidence-based, multidisciplinary approach to optimizing the care of patients who might need transfusion. It is based on three pillars, stimulating erythropoiesis, minimizing blood loss and bleeding, and restrictive transfusion strategies. It does not only involve a protocol elaboration, but also a change in transfusion paradigms.
Recently, best evidence has arisen about the risks of blood transfusion such as infection, TRALI and increase in morbimortality rate, as well as lower haemoglobin (Hb) target tolerated by patients.We aim to describe the impact of a PBM programme in a third level hospital where more than 16000 surgeries are carried out per year.
Materials and Methods: Data about units of blood components transfused per department was gathered from the blood bank database. We analysed the first six months of each year between 2011 and 2014 avoiding the second semester, this being the period during which surgical activity is lower. Surgical activity was classified by DRG (diagnosis related groups) and years. Implementation of PBM was set up by steps according to the three pillars of the programme. To minimize blood loss, a tranexamic acid and blood salvage protocols were started in Orthopaedic surgery, cardiothoracic surgery and other procedures. Restrictive transfusion strategies were encouraged. The Next step was to optimize preoperative anaemia. We started protocols focused on iron therapy and other erythropoiesis inductors. An educational multidisciplinary programme was developed to raise awareness about the importance of PBM for the institution.
Results and Discussion: We did not find any differences related to number of procedures carried out per year and grouped by RDG.Surgical specialties were responsible for 42% of the total hemoderivatives transfused. Orthopaedic performed 877 transfusions in 2011, down to 545 in 2014 (38% reduction).Postsurgical ICU, including transplantation care, experimented a 26% reduction (1129 transfusions in 2011, 832 in 2014).Considering all surgical specialties and the ICU, there was a 21% drop, 5813 transfusions in 2011 and 4610 in 2014.
Conclusion(s): Implementing a PBM programme and a multidisciplinary approach with a change in mentality and update on new evidence related to transfusion threshold and anaemia tolerability of patients, effectively reduced transfusions in a third level hospital.

8AP4-1

Four-factor prothrombin complex concentrate (4F-PCC) reverses bleeding associated with the new direct oral anticoagulants (NOAC) dabigatran, rivaroxaban, edoxaban and apixaban in a rabbit model

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Background and Goal of Study: A new generation of direct oral anticoagulants (NOAC) has been developed to overcome shortcomings of heparin and oral vitamin K antagonists. Despite the clear advantages, major bleeding remains a significant risk also with these new direct oral factor IIa (FIIa) and factor Xa (FXa) inhibitors. Unlike traditional anticoagulants, the new direct oral drugs do not have specific, validated anticoagulant reversal strategies, which may be required during emergency surgery, serious bleeding or anticoagulant overdose. To date there is still a paucity of data on this topic. The non-activated four-factor prothrombin complex concentrate (4F-PCC) Beriplex® P/N has been demonstrated to effectively control acute NOAC associated bleeding in an in vivo rabbit model. This study presents a comprehensive overview

of the efficacy data obtained using this animal model, including 4F-PCC mediated reversal of the FIIa inhibitor dabigatran, and the FXa inhibitors rivaroxaban, edoxaban and apixaban together with the correlation between in vivo measures of haemostasis and in vitro coagulation parameters.
Materials and Methods: Anesthetized rabbits were treated with a single intravenous dose of dabigatran (400 μg/kg), rivaroxaban (300 μg/kg), edoxaban (1200 μg/kg) or apixaban (1200 μg/kg) followed by 4F-PCC (Beriplex® P/N; 6.25–100 IU/kg). Bleeding was induced by a standardized kidney incision and quantified by measurements of volume of blood loss and time to hemostasis. In parallel, blood samples were collected for evaluation of coagulation parameters.
Results and Discussion: Results confirmed a dose-dependent increase in time to haemostasis and total blood loss after NOAC administration. Subsequent treatment with 4F-PCC was able to statistically significantly reduce bleeding time and volume within a clinically relevant dose range. Of the coagulation parameters measured, thrombin generation parameters (peak and ETP) were the most sensitive to 4F-PCC mediated reversal, correlating best with in vivo measure of hemostasis, although correlations were also observed for prothrombin time (PT), whole blood clotting time (WBCT) and thromboelastography paramaters (TEG).
Conclusion(s): Overall, in this rabbit model of hemostasis, 4F-PCC showed potential for reversing the bleeding effects of all NOACs tested including both direct FIIa and FXa inhibitors.

8AP4-2

Multicenter, randomized placebo-controlled clinical trial to evaluate the effect of perioperative use of tranexamic acid on transfusion requirements and surgical bleeding in major spine surgery

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Background and Goal of Study: To determine the efficacy and safety of intraoperative tranexamic acid (TXA) in reducing perioperative blood loss in adult patients submitted to major spinal surgery.
Methods and Design: Prospective, randomized, double-blinded control study to evaluate the effects of TXA *vs* placebo in complex spinal surgery. Efficacy was determined by intraoperative and postoperative blood loss. Other clinical outcomes included transfusion rates, length of hospital stay and the safety profile of TXA in the postoperative period and a mid-term follow-up (6 weeks). Main comparisons were performed using mixed models with logtransformed values of intraoperative and total bleeding, adjusted by age, BMI, number of fusion levels, and decompression.
Results: Ninety five patients were randomized. 44 (29 female, average age of 59 years) received TXA and 51 (38 female, average age of 50 years) received placebo. TXA reduced intraoperative (869ml *vs.* 1228ml; p= 0.021) and total blood losses (1591 ml vs. 2052ml; p= 0.034) compared with placebo. 48% patients of TXA group didn't require any transfusion compared to control group, 33% p= 0.056. The average numbers of units transfused were 1.14 in TXA group and 2.05 units in control group. There were no differences with duration of surgery, levels fused, decompression and length of hospital stay. 2 patients in TXA group and 1 patient in control group presented an episode of deep venous thrombosis (DVT).
Discussion and Conclusion(s): TXA significantly reduced blood loss and blood transfusion requirements in patients undergoing major spinal surgery, with a safety profile.
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Trial Registration: ClinicalTrials.gov ID: NCT01136590
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8AP4-3

Estimation of dabigatran plasma concentrations in the perioperative setting: an ex-vivo study using dedicated coagulation assays

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Background and Goal of Study: The perioperative management of dabigatran is challenging and recommendations based on activated partial thromboplastin time (aPTT) and thrombin time (TT) are unsatisfactory. Dedicated coagulation tests showed limitations to measure plasma concentrations <50ng/mL. Therefore, a more sensitive test, which is available 24/7, is required.
The aim of this study was to investigate the performance of the Hemoclot Thrombin Inhibitors® LOW (HTI LOW) kit, a diluted thrombin time, and the STA® - ECA II (ECA-II) kit, a chromogenic variant of the ecarin clotting time, specifically developed to measure low dabigatran concentrations Results were compared to a reference liquid chromatography tandem mass-spectrometry (LC-MS/MS).
Materials and Methods: Thirty-three plasma samples <200 ng/mL from patients treated with dabigatran etexilate were included. HTI LOW and ECA-II were performed along with HTI, aPTT (STA®-C.K.Prest® and SynthasIL®) and TT (STA® - Thrombin). All procedures were performed according to recommendations of manufacturers. Linear (or curvilinear) correlations and Bland-Altman analyses were calculated.
Results and Discussion: For free dabigatran concentrations <50ng/mL, the R^2 of linear correlations were 0.69, 0.84 and 0.61, with HTI, HTI LOW and ECA-II, respectively. The R^2 for TT, STA®-C.K.Prest® and SynthasIL® were 0.67, 0.42 and 0.15. For HTI, HTI LOW and ECA-II, Bland-Altman analyses revealed mean differences of -6ng/mL (95%CI: -25 - 14ng/mL), 1ng/mL (95%CI: -18 - 19ng/mL) and -1ng/mL (95%CI: -25 - 23ng/mL), demonstrating that tests dedicated to measuring low concentrations are more accurate than HTI.
Conclusions: HTI LOW and ECA-II assays performed well with plasma dabigatran concentrations <50 ng/mL. We recommend the use of HTI LOW or ECA-II to assess the plasma concentrations when they are suspected to be low, such as those encountered in the perioperative context. The clinical benefit of such a procedure should be confirmed in a large multicentric study that addresses its impact on clinical outcomes.

8AP4-4

The clinical relevance of perioperative factor XIII levels in open biliary surgery for obstructive jaundice

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Background and Goal of Study: Factor XIII (F XIII) consists of potentially active A2 and inhibitory B2 subunits, which cross-links subunits of the fibrin clot to form insoluble fibrin. Since B2 is synthesized by hepatocytes, their failure may confer a bleeding diathesis when F XIII plasma activity is decreased ≤50%. Little is known about the pattern and significance of the F XIII changes after surgery for obstructive jaundice (OJ), which is the aim of our study.
Materials and Methods: 105 consecutive adult patients undergoing open biliary surgery were included in a prospective, observational, descriptive study and were stratified as follows: with malignant OJ (group A, n=36), with benign OJ (group B, n=39), without OJ (group C, n=30) and with biliary inflammation (a case-mix from groups mentioned above, group D, n=39). Plasma and whole blood samples were collected preoperatively and then on 1, 3 and 5 postoperative days. F XIII as well as PT, aPTT, AT III, antiplasmin were measured using automated coagulation analyzer "STA Compact". F XIII levels were expressed as % of normal activity (normal range 60-125%). The between-groups comparisons and multiple correlations with total bilirubin (i.e. with OJ) and the other haemostatic parameters were calculated using One-Way ANOVA and stepwise multiple regression, respectively, at $\alpha = 0.05$ (SPSS version 19). As a secondary end point were monitored the prescribed fresh frozen plasma (FFP) units perioperatively.

Results and Discussion: In all the groups perioperative mean values of F XIII were decreased ($p<0,01$), but remained above the critical level ≤ 50%. The decrease was greatest in group A, followed by group D and group B, with the lowest levels at 3rd postoperative day. There were moderate significant correlations among the F XIII decreases and OJ, PT, aPTT, AT III, antiplasmin levels, respectively. The implemented haemostasis monitoring feedback did not result in lower FFP prescription during the study period.
Conclusion(s): In patients undergoing open biliary surgery for OJ (accompanied or not by biliary inflammation), the changes in F XIII are not isolated, but go with the changes in other haemostasis parameters (such as PT, aPTT, AT III, antiplasmin). The latter fact is of clinical relevance as it is associated with increase perioperative haemorrhage requiring correction with FFP (and the like).

8AP4-5

Perioperative management of antiplatelet therapy in cardiovascular patients undergoing transurethural resection of the prostate

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Background and Goal of Study: The risk of excessive intraoperative bleeding should be carefully balanced against the increased thrombotic risk after discontinuation of antiplatelet therapy before a non-cardiac surgery. The aim of our study is to evaluate the pre- and peri-operative platelet function in patients receiving clopidogrel and undergoing transurethral resection of prostate (TURP).
Materials and Methods: Fourteen patients (age: 75 ± 5 years) receiving clopidogrel (75 mg/day) for secondary prevention of cardiovascular disease were enrolled in the study. All patients underwent TURP. Platelet function testing was performed under clopidogrel treatment (time 0-cessation of clopidogrel), 3-days after clopidogrel cessation (time 1), 7-days after clopidogrel cessation meaning just before induction of anaesthesia in the operating theater (time 2) and within the first 24h after surgery and before the restart of clopidogrel treatment (time 3). The maximum platelet aggregation to ADP (20 μM, 5 μM) was measured by Light Transmission Aggregometry. Additionally, we studied expression of integrin GPIIb/IIIa (PAC-1-FITC binding) before and after activation of platelets with ADP 50μM by flow cytometry (MFI values; Mean Fluorescence Intensity).
Results and Discussion: According to LTA measurements performed at time 0, twenty-five percent of patients were clopidogrel non-responders. In total, the maximum platelet aggregation at time 0 was 51 ± 14 % και 38 ± 11 % for ADP 20μM and 5μM, respectively. At time 1, maximum platelet aggregation was significantly higher ($P<0.05$), 77 ± 14 % and 64 ± 16 % for ADP 20μM and 5μM, respectively. At time 2 and 3, no significant differences were observed in comparison with time 1. MFI values for PAC-1 binding are similar between time intervals for unactivated platelets (mean ± SD; 3.5 ± 0.5). In contrast, for activated platelets MFI values were low at time 0 (28.6 ± 19.0) whereas at time 1-3 were progressively increased from 46.2 ± 25.0 to 54.2 ± 23.0. These findings raise the question of when it is best to discontinue the antiplatelet therapy in order to minimize thrombotic and haemorrhagic risk.
Conclusion(s): We showed that platelet activation seven days after discontinuation of clopidogrel was similar to that in three days after cessation. We could speculate that platelet function testing might enable individualized timing of cessation of antiplatelet drugs prior to non-cardiac surgery.

8AP4-6

Preoperative detection of thrombogenic factors in reconstructive microvascular surgery

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Background and Goal of Study: Free flap transfer has become a routine surgery to close tissue defects. Microvascular thrombosis leading to possible flap loss still remains a serious threat, it can occur due to external or intrinsic thrombogenic factors, such as hypercoagulability. The aim was to detect preoperatively thrombogenic factors in order to prevent possible free flap thrombosis and to improve surgical outcome.
Materials and Methods: In the prospective observational study were enrolled 34 patients who underwent microvascular free flap surgery in the Latvian Centre of Reconstructive and Microsurgery. Demographical data and external thrombogenic factors such as comorbidities, previous thrombosis, history of trauma and smoking were recorded.
Results and Discussion: 34 patients with mean age 38 ± 11 years undergoing free flap surgery mainly because of traumatic tissue injury were analysed. Hypercoagulability by ROTEM was found in 8 (23%) patients mainly detected by MCF_{EXTEM} and MCF_{FIBTEM} with mean values 75 ± 5 and 34.7 ± 3 mm, respectively. Parallely, increased plasma fibrinogen level 5.2 ± 0.9 g/L was found in 7, but thrombocytosis in 5 hypercoagulable patients. Positive non-significant correlation was observed between plasma fibrinogen level and MCF_{FIBTEM} ($r = 0.517$, $p = 0.154$), moderate positive significant correlation was found between thrombocytosis and MCF_{EXTEM} ($r = 0.695$, $p = 0.05$). External thrombogenic factors such as surgery within 1 month after trauma was seen for 10 patients (with hypercoagulable ROTEM values in 5 cases), history of arterial thrombosis for 4, smoking history for 7, and tetraparesis in 1 case from all the studied group.Reexploration was done for 6 patients due to early flap thrombosis. In 4 out of 6 cases at least one thrombogenic factor was identified, most frequently hypercoagulability by ROTEM. In 31 cases microsurgical flaps survived.
Conclusion(s): According to first data, hypercoagulability detected by ROTEM, high plasma fibrinogen level and external thrombogenic factors can affect outcome after microvascular free flap surgery, especially in combination. Therefore, preoperative identification of thrombogenic factors can improve surgical outcome.

8AP4-7

Point-of-care testing ROTEM®: at the bedside or at the laboratory? That is the question

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Background and Goal of Study: ROTEM® is an useful transfusion guide tool for potentially hemorrhagic surgery such as liver transplantation. Some studies have demonstrated that the clot amplitude at 5 minutes, A5 (mm), 10 minutes, A10 (mm) and 15 minutes, A15 (mm), can be used in the clinical management of life-threatening massive hemorrhage[1,2]. At our hospital, ROTEM® is located at the Central Laboratory (Central Lab) and not at hand in the Operating Room (OR) like the blood gas analyzer (BGA) that is. The objective of this study is to discover the time that could be saved in getting the blood analyzed by ROTEM®, and in so doing discover the time that could be gained in hemostatic management in severe hemorrhagic patients.
Materials and Methods: For 1 year, all adult patients (n= 52) submitted to liver transplant, had 2 blood samples taken from the arterial catheter inserted for every tromboelaestrogram needed (n=151). One of the samples was analyzed by ROTEM® (the time of entry at the Central Lab was used) and the other sample for BGA (the time taken as the entry of BGA). Later we proceeded to calculate the difference between the entry at the Central Lab and the entry at the BGA. The computer clock of the Central Lab and the BGA were checked at exactly the same hours and minutes. The personnel that took the blood sample from OR to the Central Lab and to the BGA did not know of our study. Statistical analysis with SPSS Statistics (v.21, IBM SPSS).
Results and Discussion: There is a statistically significant difference between the mean time for a sample to be processed and ready for analysis by the BGA and the ROTEM® (2min 05sec vs 10min 26sec; $p< 0,001$). The blood sample would be available 8 minutes earlier if we had this equipment in OR.
Conclusion: Not only has ROTEM® analysis brought us the possibility of seeing real time coagulation at work but also given us valuables results at A5, A10 and A15 (mm). That has opened up the possibility of goal directed therapy in coagulation acute deficits. We are clearly losing valuable time and therefore at our hospital, hemostatic management may be at least 8 minutes too late for goal directed therapy and we should clearly look for solutions that bring ROTEM® closer the patients' bedside.
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8AP4-8

Low-frequency piezoelectric thromboelastography vs platelet aggregation test, standard coagulation tests and thromboelastography

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Introduction: It's known that deep vein thrombosis of lower extremities and pulmonary embolism occupies an important place in the structure of postoperative morbidity and mortality.
Objectives: After Ethics approval and informed consent (Research Ethical Board number 2354-J of Odessa National Medical University on 14 of April 2013), was studied the functional state of hemostasis in a group of 60 healthy volunteers, who were not receiving drugs affecting coagulation. Monitoring of hemostasis was by low-frequency piezoelectric thromboelastography (LPTEG), platelet aggregation test (PAT), standard coagulation tests (SCT) and thromboelastography (TEG). We studied the correlation by the Pearson's Correlation Coefficient.
Results: It was found that the indexes of LPTEG as the intensity of the contact phase of coagulation (ICC), the time the contact phase of coagulation (t1), and initial rate of aggregation of blood (A0) were correlated with PAT indexes as the spontaneous platelet aggregation and epinephrine-induced platelet aggregation (0.59 - 0.76); the intensity of coagulation drive (ICD) correlate with activated partial thromboplastin time of SCT (0.56) and reaction time to initial fibrin formation of TEG (0.64), maximum density of the clot (MA) with fibrinogen level of SCT (0.67) and maximal amplitude of TEG (0.86) a constant thrombin activity (CTA) with thrombin time of SCT (0.78) and clotting time of TEG (0.93), and the intensity of the retraction and clot lysis (IRCL) with the total fibrinolytic activity of SCT (0.83) and clot lysis of TEG (0.74).
Conclusions: LPTEG allows make the total assessment of all parts hemostasis: from initial viscosity and platelet aggregation to coagulation and lysis of clot, as well as their interaction. We can use the indexes ICC, A0, t1 for control aggregation, ICD, MA, CTA for control coagulation and IRCL for control fibrinolysis. His figures are objective and informative, as evidenced by close correlation with the performance of traditional coagulation methods.

8AP4-9

Rivaroxoban vs enoxaparin in patients with venous thromboembolism

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Background: A prospective study was conducted in patients for treatment venous thromboembolism (VTE) to compare the effect of enoxaparin and rivaroxaban with using the method of low-frequency piezoelectric thromboelastography (LPTEG) for checking coagulation activation markers.
Methods: A total of 60 patients entered the Odessa Clinical Regional Hospital for treatment venous thromboembolism . Patients were divided in to 2 grours. The 1-st group (n=30) were receiving enoxaparin in dosage 1,5 mg/kg subcutaneously per day. The 2-nd group (n=30) were receiving rivaroxaban orally 15 mg per day. For checking the coagulation state we were using such indicators of LPTEG as constant thrombin activity (CTA), intensity of coagulation drive (ICD) and gel point (GP). We were making LPTEG 3 times per day after 4, 12 and 24 hours after taking the drug for checking changes in coagulation state in both groups of patients.
Results: The peak of action of enoxaparin and rivaroxaban was observed at 4 hours post-administration. LPTEG indicators that determine coagulation state after 4 hours in 1-st group: CTA was decreased on 72,12 % ($p< 0.05$), ICD was decreased on 68,44 %($p< 0.05$), GP was increased on 17,9%, in 2-nd group: CTA was decreased on 76,24% ($p< 0.05$), ICD was decreased on 74,52 % ($p< 0.05$), GP - was increased on 23,34 %. After 12 hours CTA in 1-st group decreased on 22,41%, ICD decreased on 5,3%, GP increased on 8,12% that indicating reducing of hypocoagulation effect, in the 2-nd group CTA in decreased on 39,35% ($p< 0.05$), ICD decreased on 40,24% ($p< 0.05$), GP increased on 18,25%. After 24 hours in the 1-st group LPTEG indicators returned to the original value, in the 2-nd group of patients CTA was decreased on 15,14%, ICD was decreased on 6,62%, GP increased on 14,22%.
Conclusion: Using LPTEG was showed that hypocoagulation effect of rivaroxaban continuous 24 hours after oral administration compared to enoxaparin, which retains less hypocoagulation effect after 12 hours after administration. LPTEG indicators in 2-nd group was bigger than in 1-st group after 12 hours: CTA on 43,07%, ICD on 69,72%, GP on 54,12%.

8AP4-10

Post-operative venous thromboembolism risk and lethality in a Portuguese tertiary university hospital - a 5 years retrospective study

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Background and Goal of Study: Venous thromboembolism (VTE), including pulmonary embolism (PE) and deep venous thrombosis (DVT), is a major post-operative complication. Epidemiological data about VTE in Portugal was scarce. This study aimed to estimate the risk of symptomatic VTE in the adult population of a tertiary university hospital sorted by surgical specialities and to measure VTE lethality.
Materials and Methods: After approval by local Ethics Committee, a retrospective study was conducted to identify new cases of post-operative VTE using ICD9 diagnosis criteria. Study was conducted in Centro Hospitalar São João, Porto. All post-operative hospitalized adults between 2008 and 2012 were included in the study. Relevant clinical information was collected from every VTE diagnosed patient's individual medical records.
Results and Discussion: Study sample consisted in 67 635 patients. VTE was identified in 90 patients, including 50 pulmonary embolism (PE). Global VTE risk was 1.33/1000 (CI 95%) ranging from 1.1 to 1.6/1000. Global PE risk was 0.75/1000 (CI 95%) ranging from 0.56 to 0.99/1000. Highest VTE risk was identified in neurosurgery (4.07/1000) followed by urology (1.55/1000), general surgery (1.42/1000), vascular surgery (1.29/1000), orthopaedics (1.09/1000), thoracic surgery (0.87/1000), otolaryngology (0.48/1000) and plastic surgery (0.47/1000). PE risk was higher in neurosurgery (2.39/1000), followed by orthopaedics (0.91/1000) and urology (0.89/1000). Annual VTE prevalence decreased between 2008 and 2012, corresponding to decreasing global risk from 1.95 to 1.01 ($p = 0.036$). VTE lethality rate VTE was 21.1 (CI 95%) ranging from 13.6 to 30.4. Lethality rate for VTE with PE was 21.6%. We could not exclude underdiagnosis, irregular VTE-related data recording or VTE diagnostic criteria between surgical specialties. The downward trend in annual risk might translate greater awareness and better clinical practices (including prophylaxis).
Conclusion(s): Neurosurgery showed the highest VTE and PE risk, possibly explained by the fear of neurosurgical patient's haemorrhagic risk. There was a reduction in VTE risk over the years in our hospital. Post-operative VTE lethality highlights the importance of VTE awareness promotion measures and clinical practices optimization, including those related to thromboprophylaxis.

8AP4-11

Is thrombin time useful to evaluate dabigatran concentrations before invasive procedures? An *in vitro* and *ex vivo* validation study

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Background and Goal of Study: There is no consensus regarding the perioperative management of patients treated with dabigatran etexilate. Quantification of dabigatran levels below 50 ng/ml requires LC-MS/MS measurement since other specific assays (i.e. dilute thrombin time and ecarin chromogenic assay) lack sensitivity.
Due to its high sensitivity, thrombin time (TT) can detect low dabigatran plasma concentrations and may be an alternative in the preoperative setting. However, it lacks standardisation. We aimed to validate TT with international standards and to highlight the analytical variables affecting its interpretation.
Materials and Methods: We tested dabigatran-spiked normal pool plasma samples at different concentrations (0, 10, 20, 30, 50, 100 and 200 ng/ml) on two coagulometers (STA-R® Evolution and ACL TOP® 700) with two thrombin reagents (STA® Thrombin and HemosIL® Thrombin Time). We aimed to define

an optimal thrombin concentration (OTC) that permitted measurements of dabigatran concentrations from 0 to 200 ng/ml. We studied accuracy, precision, robustness, stability, limit of detection (LOD) and quantification (LOQ), linearity and specificity for 4 OTCs. We used ex-vivo data to define the reference range of TT with different reagent lots.
Results and Discussion: OTCs (i.e 1.76 NIH/ml for STA® Thrombin on STA-R® and 3.75 NIH/ml for HemosIL® Thrombin Time on ACL TOP®) may differ from the manufacturer's recommendation. Thrombin time showed acceptable variability for both coagulometers (i.e. below 12% for the inter-assay). Dabigatran concentrations up to 200 ng/mL with ACL TOP® and up to 50 ng/ml with STA-R® were defined by linear regression. Storage of plasma samples at room temperature or 4°C increased TT at 4 and at 24 hours, respectively.
Conclusions: Each laboratory should optimize its TT procedure according to its coagulometer-reagent combination.
Thrombin time is useful to assess low dabigatran concentrations (up to at least 50 ng/ml). It may guide clinicians before invasive procedure. Because of its limit in analytical measurement ranges, TT should not be not be used to assess dabigatran concentrations in the therapeutic range.
Careful storage of plasma samples containing dabigatran is necessary to avoid misleading results. Communication between laboratories and clinicians concerning any biological or drug interference on TT should also be advised, to avoid any misinterpretation that may lead to wrong medical decision.

8AP4-12

Effect of transfusion of stored red blood in patients undergoing elective surgery. A role in postoperative infections?

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Background and Goal of Study: The storage time of RBC (red blood cells) has been linked with the risk of infections following surgery. Morphological and functional changes during storage are proposed to explain down-regulation of immune response of patients transfused. The aim of our study was to evaluate the association between the transfusion of stored RBC and postoperative infections.
Materials and Methods: A prospective, double-blind, randomized study was performed in Anaesthesia and Intensive Care department of Ferrara. We enrolled patients receiving intra-operative transfusion. Exclusion criteria were: patients <18 years, emergency surgery, patients with infections in the 30 days before surgery and/or transfused in the 30 days before surgery Patients were randomized into two groups: Group A received only fresh blood (storage time less than 14 days) while Group B received both fresh and old blood. The patients were assessed daily during the hospitalization period. Outcome analyzed were the rate of postoperative sepsis, pneumonia, wound infections and peritonitis.
Results and Discussion: Nowadays 120 patients were included. 80 patients received only fresh blood, while 40 patients received both fresh and old RBC. Clinical variables are presented in Table 1. Due to the high turn-over of RBC in our institution, fresh group was considerably greater. Overall incidence of infections were 10,4% of wound infections, 7,8% of pneumonia, 5,2% of sepsis and 3,5% of peritonitis. Statistical t-test analysis showed significant difference in risk of developing one of the infections in the old group (p=0,04) and in the incidence of wound infections (p=0,02).
Conclusion(s): Our data support the hypothesis that transfusion of old RBC could be related with an increased risk of postoperative infections, above all wounds infections, irrespective of the use of antibiotics.
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Clinical Variables	Group A	Group B	P value
Age	62 ± 11	69 ± 17	0.8
BMI	21.3 ± 6.3	24.5 ± 6.6	0.06
Lowest intra-operative Haemoglobin (g/dl)	7.78 ± 0.9	8.37 ± 0.7	0.38
Colloid (ml)	318 ± 175	430 ± 190	0.37
Crystalloid (ml)	2200 ± 930	2500 ± 875	0.28
Average Age of RBC units (days)	7.3 ± 2	16.6 ± 3.3	
Number of RBC units received	2.5 ± 1.1	3.19 ± 0.7	0.21

[Table 1. Clinical variables of patients. All data are presented as Mean ± SD]

8AP5-1

Individual approach to perioperative fluid therapy based on the direct current potential levels in patients after major abdominal surgery

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Background and Goal of Study: To determine how fluid therapy decisions may influence postoperative outcomes
Materials and Methods: A retrospective study of the perioperative period after major abdominal operations in 396 patients was performed. The physical condition of patients corresponded to 3 class of ASA. The median age was 46.0 (38,0-62,0) years. The duration of the operations was more than 130 minutes. TAll patients were divided into 3 groups according to the level of direct current potential (DCP): low negative level of DCP (< - 14 mV) (n = 69), average level of DCP (-15 - (-29) mV) (n = 96), high level of DCP (> -30mV) (n = 231). The measurement was conducted in a continuous recording for 10 minutes from the active electrode located in the middle of the forehead, and the reference electrode - in the thenar region. For statistical analysis AUROC (Area Under Receiver Operator Curve) was peformed.
Results and Discussion: The maximum frequency of postoperative complications (86.9%) was predicted at low negative values of DCP (< -14 mV). In group with low values of DCP there was significantly more pronounced positive water balance - greater than 92,7 ml/kg at first three days postoperative period. The data of ROC-analysis showed that cut-off point of positive water balance in the group with low negative values of DCP is not recommended to increase greater than 65 ml/kg (AUROC = 0,905) and the positive water balance in the the first day more 35.3 ml/kg
(AUROC = 0,831).
For the prevention of postoperative complications in patients with average values of DCP (from -15 to -29 mV), it is important not to exceed the intraoperative positive fluid balance more than 23 ml/kg (AUROC = 0,856) and 45,7 ml/kg at first three days postoperative period (AUROC = 0,842). The patient with high levels of DCP were more tolerated to the positive fluid balance and there were no significant relations with complications (AUROC = 0,745).
Conclusion(s): Individual approach to the infusion support during in major abdominal surgery by determining the safe borders of the positive water balance in the intra- and post-operative period was studied taking into account the level of DCP as defined in the preoperative period.
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8AP5-2

Improving use of goal directed fluid therapy

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Background and Goal of Study: Goal directed fluid therapy (GDFT) using a cardiac output monitor is widely recommended [1,2] as best practice for major elective surgery. However, uptake is far from universal in the UK [3]. We compared our local use of GDFT to the national situation and identified potentially removable barriers to universal adoption.
Methods: All anaesthetic consultants working in our hospital during a five day period were included in the study. Participants were given a hypothetical case for which GDFT is recommended. They were asked how often they would use GDFT for this case, what their preferred tool is, and to identify their reasons if they would not always use GDFT. Results were analysed using Excel 2010 and Student's T-Test used to assess significance.
Results and Discussion: The sample included 44 consultants, of which 41 (91%) participated. GDFT for suitable cases is always used by five (12%) consultants, sometimes by 20 (49%) and never by 16 (39%). GDFT is never used by significantly more (39% versus 23%, p< 0.01) consultants locally compared with nationally. Oesophageal Doppler was preferred by 18 (46%) consultants, with eight other devices being preferred by the remaining 23 (56%); this is similar to national results. Reasons for never using GDFT included lack of resources (seven, 43%), lack of experience (nine, 56%), nil advantage perceived (four, 25%), unsuitable patients (seven, 44%) and too labour intensive (three,

19%). However, eleven (69%) of those who never use GDFT would consider adopting the technology if barriers were removed but five (31%) would never adopt. Amongst those who sometimes use GDFT, 19 (95%) would always use the technology if barriers were removed.
Conclusion: GDFT is used for substantially fewer suitable cases than is advised by best practice guidance. However, barriers to adoption include several - lack of resources and experience - that are removable, and some consultants would then be keen to adopt the technology. Our results will help attract funding for equipment and staff training with the Oesophageal Doppler, the most widely accepted cardiac output monitor locally.
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8AP5-3

Intraoperative fluid optimization guided by hemodynamic measures: analysis of postoperative complications

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Background and Goal of Study: The maintenance of intravascular volumen during and after colorectal surgery is important in the optimization of perioperative outcomes.
The Intraoperative Goal-directed therapy (GDFT) have been associated with a reduction in length of stay and complication rates after mayor surgery.
The aim of the study was to evaluate the postoperative complications in patients undergoing mayor elective colorectal surgery using goal-directed therapy guided by measures stroke volumen(SV).
Materials and Methods: After ethical committee approval and written informed consent were obtained, we enrolled patients scheduled for elective colorectal surgery.
A prospective, observational and analytical study on a simple of 60 patients were randomly assigned to a group A (n=30) with conventional fluid therapy intraoperative management based on standard haemodynamic índices and group B (n= 30) monitored with EV1000 platform (Edwards Lifesciences) using GDFT approved by the Patient Safety Foundation of the European Society of Anaesthesiology.
After induction of general anaesthesia, an arterial line and central venous catheter were inserted. In group B, basal balanced crystalloid infusión rate was set a 3 ml/Kg/h and bolus of 250 ml of crystalloid were administered to maintain stroke volume trigger.
A treatment algorithm is used as guidance for fluid and inotropic therapy.
Results and Discussion: The use of protocols for GDFT in patients undergoing elective colorectal surgery was resulting in more appropiate use of fluid, vasopressors and inotropics.
The average intraoperative intravenous fluids quantity in group B was significantly reduced.
The rate and number of postoperative complications in our study were lower in the group B and the time of postoperative hospital stay shorter.
No significant differences were observed in mortality between the two gropus.
Conclusion(s): In this study, intraoperative GDFT guided by stroke volume was associated with improved outcomes in patients undergoing elective colorectal surgery as a decrease in postoperative complications.

8AP5-4

The relevance of preoperative ascites on the intraoperative haemodynamic therapy and the postoperative outcome within a goal-directed algorithm

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Background and Goal of Study: Cytoreductive surgery plays a central role in the treatment of ovarian cancer patients being an extended, multivisceral procedure with a high variability with respect to perioperative morbidity. Therefore, the identification of preoperative risk factors to indicate advanced haemodynamic monitoring and allocation of resources is crucial.
Materials and Methods: Patients were prospectively included in a randomized controlled clinical trial comparing infusion solutions (ISRCTN53154834) within a goal-directed therapy (GDT) to optimize haemodynamic status guided by oesophageal Doppler monitoring (ODM).(1) Within this trial the patients were stratified according to the presence and the amount of ascites prior to randomization. Here, we analysed the study population in regard to ascites (none and < 500ml vs. >500ml).
Results and Discussion: Patients with ascites of more than 500ml prior to surgery were not assessed differently by anaesthetists with respect to ASA physical status, the indication of advanced monitoring or central-venous or epidural catheters. However, patients with more than 500ml ascites showed a higher heart rate, a higher rate of administered norepinephrine and lower stroke volumes and diuresis despite receiving higher amounts of fluid administration and transfused red packed cells and fresh-frozen plasma within the GDT. Postoperatively, ascites >500ml was associated with prolonged hospital length of stay, a higher number of postoperative complications per patient and a higher mortality within three months after surgery.
Conclusion(s): This study indicates that despite not being recognized by anaesthetists preoperatively, the presence of more than 500ml ascites prior to surgery can be considered as a risk factor for haemodynamic instability and impaired postoperative outcome despite being treated within a GDT based on ODM.
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8AP5-5

A 3-step mini volume loading test (mVLT) could indicate preoperative dehydration in major orthopaedic surgery patients

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Background and Goal of Study: Previously, a mini Volume Loading Test (mVLT) detected signs of dehydration in healthy volunteers after an overnight fast[1]. Our objective was to investigate if these findings could be replicated preoperatively in patients after an overnight fast.
Materials and Methods: A 3-step mVLT protocol was applied in 36 elective total knee arthroplasty patients. Each subject received three fluid challenges (steps) before induction of anaesthesia. These consisted of 5 ml kg^{-1} boluses of Ringer's acetate infused over 3 min and followed by a 5 min period without fluid. Invasive (arterial, venous; laboratory) and non-invasive (capillary; SpHb™ by Radical 7, Masimo Corp., Irvine, CA) measurements of haemoglobin were performed before and after each fluid challenge, as well as after a 20 min period without fluid following the last bolus. Arterial, venous and capillary plasma dilutions were calculated in every datapoint. Dilution values were used to calculate the plasma dilution efficacy of each fluid challenge.
Results and Discussion: Venous dilution was higher than capillary after the first fluid challenge (P = 0.030), but lower than capillary after 20 min period following the last bolus (P = 0.009)(Fig.1). Arterial dilution was lower than

capillary (P = 0.005) after 20 min following the last bolus. Veno-capillary and arterio-capillary plasma dilution efficacy differences decreased (P = 0.004 and P = 0.033, respectively) from positive to negative during mVLT (Fig.2). These are signs of rehydration from preexisting dehydration according to a transcapillary reflux model (Fig.3)[1,2]. The mVLT methodology is applied in an automated clinical decision support system for a semi-closed loop infusion system (Fig.4) which currently undergoes clinical validation[3].

Conclusion(s): Signs of dehydration were observed during a 3-step mVLT fluid protocol in TKA patients after pre-operative overnight fast.

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8AP5-6

A 6-step mini volume loading test (mVLT) could indicate transcapillary fluid reflux during the preoperative stepwise crystalloid infusion in major orthopaedic surgery patients

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Background and Goal of Study: A mini Volume Loading Test (mVLT) is based on a transcapillary fluid reflux model[1,2]. It postulates that excessive interstitial fluid returns into capillaries soon after infusion and results in a negative arterio-capillary plasma dilution difference. It was investigated in healthy volunteers[1]and elective total knee arthroplasty (TKA) patients[3] after an overnight fast. Our objective was to investigate if previous findings in patients[3] could be replicated by using lower volume boluses.

Materials and Methods: A 6-step mVLT was performed in 48 patients. Each subject received 6 mini fluid challenges (steps) before induction of anaesthesia. These consisted of 2.5 ml kg^{-1} boluses of Ringer's acetate infused over 2 min and followed by 5 min periods without fluids. Invasive (arterial) and non-invasive (capillary; SpHb™ by Radical 7, Masimo Corp., Irvine, CA) measurements of haemoglobin were performed before and after each fluid challenge, as well as after a 20 min period without fluids which following last bolus. Arterial and capillary plasma dilutions were calculated. They were used to calculate the plasma dilution efficacy of each fluid challenge, as well as its arterio-capillary difference.

Results and Discussion: Arterial plasma dilution was higher than capillary after boluses 1-5 (P = 0.000, 0.000, 0.000, 0.001 and 0.009, respectively), but lower than capillary (P = 0.000) after 20 min following last bolus (Tab.1). Arterio-capillary plasma dilution efficacy difference decreased from positive in 1st step to negative in 2nd (P = 0.000) and remained negative thereafter. According to the model [1-3], these are signs of interstitial rehydration followed by excessive fluid accumulation. The mVLT requires automated data analysis. It is applied in an automated clinical decision support system for a semi-closed loop infusion system[4].

Conclusion(s): Signs of transcapillary reflux can be observed during mVLT by using 2.5 ml kg^{-1} boluses of crystalloid.

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8AP5-7

Impact of perioperative optimization by a mini volume loading test (mVLT) on the lower limbs' swelling after unilateral total knee arthroplasty surgery: a randomized double blinded clinical trial

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Background and Goal of Study: A mini volume loading test (mVLT) is a modification of conventional goal directed protocols[1]. It implies evaluation of plasma dilution response aiming to detect imminent oedema during stepwise infusion[2]. Preliminary investigation showed that perioperative mVLT is associated with better functional recovery, earlier fitness to discharge and switching to NSAID after unilateral total knee arthroplasty (TKA) surgery[3]. The objective was to investigate if improvement in outcomes could be related to lower postoperative swelling of limbs.

Materials and Methods: Sixty patients completed the study. They were randomised into an intervention (n=30) and control (n=30) groups (CONSORT Fig.1). Controls received fluids solely on the discretion of an attending physician. Each subject in the intervention group received mVLT immediately before the induction of spinal anaesthesia and 24 hrs later. Stepwise infusion of 15 ml kg^{-1} Ringer's acetate was guided by plasma dilution response. When the infused fluid did not any longer enhance plasma dilution efficacy, this was an indication to stop the stepwise infusion. Fluid administration during the 24 hours between mVLTs was at the discretion of the attending physician. The circumference of both lower limbs was measured at the level of the superior pole of the patella (site 1), as well as 10 cm above and below (site 2). We compared the ratio between preoperative and post-operative circumferences, where the post-operative variables are the means of measurements on days 4-6.

Results and Discussion: Ratio between post- and pre-operative measurements in site 2 of both legs, as well as in site 1 of the operated leg was lower in the intervention group (P = 0.006, 0.033 and 0.001, respectively; TAB.1). The mVLT methodology is currently applied in automated clinical decision support system for semi-closed loop infusion system (Fig.2)[4].

Conclusion(s): Perioperative mVLT is associated with lower postoperative swelling of tissues.

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8AP5-8

Volume replacement with HES 130/0.4 attenuates inflammatory response to major abdominal surgery compared to Ringer's Lactate: the effect on cytokines and matrix metalloproteinases

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Background and Goal of Study: Fluid therapy may affect the inflammatory response to surgery. In the present study we investigated the hypothesis that volume replacement with hydroxyethyl starch (HES) results less inflammatory response to abdominal surgery comparing to Ringer's Lactate (RL) with respect to cytokines and matrix metalloproteinases (MMPs) postoperative changes.

Materials and Methods: After Ethical approval was obtained, 47 ASA I and II patients scheduled for moderate or major abdominal surgery under general anaesthesia were allocated to receive intraoperatively and 24 hours postoperatively either only RL (RL group, n=25) or HES 130/0.4 combined with RL (HES group, n= 22) in order to replace volume loss. Invasive haemodynamic monitoring was performed intraoperatively to all participants using the FloTrac/Vigileo™. Blood samples were collected at predefined time points (before anaesthesia induction [base line], at the end of operation and 24 hours postoperatively) and measurements of Cytocines (IL-6, IL-8), MMPs (MMP-9, MMP-13), Tissue Inhibitor of Metalloproteinase and Intercellular Adhesion Molecule-1 were performed, respectively.
Results and Discussion: Demographics, operation characteristics and haemodynamic parameters were similar between the two groups. Intraoperatively RL group received 1725±350 ml of RL and HES group 720±299 ml of RL plus 582±185 ml of HES130/0.4 per patient respectively. During the study period RL group received in total 3983±888 ml of RL and HES group 1068±242 ml of HES 130/0.4 plus 2033±672 ml of RL per patient respectively.
In the total of the operations, IL-8 serum levels were significantly lower in the HES group (14.6±6.9 pg/ml [HES group] vs 23.2±13.9 pg/ml [RL group] [$p < 0.05$]); all the other markers presented less increase in HES group compared to RL group, but without being statistically significant. Specifically in major operations (total abdominal hysterectomy with bilateral salpingectomy), IL-8 serum levels were significantly lower in HES group compared to RL group (15.4±7.2 pg/ml vs 21.4±15.2 pg/ml, respectively; $p < 0.05$); MMP-9 plasma levels were also significantly lower in the HES group (128.3±11.8 ng/ml [HES group] vs 131.8±7.1 ng/ml [RL group]; $p < 0.05$) while values of the other markers were similar in both groups.
Conclusion: Volume replacement with HES 130/0.4 resulted in less cytokines and matrix metalloproteinases responses to major abdominal surgery compared to RL fluid therapy.

8AP5-9

Predicting fluid responsiveness in post surgical unit

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Background and Goal of Study: In the postoperative period, many situations can simulate a hypovolemic state. Detecting patients that can improve their hemodynamic state with fluid therapy is not easy. Passive legs raising (PLR) test has been tested in various studies to predict preload dependence in spontaneous breathing patients. These studies were performed in medical patients. Post surgical patients have clinical characteristics different to medical patients.
The aim of this study is to test the value of PLR to predict hemodynamic improvement after fluid resuscitation in this population.
Materials and Methods: Once the approval of the Clinical Research Ethics Committee of our hospital was obtained, we carried out a prospective observational study. Post surgical patients with spontaneous breathing activity in whom we suspect a hypovolemic state were collected for a period of a month. We measured by echocardiography the velocity time integral of aortic blood flow (VTiAo) at baseline, during PLR and after fluid expansion (500 ml of Ringer Lactate (RL) over 15 min). We also controlled blood pressure and heart rate. Data were analyzed using SPSS 15.0.
Results and Discussion: Twenty-one patients were included (62% men, 38% women) with an average age of 70 (48 - 84) years old. The ASA physical status was II: 57% and III: 43%. Patients was submitted to general (48%), orthopedic (42%) and vascular (10%) surgery. 52% were received general anesthesia and 48% regional anesthesia. All patients had appropriate analgesia management before inclusion.
The reason of inclusion was: oliguria 57%, hypotension: 38% and tachycardia: 5%.
Thirteen patients responded to RL infusion, increasing their SV > 12%. An increase >10% in VTiAo or SV during PLR distinguished responders from no responders with a sensitivity and specificity of 85% and 100% respectively. The area under the curve was 0,95 CI [0,86-1]. A significant correlation was observed between variations in VTiAo and SV during PLR; and changes in SV after fluid challenge. ($r=0,69$; $p < 0,001$). Neither absolute value nor changes in blood pressure were predictive of an increase in SV after RL administration.
Conclusion: We conclude that in post surgical patients, with spontaneous breathing, echocardiographic assessment of SV during PLR can predict a positive hemodynamic response after fluid administration.

8AP5-10

Assessment of perioperative endothelial leakage with venous occlusion plethysmography in extensive high-risk non-cardiac surgery

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Background and Goal of Study: Data on perioperative endothelial leakage in non-cardiac surgery are still limited. This study aimed to investigate the presence of perioperative endothelial leakage during the perioperative course of major gynaecological surgery.
Materials and Methods: The data were prospectively obtained in patients undergoing multivisceral, cytoreductive surgery due to primary and recurrence epithelial ovarian cancer. The patients were treated intraoperatively within a goal-directed haemodynamic algorithm based on the oesophageal Doppler monitor (ODM) to optimize stroke volume, maintain mean arterial pressure and avoid significant drops of cardiac index. Endothelial leakage was assessed by strain-gauge venous occlusion plethysmography. The primary endpoint was the perioperative course of venous filtration coefficient determined by the difference of venous capacity from 6st to 3rd minute during venous occlusion. Venous filtration coefficient was obtained every 30 minutes during surgery, 1 and 6 hours after surgery and on postoperative day 1 and 3.
Results and Discussion: A total of 30 patients were included and analysed (n=15 primary and n=15 recurrence cancer patients). Using strain-gauge venous occlusion plethysmography at bedside during surgery was feasible. At the start of surgery, baseline filtration coefficient was similar in primary and recurrence ovarian cancer patients (median 0.5 (25th; 75th quartile 0.4; 0.8) vs. 0.5 (0.5; 0.6) %). The primary cancer group had a single increase after 2 hours of surgery with a narrow interquartile range (0.8 (0.7; 0.9) %), while after 2.5 hours the patients reached baseline values again and did not change any more until the end of surgery. Postoperatively, the filtration coefficient in the primary cancer group showed an increase up to the third postoperative day (0.9 (0.6; 1.1) %). In contrast, the recurrence cancer group had a slightly decreased filtration coefficient during the course of surgery, reached baseline values at the end of surgery and did not change significantly during the postoperative course.
Conclusion: This study indicates that within a goal-directed haemodynamic algorithm guided by the ODM venous filtration coefficient as a measure for capillary leakage did not increase during perioperative course in extended high-risk gynaecological surgery. Only postoperatively in primary cancer patients there was a significant increase after surgery up to third postoperative day.

8AP5-11

The effect of goal-directed fluid therapy during elective esophageal surgery on post-operative complications, length of hospital stay and 30-day mortality

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Background and Goal: The use of goal-directed fluid therapy (GDT) during high-risk surgery has been shown to reduce morbidity and length of stay (LOS). Esophagectomy is a high-risk surgical procedure (mortality rate of 5%, morbidity rate of 40%), mainly caused by tissue ischemia and leakage of the anastomosis. It is uncertain whether GDT has the same benefits in this population. In this study we evaluated the implementation of intraoperative GDT on postoperative surgical and pulmonary complications in esophageal surgery patients. Secondary endpoints were the decrease of hospital LOS, and 30-days postoperative mortality.
Methods: This study consisted of 3 phases.
1) Retrospective data collection of adult patients undergoing elective open or minimally invasive (MI) transhiatal (THOCR) or transthoracic (TTOCR) esophageal surgery,

2) GDT protocol training for two months,
3) Data collection of all TTOCR/THOCR patients during the following 16 months.
GDT optimization was stroke volume (SV) guided (FloTrac, EV1000). When SV was >10% under the determined optimal SV, a bolus of 250 ml colloid was given. Another hemodynamic target was a mean arterial pressure (MAP) > 65 mmHg or 70% from baseline MAP.
Results and Discussion: In the retrospective group 107 patients were included (85 TTOCR (of which 68 MI), 22 THOCR (9 MI) vs 99 (83 TTOCR (72 MI), and 16 THOCR (16 MI) patients in the prospective group. There was a significant decrease in pulmonary complications in all patients receiving GDT (26 vs 40%, P=0.03). For TTOCR patients only this was 28 vs 45% (P = 0.02), for THOCR 19 vs. 23% P=0.77. There was a trend in reduction in the MI TTOCR group 25 vs 38%, P=0.06).
Mediastinal abscesses without anastomotic leakage were found in 3% (GDT) vs 12% (control), P=0.02 (TTOCR: 2 vs.15% (P=0.003), THOCR: 6 vs 0% (P=0.24)). Gastric tube necrosis occurred in 0 vs 7% (P=0.02).
There were no differences in anastomotic leakage or other surgical complications (>1 vs 0 complications), hospital LOS and 30-day mortality in all subgroups (P>0.05). Fluid balance was lower in de GDT group (median of 2045 (IQR1392-2496) vs. 2667 (IQR 2016-3330) ml, P<0.01), and more colloid was used (median of 1250 (IQR 750-1500) vs.1000 (IQR 500-1000) ml, P<0.01) during anesthesia. A decrease in fluid balance was seen in all subgroups.
Conclusion: Implementing GDT during esophageal surgery may reduce pulmonary complications and mediastinal infections but not anastomotic leakage, LOS and 30-day-mortality.

8AP5-12

Context-sensitive haemodynamic effects of different infusion solutions within a goal-directed algorithm in high-risk gynaecological surgery

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Background and Goal of Study: Within a goal-directed therapy (GDT) to optimize the haemodynamic status of the patient, data comparing the haemodynamic effects of infusion solutions (INF) and fresh-frozen plasma (FFP) are still limited.
Materials and Methods: Patients were prospectively included in a randomized controlled clinical trial comparing infusion solutions (ISRCTN53154834) within a goal-directed therapy (GDT) to optimize the haemodynamic status by oesophageal Doppler monitoring (ODM).(1) According to the haemodynamic algorithm, we determined the time to a re-indication of fluid administration (Time-Re-Ind) after stroke volume optimization and the administered rate of norepinephrine (NA-Adm). The analysis was performed regarding the haemodynamic effects of the different infusion (crystalloid and colloid) solutions and FFPs in the context of ascites and by performing multivariate generalized estimating equation (GEE) with adjustment for multiple measurements per patient.
Results and Discussion: Within a GDT based on ODM, patients with more than 500ml ascites received intraoperatively higher amounts of infusion solutions and fresh-frozen plasma. In patients with no or less than 500ml ascites Time-Re-Ind and NA-Adm was stable over the course of surgery. In patients with more than 500ml ascites Time-Re-Ind decreased and NA-Adm increased during the first two hours of surgery and recovered thereafter up to the end of surgery. GEE analysis revealed that crystalloid and colloid infusion solutions were associated with a decrease of Time-Re-Ind and increased NA-Adm and FFP was associated with an increase of Time-Re-Ind and a decrease of NA-Adm in patients with more than 500ml ascites. GEE analysis of patients with no or less than 500ml ascites showed no association of the kind of administered fluid and haemodynamic effects.
Conclusion(s): The haemodynamic effects of crystalloid and colloid solutions and fresh-frozen-plasma can be considered context-sensitive to the presence of ascites. If more than 500ml of ascites is present the administration of crystalloid and colloid solutions was associated with a deterioration of haemodynamic stability whereas FFP prolonged Time-Re-Ind and reduced NA-Adm.
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8AP6-1

Effects of μ-opioid receptor gene polymorphism on postoperative nausea and vomiting in patients undergoing general anesthesia with remifentanil - double blinded randomized trial

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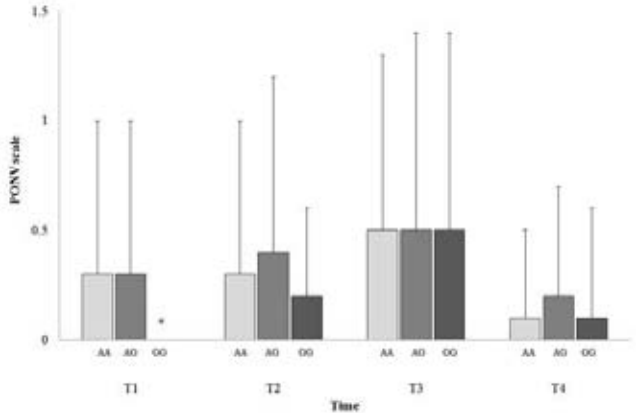
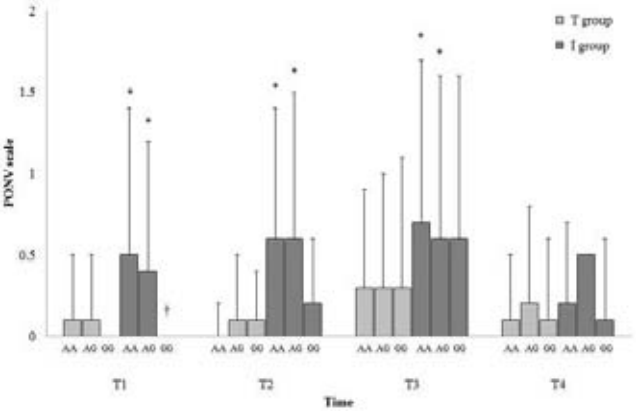
Background and Goal of Study: Association between postoperative nausea and vomiting (PONV) and μ-opioid receptor A118G single nucleotide polymorphism (SNP) is undefined and might underlie inconsistent results of studies on PONV occurrence in patients undergoing general anesthesia with the opioid, remifentanil.
Materials and Methods: Four hundred and sixteen Korean female adults undergoing breast surgery with general anesthesia were evenly randomized to receive remifentanil 10 ng.ml^{-1} using a target-controlled infusion device and either propofol for total intravenous anesthesia (T group) or sevoflurane for inhalation anesthesia (I group) with bispectral index values maintained between 40 and 60. Blood specimens were collected after anesthesia induction for A118G SNP analysis. PONV and postoperative pain were evaluated.
Results and Discussion: A118G SNP type distribution among Korean female adults studied was AG (n=195) > AA (n=158) > GG (n=63). Regardless of anesthetic technique, patients with GG types had lower PONV scale on arrival at postoperative care unit (PACU) (P = 0.002), while T group showed lower PONV scale than I group up to 6 hours after PACU discharge in AA and AG types. No differences were apparent for postoperative pain among groups.



[Figure1]



[Figure2]

Conclusion: PONV occurrence differs according to opioid receptor polymorphism and anesthetic technique in patients undergoing general anesthesia with remifentanil.
References:
Zhang W, Yuan JJ, Kan QC, Zhang LR, Chang YZ, Wang ZY. Study of the OPRM1 A118G genetic polymorphism associated with postoperative nausea and vomiting induced by fentanyl intravenous analgesia. Minerva Anestesiol 2011; 77: 33-9.

8AP6-2

Evaluation of postoperative nausea and vomiting (PONV) clinical impact with PONV intensity scale

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) remain one of the most undesirable postoperative effects. To access their clinical impact and test strategies to reduce it, scales should be used. Verbal numeric scale (VNS) could be used, PONV intensity scale is available in Portuguese[1,2]. The goal of this study was to test correlation between PONV intensity scale and VNS during an audit to a PONV prophylaxis protocol in our institution.
Materials and Methods: Prospective audit to all adult patients submitted to inpatient elective surgery from March to May 2014. Excluded re-operated, unreachable and non-cooperating patients. Protocol and PONV incidence were evaluated 24 hours after surgery (clinical records, personal/phone interview). PONV were evaluated with Portuguese version of PONV intensity scale (Table 1) and a VNS (0-10). Chi-square, t-test and spearman correlation tests were used ($p < 0.05$ for statistic significance).

Assessment	Score
Have you vomited or had dry-retching?	No = 0 Once or twice = 2 Three or more times = 50
Have you experienced a feeling of nausea (unsettled feeling in the stomach and slight urge to vomit)? If yes, has your feeling of nausea interfered with activities of daily living?	No = 0 Sometimes = 1 Often or most of the time = 2 All of the time = 25
Has your nausea been mostly:	Varying = 1 Constant = 2
What was the duration of your feeling of nausea (h)	__ , __ h
Clinically important PONV is defined as a total score ≥ 50	

[Table 1. PONV intensity scale(1)]

Results and Discussion: Included 1006 patients. PONV incidence: 23%. POV (postoperative vomiting) incidence: 10,3%. Results of PONV evaluation in table 2.

	Total	Protocol group	Non protocol group	p
Nausea (n,%)	230 / 23%	34 / 19%	196 / 24%	p= 0,15
Vomiting (n,%)	104 / 10,3%	11 / 6,1%	93 / 11,3%	p= 0,04
Nausea duration (mean ±SD)	2,0 (9,2)	0,9 (1,4)	2,2 (10,0)	p= 0,08
PONV impact scale (mean ±SD)	12,3 (27,0)	7,8 (15,3)	13,2 (28,4)	p=0,11
PONV (0-10) scale (mean ±SD	4,9 (2,3)	4,4 (2,5)	4,9 (2,33)	p=0,23

[Table 2. PONV incidence and scales]

Comparing PONV intensity scale and VNS between groups no statistical difference was found.
PONV impact scale showed a good correlation with VNS (0-10) ($r=0,4915$, $p<0,0001$).
Conclusion(s): PONV intensity scale seems to have a good relationship with a VNS (0-10), and could be used to evaluate strategies to reduce PONV.
Despite statistically significant difference in POV between the protocol and non protocol group, PONV intensity scale and VNS didn't show significant difference between groups; patients may not value vomiting episodes so much as we thought.
References:
1. Rev Bras Anestesiol 2013; 63 (4): 340-6
2. Br J Anaesth 2010; 104 (2): 158-66

8AP6-3

A comparison study of palonosetron and ondansetron for the prevention of postoperative nausea and vomiting in women patients using intravenous patient-controlled analgesia

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Background and Goal of Study: Palonosetron, the latest 5-HT_3 receptor antagonist, has a higher receptor binding affinity and a longer plasma half-life than older 5-HT_3 receptor which results in prolonged inhibition of receptor function. It was reported palonosetron 0.075 mg effectively reduced PONV up to 72 h after an operation compared to placebo.[1] In addition, Moon et al[2] reported palonosetron is more effective in preventing PONV than ondansetron during 24 h after surgery (42% vs 62%). However, Kim et al[3] reported that the effects of palonosetron in preventing PONV were similar with ondansetron in high-risk patients receiving opioid-based IV-PCA. Therefore, the aim of this study was to compare the effects of palonosetron and ondansetron for the prevention of postoperative nausea and vomiting (PONV) in high-risk patients receiving intravenous opioid-based patient-controlled analgesia (IV-PCA) during the 24 h after surgery.
Materials and Methods: In this randomized, double-blinded study, 195 healthy female patients who were scheduled to undergo elective surgery under general anesthesia followed by IV-PCA for postoperative pain control were enrolled. Patients were divided into two groups: the Palonosetron group (palonosetron 0.075 mg IV; n=99) and the Ondansetron group (ondansetron 8 mg IV as a bolus and 16 mg was added to the IV-PCA infusor; n=96). The treatments were given 30 min before the end of surgery. The incidence of nausea, vomiting, severity of nausea, and the use of rescue anti-emetics during the first 24 hours after surgery were evaluated.
Results and Discussion:
1) Age, weight, duration of surgery and anesthesia, type of operation, Apfel's risk score were comparable between two groups.
2) The incidence of nausea and vomiting was similar between two groups during 24 h after surgery (56% in palonosetron group vs. 58% in ondansetron group).
3) The severity of nausea was similar between two groups during 24 h after surgery .
4) The use of rescue antiemetics was similar between two groups during 24 h after surgery (29% in palonosetron group vs. 29% in ondansetron group).
Conclusion(s): Palonosetron was similar in preventing PONV compared to ondansetron in women receiving IV-PCA using fentanyl.
References:
1. Kovac AL, Eberhart L, Kotarski J, et al. Anesth Analg *2008; 107: 439-44.*
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3. Kim YY, Moon SY, Song DU, et al. Korean J Anesthesiol 2013; 64: 122-6.

8AP6-5

When does PONV happen? Is the rescue treatment effective enough?

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Background and Goal of Study: It is commonly thought that PONV happens mainly during the early hours of the postoperative period and only very seldom during the late postoperative period. When we use an antiemetic prophylaxis according to the patient's risk, we trust it will be effective, but data about the efficacy of the rescue treatment administered when the prophylaxis has failed are limited and disperse. Nowadays there is a debate about using a more universal and liberal PONV prophylaxis vs. a risk-adapted prophylaxis, as the most used antiemetics are cheap and well tolerated. We report the pattern of incidence of PONV and the efficacy of the rescue treatment in those patients who suffered from PONV despite prophylaxis.
Materials and Methods: We reviewed retrospectively the medical records of patients undergoing highly emetogenic elective surgeries (colorectal, cholecystectomy, gynaecological, breast and thyroid surgery) under general anaesthesia between 2009 and 2011. Women whose Apfel Risk Score was ≥ 3 who received a combination of two antiemetics for PONV prophylaxis were selected. We recorded the incidence of PONV at 0-2, 2-6, 6-12, 12-24 and 24-48 hours periods after surgery and the antiemetic rescue requirements

and efficacy. The main goals were the pattern of occurrence of PONV and the rescue treatment efficacy.
Results and Discussion: 368 women fitted eligibility criteria, and 159 of them suffered PONV (43,2%). Only 14,1% of the patients had PONV in the recovery room (0-2h). The peak of incidence occurred during the 2-6h when 26,9% of patients suffer PONV, although this frequency kept high during the 6-12h period (18,8%). 111 of those patients with PONV required rescue treatment (69,8%), which was effective in 41,2% of the cases. The recurrence rate of PONV after rescue treatment was 58,8%.
Conclusion(s): Against the general opinion, our patients suffer from PONV more frequently on the ward than in recovery room, so our prophylaxis policy can be less effective than we think. Patients should be followed at least for 24 hours after surgery to notice the secondary effects and complications derived from anaesthesia and surgery.
Given the low efficacy of the rescue treatment and to facilitate the clinical implementation of PONV prevention, a more liberal PONV prophylaxis or a second dose of those short half-life antiemetics should be considered, mainly in high-risk patients or when the emetic episode can provoke serious complications.

8AP6-6

Meta-analysis of the effect of glucocorticoids on quality of recovery after general anesthesia

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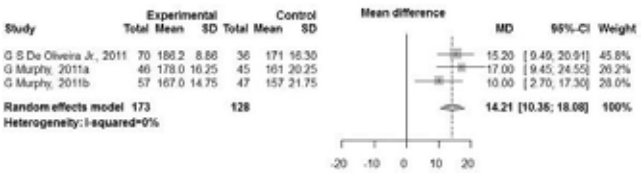
Background: Quality of recovery (QoR) after anesthesia, which can be determined using the QoR-40 questionnaire, is an important measure of the early postoperative health status of patients. Although the efficacy of perioperatively administered glucocorticoids in the prevention of postoperative nausea and vomiting, and reduction of postoperative pain is widely accepted, their effect on QoR remains unknown. The purpose of this meta-analysis was to evaluate whether perioperative administration of glucocorticoids improves patient QoR-40 scores after general anesthesia.
Materials and Methods: We reviewed clinical trials registered in MEDLINE, the Cochrane Central Register of Controlled Trials, Embase, Web of Science, ClinicalTrials.gov, and the University Hospital Medical Information Network - Clinical Trial Registry. We included randomized controlled trials (RCTs) in which the effects of glucocorticoids on QoR after general anesthesia were reported. We combined patient data gathered from QoR-40 by using the random effects model and results were presented using mean difference (MD) and a 95% confidence interval (CI); heterogeneity was quantified using the I^2 statistic. The quality of each study was evaluated using the Cochrane Collaboration tool for assessing risk of bias. Further, a sensitivity analysis was performed according to the quality of each study.
Results and Discussion: Three RCTs—including a total of 301 patients—were included in this meta-analysis. We were unable to include 4 other RCTs that were initially selected from the clinical trial registration sites because they were in progress at the time of our meta-analysis. Dexamethasone was used in all 3 studies and results demonstrated that compared to placebo, it significantly improved QoR-40 scores (MD [95% CI]: 14.2 [10.4-18.1]; $P<0.001$; $I^2 = 0\%$; see Fig. 1). There were 2 studies that had a low risk of bias. Results were not affected by studies that had a high risk of bias.
Conclusion: We have established that perioperative dexamethasone improves the QoR after general anesthesia. Further analysis should be performed when the results of ongoing studies are available.



[Figure 1]

8AP6-7

Aprepitant as prophylactic antiemetic therapy for postoperative nausea and vomiting after mastectomy in cancer patients: preliminary results of a RCT

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is a common anesthetic complication that occurs in approximately 30% of the surgical population and may reach up to 70% in high risk patients for PONV. In high risk patients, pharmacologic intervention should consist of multimodal therapy, targeting different mechanisms of action. The objective of this study is to investigate if aprepitant in association with palonosetron and dexamethasone can reduce the incidence of PONV in high-risk patients for this condition, undergoing mastectomies in breast cancer treatment.
Materials and Methods: This is a pilot of a randomized and double blind clinical trial. Female high-risk patients for PONV (Apfel score 3 or 4) scheduled for mastectomy that agreed participating in the study and signed the informed consent, were randomly distributed into one of two groups: Group A or Group B. One of them received placebo *per os* one hour before the surgery and the other group received 80 mg aprepitant by the same route, in a double-blind way. After induction of anesthesia, 4 mg dexamethasone and 0.075 mg palonosetron were intravenously administered to all patients. After the end of the surgery, morphine patient-controlled analgesia (PCA) was used in all patients. In the postoperative period, patients were evaluated for nausea, vomiting and pain intensity in the recovery room and after 24 hours.
Results and Discussion: We studied 35 patients, 19 in group A and 16 in group B. No patient experienced nausea or vomiting in the post-anesthetic care unit in neither group. During the first 24 hours, 15.78 and 18.75 % of patients in group A and B, respectively, experienced nausea, while 10.52 and 12.55% of patients in groups A and B, respectively experienced vomiting. There was no statistically difference between groups related to PONV, but the incidence of nausea and vomiting was reduced in both groups compared to the overall average of our service (unpublished data).
Conclusion(s): Palonosetron plus dexamethasone reduced PONV in high risk patients submitted to mastectomy. Although the blind nature of the study is maintained, at this moment, it is not possible to see any significant difference between the two groups.
References:
1. Moon et al. BMC Anesthesiology 2014, 14:68
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8AP6-8

Does comorbidities influence the incidence of PONV? A prospective audit

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) incidence is about 50% but in high-risk patients for PONV it can reach 80%. Several risk factors have been identified, other remain unconsensual. The aim of this study was to evaluate if comorbidities influence PONV incidence.
Materials and Methods: Included all in-patients scheduled to elective surgery between March-May 2014. Re-operated, unreached, non-cooperating patients excluded. We implemented a PONV prophylaxis protocol considering as risk factors (RF) - female, age< 50, non-smoking, post-operative opioids, anaesthesia>120min, volatile anaesthetics, motion sickness/PONV, associated in risk groups - low (0-1RF), medium (2-5RF), high (6-7RF). Prophylaxis protocol: dexamethasone, droperidol, ondansetron alone or associated. Registered demographic data, risk factors, prophylactic antiemetic, comorbidities, collected from clinical records and patient interview 24h after surgery. Comorbidities were grouped by systems (cardiovascular, respiratory, endocrine, gastrointestinal (GI), renal, haematological, psychiatric). PONV incidence recorded until 24h post-operative. Results, number and percentage. Chi-square test was used ($p< 0,05$).

Results and Discussion: PONV incidence in patients with GI disease was the only group that had a statistically significant difference (p=0.003) (table 1).

	Total (%)	Without PONV(%)	With PONV(%)	P value
Total	1006 (100)	776 (77)	230 (23)	
Cardiovascular	490 (49)	383 (38)	107 (11)	0,45
Respiratory	328 (33)	264 (26)	64 (6)	0,08
Endocrine	506 (50)	401 (40)	105 (10)	0,11
Gastrointestinal	123 (12)	82 (8)	41 (4)	0,003
Renal	88 (9)	72 (7)	16 (2)	0,27
Haematological	57 (6)	41 (4)	16 (2)	0,34
Psychiatric	98 (10)	77 (8)	21 (2)	0,69

[Table 1: PONV incidence by groups]

Analyzing patients with protocol prophylaxis (n=585) and by risk group: low risk: 68, medium risk: 475, high risk: 42 we found in low (n=9) and high risk (n=0) few patients with GI disease We looked at medium risk group with GI disease (n=58) to see the influence of GI disease on PONV incidence. Results, PONV, n=19 (33%) no PONV, n=39 (67%); p=0.08.
Conclusion(s): In our patients cormobidities didn't influence de incidence of PONV. Only GI disease seemed to influence PONV. Analyzing the patients with protocol prophylaxis and GI disease there was no statistically significant difference in PONV incidence.

8AP6-9

Does migraine influence the incidence of postoperative nausea and vomiting?

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are frequent anaesthesia side effects. Studies are published identifying risk factors. To date, migraine patient history was not considered as an independent risk factor. In this study, our goal was to determine if migraine history can influence the incidence of PONV.
Materials and Methods: A PONV prophylaxis protocol was implemented in our institution. It quantifies the number of risk factors (RF) of PONV (female, age < 50, non-smoking, post-operative opioids, anaesthesia > 120 min, volatile anaesthetics, motion sickness/PONV) and associates them in 3 groups of risk - low (0-1 RF), medium (2-5 RF) and high (6-7 RF) and suggests a prophylaxis protocol. Included all in-patients for elective surgery between March and May 2014. Excluded re-operated, unreachable and non-cooperating patients. Demographic data, risk factors and history of migraine. were collected. Incidence of PONV was registered at 24 hours post-operative. Statistical analysis was obtained by Chi-squared test. Data are expressed as percentage and p value < 0,05 was used for statistical significance.
Results and Discussion: A total of 1006 patients were included. Total incidence of PONV - 23%. Low risk group, n=95 - 11% PONV; medium risk, n=869 - 23% PONV; high risk, n=42 - 48% PONV. History of migraine - 19%: low risk group - 3%; medium risk - 21%; high risk - 26%. Patients in medium risk group with two recommended antiemetic drugs (n=475) and with previous history of migraine (n=100), had an incidence of 36% of PONV (n=36); without history of migraine (n=375) had a PONV incidence of 20% (n=76) (p=0,001). Low risk group and high risk group patients were not included in this analysis because of a low sample size.
Conclusion: We observed that patients with 2-5 RF for PONV and with history of migraine, had a statistically significant higher incidence of PONV even though they had recommended antiemetic prophylaxis. To validate this result, a study including patients with low and high risk for PONV should be done.
Reference: AnesthAnalg 2014; 118 (1):85-113

8AP6-10

Postoperative nausea and vomiting: genetic and non-genetic risk factors

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are common adverse events after anaesthesia compromising patients' recovery and well-being.[1] A genetic predisposition for PONV has been supposed, however, trials were inconclusive so far and cohorts investigated were mostly small.[2-4] Aim of this prospective association study was to investigate non-genetic variables and genetic variants of well described candidate genes possibly associated with PONV.
Methods: After approval of the local ethics committee and written informed consent, blood was drawn in patients undergoing elective surgery under general anaesthesia in two university hospitals. Genotyping using real-time PCR was performed for genetic variants of 13 candidate genes, e.g. 5HT-transporter (*SLC6A4*), serotonin (5HTR3A, 5HTR3B), dopamine and cholinergic receptors. Primary end point was PONV occurring within 24 hrs after surgery. Statistics: Multiple logistic regression analysis with step-wise bidirectional variable selection using PONV as dichotomous outcome variable. The relative effects of the significant genetic and non-genetic factors are reported as odds ratios (ORs) to indicate the risk of the predictors.
Results: 1460 Patients with complete data were analysed. PONV occurred in 37.6% (males/females: 25.3/56.7%) and 62.4% (44.7/70.5%) of the patients in hospital A and B. Risk factors assessed by the Apfelscore as well as younger age and laparoscopic surgery were associated with the incidence of PONV (all p< 0.001). All genetic markers were in Hardy-Weinberg-equilibrium. The *S*-allele in 5HTTLPR (rs4795541) was associated with PONV. Additionally, the wild-type of HTR3A (rs1176713) showed an association for males. The ORs (95%-CI) were 1.4 (1.1, 1.9) for 5HTTLPR, 1.6 (1.1, 2.2) for laparoscopic surgery, 1.7 (1.3, 2.3) for surgery in hospital B, 0.4 (0.3, 0.5) for men, 2.2 (1.8, 2.8) for a history of PONV/ motion sickness and 0.7 (0.5, 0.9) for smokers.
Conclusion: Two genetic variants of the serotonin system were independently associated with PONV. *SLC6A4* is crucial for the regulation of serotonin concentrations with the S-allele being associated with reduced transcription rates and reuptake of serotonin. A replication of these findings in an independent cohort is necessary.
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8AP6-11

Does postoperative nausea and vomiting influence time spent at post anaesthesia care unit? - a prospective audit

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) in post anaesthesia care unit (PACU) might delay patients discharge and slow patients turnover in PACU(1). Incidence can vary between 10-18% (2). The goal of this study was to identify the incidence of PONV in PACU in our hospital and evaluate its influence on time of discharge from PACU.
Materials and Methods: Prospective audit to adult patients submitted to inpatient elective surgery from March to May 2014. Excluded re-operated, unreached and non-cooperating patients. Registered patient demographics data, incidence of PONV in PACU, intensity of nausea using a Verbal Numeric Scale 0-10 (VNS), time spent in PACU, type of anaesthesia and PONV prophylaxis during surgery. Data collected by patient interview in PACU and electronic clinical records. Results are expressed as percentage and mean ± standard deviation (SD), Statistics: T-student test, statistical significance: p<0.05.
Results and Discussion: Included 1006 patients; women: 50% (n=504), age 56±16 years old. General anaesthesia - 76%, combined anaesthesia - 12%; regional anaesthesia - 12%. Antiemetic prophylaxis during surgery was observed in 86% (n=863) of the patients. The most commonly used antiemetic drugs were dexamethasone (70%), droperidol (45%), ondansetron (32%) and metoclopramide (13%), in association or as monotherapy. Incidence of nau-

sea in PACU was 4,2% (n=42), and in this group of patients, 14% (n=6) experienced severe nausea (VNS >7). Incidence of vomiting - 1.7% (n=17). 88% (n=37) of the patients experiencing PONV received at least one antiemetic drug during surgery. Average of time spent in PACU was 90 ± 62,61 minutes. Time spent in PACU in the group of patients with PONV - 119 ±73 minutes and in the group without PONV - 88±62 minutes (p=0,01).
Conclusion(s): The incidence of PONV in the PACU in our sample was inferior to the described in the literature. The fact that the majority of patients had received prophylaxis during surgery could be responsible for these results. In this sample, patients with PONV had their discharge from PACU delayed. Efforts must be done to reduce even more the incidence of PONV and thereafter increase the efficacy of PACU.
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8AP7-1

Postponement of surgery for proximal femoral fractures - can we prevent it?

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Background and Goal of Study: Several systematic reviews of proximal femoral fracture surgery have demonstrated that operative delays beyond 48 hours result in increased morbidity and mortality. Reasons for operative delay can be grouped into medical or non-medical based delays. Non-medical delays include the unavailability of operating theatre time, equipment or staff. Medical delays include stabilisation of medical problems such as anaemia requiring transfusion, correction of electrolyte imbalance, cardiac arrhythmia and anticoagulation treatment. Although surgical postponement for acute medical pathology is commonplace, it is unclear whether these patients are routinely selected in a standardised manner. Timely surgery presents a challenge for healthcare systems as it involves large numbers of elderly patients with significant comorbidities. The aim of this study is to investigate whether patients are being delayed for acceptable reasons.
Materials and Methods: Prospective, observational, clinical study, performed in Gaia/Espinho Hospital Center, from 1st July 2012 to 30th June 2013. The study included all patients who were admitted to the Emergency Department with proximal femoral fracture and submitted to corrective surgery.Relationships between the presence of medical abnormalities and operative postponement were analysed. Patients without medical problems who had delayed surgery were also documented.
Results and Discussion: A total of 100 (40.6%) patients did not have surgical delay. From 146 patients with postponed surgery, 61 (41.8%) had preoperative medical abnormalities, while 85 (58.2%) had none. Delay for non-medical reasons was:lack of operating theatre time, equipment or available staff (71);lack of postoperative care unit beds (1);or scheduling for elective surgery (13).To manage the complexity of elderly patients with proximal femoral fractures, a protocol-driven and multidisciplinary approach is ideal. Patients who arrive at the emergency department should have a planned care pathway which includes prioritised anaesthetist and orthopaedic reviews as well as instructions on the management of preoperative issues.
Conclusion(s): We observed that the majority (58.2%) of postponed cases have no preoperative abnormalities, which is an unacceptable reason for surgical delay. Therefore, we recommend routine use of criteria to screen patients who may benefit from surgical postponement and medical optimisation and those where this is perhaps unnecessary.

8AP7-2

Delay to surgery prolongs hospital stay in patients with fractures of the proximal femur - what is the impact on health care costs?

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Background and Goal of Study: The number of patients with proximal femoral fractures is increasing worldwide, with a consequent extra burden on health services. One of the clinical guidelines for the management of proximal femoral fracture is early surgery, following medical assessment and appropriate stabilisation of the patient's condition. Surgery is often postponed because of lack of operating theatre time, equipment or available staff, as well as for medical reasons.
The primary goal of this study is to determine the effect of surgical delay on the length of hospital stay. The secondary goal is to identify any additional cost implications with the increasing in-hospital stay.
Materials and Methods: Prospective, observational, clinical study, performed in Gaia/Espinho Hospital Center, from 1st July 2012 to 30th June 2013. The study included all patients who were admitted to the Emergency Department with a proximal femoral fracture and were submitted to corrective surgery. All patients were subdivided into two groups according to the delay between admission and operation (early group ≤ 48 h and late group > 48 h). Hospital stay included the time spent on the orthopaedic ward and any other hospital wards until hospital discharge.
A Student's t test for independent samples (significance level of 0.05) was performed to determine whether the length of stay was influenced by the delay in surgery.
Results and Discussion: Of the 252 patients admitted, only 231 patients were included in this analysis due to preoperative death (2), postoperative death (13), indication for conservative treatment (5) or patients who have been transferred to another hospital (1). 138 patients had surgery within 48 hours, and 93 had a delay in surgery >48 hours.
Statistical analysis showed a causal relationship between delay to surgery and length of hospital stay (95% CI; $p<0.05$). The mean length of hospital stay increased from 11.9 days in the patients with early surgery to 16.7 days in the patients with delayed surgery ($p<0.05$), which corresponds to an overall extra cost. The average daily cost in an acute orthopedic ward was estimated at €715.52. The unadjusted cost increased from €8,515 in the patients with early surgery to €11,949 in the patients with delayed surgery.
Conclusion(s): We concluded that delay to surgery does have a significant impact on the length of hospital stay, therefore spending more resources to perform surgery within 48 hours of admission is cost effective.

8AP7-3

Predicting operating room scheduling error via automated anesthesia information management system (AIMS)

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Background and Goal of Study: Improvements in operating room (OR) efficiency can have a major impact on hospital finances and staff. The aim of this study is to determine scheduling error and to compare scheduling performance between surgical specialties.
Methods: A review of the Anesthesia Information Management System (AIMS) over a 2 years was conducted for 44503 procedures. The following data were extracted:
1. scheduled start time,
2. scheduled finish time,
3. Actual start time,
4. Actual finish time, and
5. surgical specialty.

Results and Discussion: The mean scheduled surgical duration was 101.38 ± 87.11 min compared to a mean actual surgical duration of 108.18 ± 102.27 min with a mean difference of 6.80 ± 52.83 min; $P<0.001$. Most specialties under-estimated scheduled surgical times, resulting in a consistent too high scheduling error. Pediatric cardio-thoracic surgery had the highest scheduling error (36.11 ± 102.25 min) followed by neurosurgery (21.31 ± 88.40 min) and orthopedic surgery (16.56 ± 53.75 min).
Three specialties over-estimated their scheduled surgical times, resulting in a consistent too low scheduling error.
These specialties were pulmonology (-22.92 ± 42.85 min), organ procurement (-12.9 ± 135.1 min), and podiatry (-5.53 ± 32.50 min). The best scheduling specialty with the least scheduling error was urology (-0.28 ± 33.49 min) followed by gastroenterology (0.95 ± 21.52 min). There was a significant correlation of 0.27 ($P<0.001$) between surgical duration and prediction error supporting the idea that surgeries of longer duration tend to have higher prediction errors.
Conclusion(s): By utilizing AIMS to analyze surgical durations, we were able to detect overall scheduling errors and utilization inefficiencies in each specialty.
The ability to calculate prediction errors led us to important management changes including the number of needed ORs, allocation, and sequence of surgeries; allowing for better OR management and improved patient care.

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8AP7-4

Satisfied or dissatisfied with the anaesthetist? A systematic process quality analysis of the preoperative outpatient clinic of a large German university hospital using the ServQual tool

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Background: Chronologically, the premedication consultation is the first contact between the anaesthetist and the patient and thus the point of entry into the specialist area. Due to the fact that the anaesthetist working in the subarea of clinical anaesthesia experiences a patient with impaired vigilance, this first contact should be evaluated as a key encounter[1]. Within the framework of an ever-increasing shortage of resources, we are also experiencing increased rationalisation in the area of anaesthetics. Conversely, patient satisfaction has become an important instrument in strengthening the image of a hospital. In marketing, it has been long known that positive word of mouth can mean a decisive competitive edge[2]. Therefore in the area of premedication outpatient care in particular, this raises the question: How satisfied are our patients with our performance and what factors influence this?
Methods: 621 patients from University Hospital Düsseldorf were included in this study, based on a cross-sectional research design, following a positive response from the local ethics commission. During the survey, comprising a total of 65 items per patient, socio-demographic data, preoperative anxiety as well as physician-related data were collected, in addition to the ServQual questionnaire, which we modified. We carried out exploratory and confirmatory factor analyses as well as detailed multiple regression analysis.
Results: In all five quality dimensions surveyed, the results of patient satisfaction showed the expected negative disconfirmation between expectation and perception. In particular the quality dimension "Empathy" displayed a strong discrepancy. We determined significant influencing variables, including the type of insurance, profession, country of origin and prior experience of anaesthesia.
Conclusions: Collecting data on patient satisfaction using valid and reliable measuring instruments is useful and necessary. In addition to purely perioperative anaesthetic performance, which we have been improving for many decades now, we should not neglect the aspect of satisfaction with our premedication outpatient clinic.
There is also scope for even more improvement here.
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8AP7-5

Weekend surgery is not associated with an increased length of hospital stay

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Background and Goal of Study: In the land of maximizing resources for a hospital setting when to schedule a surgery has become an increasingly fraught question. Surgeries are normally scheduled Monday through Friday which constitutes the normal work week. Saturday and Sunday are days of rest where there is a reduced staff both in the operating room as well as the medical and surgical wards. It has been asked if this reduced staffing affected outcomes for patients.
Our study aimed to see if there was a difference in length of hospital stay for a patient that had elective surgery and was admitted to the hospital on a Friday through Sunday which have reduced staffing versus Monday through Thursday which have normal staffing ratios.
Materials and Methods: A retrospective analysis of a de-identified dataset containing perioperative and patient admission information was undertaken for quality assurance purposes. The dataset was created from the electronic medical record system of one large urban academic center for the years 2010-2012. The data was cleaned for outliers. Data was grouped together from surgeries that took place on Monday through Thursday. In a similar way data from the 22.5% of total surgeries that took place on Friday through Sunday were grouped together. This dataset includes every patient who received surgery with anesthetic care in the operating room. Microsoft Access was used to manage and clean the dataset. A two-factor ANOVA was conducted using PSPP. Tableau was used to generate data visualizations.
Results and Discussion: This study shows that there is no difference in length of hospital stay between those patients who received elective surgery on a Friday through Sunday versus Monday through Thursday. There is not a statistically significant difference between the length of the hospital stay of patients admitted under normal staffing ratios and those admitted under reduced staff.
Conclusion: It is reasonable to schedule surgery on a Friday, Saturday or Sunday as you would Monday through Thursday without concern for increased length of hospital stay at our hospital in an urban setting. Future studies should investigate if specific types of surgeries or patients or risk factors can influence length of hospitalization stay after elective surgery.
Acknowledgements: New York University Langone Medical Center for unwavering support of patient care and for use of this data.

8AP7-6

Impact of anesthetic technique on turnover times and discharge from hospital; a retrospective study

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Background and Goal of Study: Techniques facilitating theatre efficiency and that provide rapid recovery; enabling patients to leave hospital shortly after surgery are sought. The aim of the present study was to analyze changes in clinical pathway and impact on time logistics for a common intermediate high volume gynecological procedure with a focus on impact of anesthetic technique.
Materials and Methods: This is a retrospective patient record reveiw of patients having elective prolapse surgery at 4 hospitals in Gothenburg area. Patient demographics, type o surgery, anesthesia, time in theatre, knife time and discharge data were collected.
Results and Discussion: Clinical pathway data for 340 patients (65 ASA 1, 236 ASA 2, and 39 ASA 3) mean age 62 (SD 11), mean BMI 26,4 (SD 4) was collected and analyzed. The most common procedure was partial anterior colporraphy (n=188) followed by dorsal colporraphy 69 and combined colporraphy 43. Mean time in theatre was 108 (SD 32) minutes and mean knife time 53 (SD 23) minutes, thus a mean theatre resource utilisation of 0.49. Time in the recovery area varied considerable, 60 patients could by-pass the recovery area median time 100 minutes (0 - staying overnight). Two hundred and two patients (59%) were discharge day of surgery. Anaesthetic technique had a major impact on the resource quotation as well as on discharge frequency day of surgery see table below.

	Knife time/ theatre time	Bypass recovery area	Discharge day of surgery
Local anaesthesia + sedation (n=182)	0.53 ± 0.15*	60 (33%)	152 (84%)
GA propofol (n=18)	0.42 ± 0.10	0	3 (17%)
GA sevoflurane (n=35)	0.43 ± 0.10	0	17 (49%)
Spinal (n=105)	0.45 ± 0.11	0	30 (29%)

[Anaesthetic technique impact on theatre usage]

Conclusion(s): Local anaesthesia and sedation as anesthetic technique facilitate enhanced recovery pathways for colporraphy surgery.

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Acknowledgements: Metha Brattwall PhD, Ekre O PhD

8AP7-7

Rate and causes of surgery cancellation in a central hospital

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Background and Goal of Study: Surgery cancellation reduces operating room efficiency and increases costs. It is stressful and costly to patients.
Cancellation rate accesses quality of patient care and quality of management. There is no consensus on the acceptable rate to define efficient operating room but less than 5% is recommended.
The aim of this work is to access the cancellation rate and causes in our hospital.
Materials and Methods: Operating room records of elective surgery from January2014 to June2014 were retrospectively reviewed.
Inclusion criteria: patients>18 years old, scheduled for inpatient surgery whose operation was cancelled(n=209).We excluded cancelations made 2 or more days before surgery(n=143). So we defined “cancellation” as those procedures cancelled on the day or the day before surgery. Patient records were analysed to identify the cancellation cause.
Results and Discussion: 66 patients included, mean age was 55,2years old and 40,7%were male.
Procedures from various specialities were cancelled and the global cancelation rate was 1,2% (table 1).

	General Surgery	Plastic Surgery	Vascular Surgery	Gynae-cology	Neuro-surgery	ENT	Ortho-paedics	Urology	Total
Cancelled surgeries (N)	21	1	6	16	10	2	4	6	66
Cancelled surgeries (%)	1,6%	2,7%	1,8%	2,1%	1,9%	0,4%	0,4%	0,9%	1,2%
Contribution to total cancellations (%)	31,8%	1,5%	9,1%	24,2%	15,2%	3,0%	6,1%	9,1%	100%

[Number and rate of cancellation]

Causes for cancellation were divided in 8 categories: lack of theatre time (64%), change in surgery indication (9%), acute change in baseline disease (7,5%), acute disease (7,5%), non compliance with protocol to stop chronic medication (6%), patient did not attend (3%), patient refusal (1,5%), lack of intensive care bed (1,5%).
Anaesthesia-related cancellations were due to acute changes in baseline medical disease (acute pulmonary oedema and acute asthmatic episode), acute disease (respiratory infection and angina) and non-compliance with the protocol to stop anti-coagulant drugs before surgery.
Conclusion: Our results show a lower cancellation rate when compared to previously published studies, which might translate operating room efficiency, or may be due to different inclusion criteria or to inadequate records in our centre. Causes for cancelation are similar to the previously reported.
The decision to cancel surgery must consider economic and emotional factors but also the increased risk of prolonged hospital stay. To abolish potentially avoidable cancellations it is necessary to optimize patient’s clinical condition and schedule theatre time in a realistic manner.

8AP7-8

Effects of ERAS Program implementation in major colorectal surgery

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Background and Goal of Study: Enhanced recovery after surgery (ERAS) employs a multimodal perioperative care pathway with the aim of attenuating the stress response to surgery and accelerating recovery1. The ERAS protocol has been demonstrated to reduce the hospital length of stay (LOS) and postoperative complications2 suggesting that ERAS should be regard as a new standard of care for patients undergoing elective colorectal resection3. The aims of this study was to evaluate the effects of an ERAS protocol for colorectal surgery at a tertiary medical centre.
Materials and Methods: 53 patients undergoing elective colorectal resection according to a standardized ERAS protocol (ERAS group) were compared to patients (N=52) operated in the same institution (control group) with traditional methodology. Anaesthesiologic management included blended analgesia with thoracic epidural catheter, intravenous anaesthetics and short acting opioids, restrictive intravenous fluid replacement. Postoperative analgesia was obtained by local anaesthetic administered by the epidural catheter. Functional recovery time, morbidity, LOS, and readmission rate were compared.
Results and Discussion: Patients were homogeneous in terms demographics characteristics (age, sex and ASA classification). The outcome variables are presented in the following table: **Variables**
ERAS group (N = 53)
Control group (N=52)
P value
Time to intestinal activity (days)
2 (1 - 2)
3 (2.3 - 4)
0.001
Pain control on oral analgesic (days)
3 (2.5 - 4)
4 (3 - 5)
0.023
Postoperative day fit for discharge (days)
4 (3 - 5)
7 (6 -8)
0.001
Minor complications (grade I - II)
7 (13.2%)
9 (17.3%)
0.5
Major complications (grade III - IV)
0
3 (5.8%)
0.2
Hospital length of stay (days)
5 (4 - 7)
8 (7 - 10)
0.001
30-day re-admission
0
1 (1.9%)
0.6
30-day mortality
0
0
Conclusion(s): Our data show a significant reduction in functional recovery, morbidity and postoperative LOS with no increase in the readmission rate within 30 days.
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8AP7-9

Spanish survey on enhanced recovery after surgery (ERAS)

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Background and Goal of Study: The aim of this study was to survey the interest, the knowledge of ERAS protocols, and compliance with perioperative care items.
Materials and Methods: Free access survey was conducted professionals, hosted on the websites of the Spanish society of anesthesiology and critical care (SEDAR); Spanish association of surgeons (AEC) and Spanish society of enteral and parenteral nutrition (SENPE) and ERAS Spain (GERM) between September 2014 and December 2014.
Results and Discussion: Survey was answered by 256 professionals, (anesthetists 43%, general surgeons 44%) from 110 hospitals. 58% had experience in ERAS protocols, 85% knew ERAS protocols, whereas only 52% knew the ERAS recommendations and 43% GERM recommendations. 71% of respondents say ERAS protocolos are performed in their hospitals, mainly in colorectal (68%) laparoscopic surgery (55%) and based on GERM / ERAS recommendations in 40%.
56% think there is a good implementation of ERAS protocols, while 56% think that are satisfactory. 94% are interested in development of multidisciplinary national guidelines; and, with the development of these, 87% start to perform these.
47% perform preoperative nutritional assessment, although there is no universal malnutrition screening method (36%); and is based mainly on weight loss (18%). Usually there is not a protocol for referral to dietician (35%), neither preoperative nutritional support is indicated in cases of severe malnutrition (44%); and, when performed, only in 39% of cases is performed with immunomodulating formulations. In a minority of cases preoperative loading with carbohydrate drinks is carried out (44%)
Nasogastric tube and drainage are avoided (64%), prophylaxis of postoperative nausea and vomiting (57%), goal directed fluid therapy (57%), active maintenance of normothermia (69%) are performed.
In most cases mobilization (72%) and early feeding (73%) are performed and in cases of malnutrition postoperative nutritional support is carried out (69%). The leading causes of protocol failure are postoperative nausea and vomiting (31%) and ileus (40%).
Conclusion(s): Conducting fast track protocols is known in Spain, however, not seem to exist a consensus, nor are performed according to guidelines. Overall compliance with the items of the protocol is adequate, although has a deficit in the perioperative nutritional management.

8AP7-10

Feasibility of a prehabilitation program for patients receiving neoadjuvant chemotherapy and candidate for radical cystectomy

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Background and Goal of Study: Prehabilitation identifies a physical exercise program performed in the preoperative period. There is evidence that this intervention improves post-operative outcome increasing pre-operative functional capacity[1]. As concerns bladder cancer, in our hospital surgery is planned 5 weeks after the end of neoadjuvant treatment, to let patients recover from chemotherapy side effects. This is the period of time we want to invest on with prehabilitation. Our goal is to assess the feasibility of a home-based prehabilitation protocol based on moderate aerobic exercise with the Nordic Walking technique[2].
Materials and Methods: Patients diagnosed with high grade muscle infiltrating bladder cancer, candidate for neoadjuvant chemotherapy (M-VAC and Sorafenib) and radical cistectomy are eligible. Exclusion criteria are age over 80 and ASA score 3-4. The exercise consists of walking with poles on a route outlined near patients' domicile, plotted with Google Maps. A 2,5 km itinerary should be covered in 30 minutes, once a day, 5 days a week for 4 weeks. Patients are provided with an exercise diary to fill-in daily. A weekly telephonic contact is scheduled. The primary endpoint is adherence: at least 60% of the exercise program must be carried out. Assuming a 70% adherence, 19 patients are needed to test for a 25% difference in compliance with 90% power value. Secondary endpoints are: variations in 6MWT (six minutes walking test), lean body mass (LBM) measured with BIVA, HOMA index and CRP, before and after prehabilitation. A one-tail t-test is used to assess significance.
Results and Discussion: Six patients, aged 65 to 74 were enrolled. Adherence to the program is 80%. LBM and HOMA do not statistically improve. The 6MWT is used as functional assessment of cardiopulmonary reserves: a mean increment of 70±25 mt. (M±SD) is not a significant result, but largely exceeds prehabilitation responders' threshold found by Carli.[3] RCP decrement from 7.5±21 to 1±0,70 mg/L is significant (P=0.034), since physical activity reduces inflammatory states. The effort required seems well tolerated. Patients and families show remarkable involvement in the program.
Conclusion: Nordic walking appears to be feasible as a home-based, non-supervised prehabilitation program between neoadjuvant treatment and surgery.
References:
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8AP7-11

The anesthesiologist: the patient's vision

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Background and Goal of Study: Understanding the role of the anesthesiologist has been an undervalued subject. The aim of this study was to assess the patient's knowledge about the role and responsibility of the anesthesiologist during the perioperative period.
Materials and Methods: Prospective study conducted over 3 months in patients scheduled for Preoperative Anaesthesia Consultation, with age > 18 years. Demographic data and number of previous anesthesia (PA) were recorded. The questions applied were ensuring that patients don't wake up during surgery (PDWDS), postoperative pain management, wake the patient after surgery (WPAS), prevent nausea and vomiting after surgery, treat the patient in the recovery room, treat medical problems (TMP), antibiotics administration and performing blood transfusions during surgery (BTDS). These items were scored using a 5-point scale (1=no responsibility; 5=very responsible). Descriptive analysis of variables and Analysis of Friedman, Wilcoxon and KrusKall-Wallis test were used.
Results and Discussion: 204 patients were included. The anesthesiologist was recognized as a specialist by 135 (66.2%), as a technician specialist by 28 (13.7%), as a specialist surgeon by 8 (3.9%), as a specialist nurse by 5 (2.5%). 108 (52.9%) patients didn't know the time required for becoming an anesthesiologist, 44 (21.6%) considered 5 years and 52 (25.5%) considered > 5 years.Ensure that PDWDS was the most recognized task as being the responsibility of the anesthesiologist, compared to all other responsibilities (P< 0.05). Performing BTDS was the task lesser recognized, compared to ensure PDWDS, WPAS and TMP (p< 0.05). No significant differences were found when PA was considered.
Conclusion(s): Most patients recognized the anesthesiologist as a medical specialist, nevertheless there were an unknown about the anesthesiologist's functions during the perioperative period.

8AP7-12

Successful anaesthetic strategy for the transformation of a breast cancer service: one stop diagnosis and listing, followed by day case surgery

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Background and Goal of Study: In 2011 a successful 23 hour breast cancer service was implemented at WWL NHS Foundation Trust[1]. We sought to further improve on this by transforming to a day surgery pathway with one stop diagnosis and listing. By 2013 this was achieved through multidisciplinary team work and close co-operation between surgical and anaesthetic stakeholders.
The study aimed to check the practicality and success of the changes as well as test the anaesthetic strategy.
Materials and Methods: A retrospective audit was completed of 45 patients undergoing either wide local excision or mastectomy, with or without lymph node surgery, between January and March 2014. Results were compared with those for 100 patients undergoing similar surgery in 2011. Data was collected on length of stay, reasons for prolonged stay, readmission within one week and thirty day mortality.
Results and Discussion: The scheme has seen 93% of patients discharged the same day; 7% were discharged after 1 day. Analysis using an unpaired t-test demonstrated a statistically significant decrease ($p<0.05$, 95% confidence interval -1.44 to -1.02) in length of stay compared to 2011.
There was no readmission within one week or thirty day mortality. Average age of patients was 62, ranging from 44 to 86. The modal ASA was 2, ranging from 1 to 3.
The results and statistical analysis confirm the success of the transformation. This proves day case surgery may be employed at a district general hospital without any complex facilities or resources. They show with careful anaesthetic consideration, there was no extra risk to these women.
Possible benefits to patients include increased satisfaction and comfort as well as decreased rates of thromboembolic events and hospital acquired infections. The project has brought significant cost savings to the department, better utilisation of theatre space and beds and allowed implementation of government policy.
Conclusion(s): One stop diagnosis and listing followed by day case breast cancer surgery has been extremely successful. Implementation has seen far reaching benefits both to patients and the trust.
References: 1. Wasson C, Koussa F, Harland R, Deshpande A. Anaesthetic considerations for 23 hour discharge pathway for breast cancer surgery at WWL NHS Foundation Trust UK. EJA. 2012; 29:31-32.
Acknowledgements: We wish to thank all the members of the day case breast surgery committee at WWL.

8AP8-1

What is the optimal preoperative high sensitive cardiac troponin T threshold for predicting postoperative death and major cardiovascular events in patients undergoing non-cardiac surgery?

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Background: Preoperative high-sensitive cardiac troponinT (hscTnT) concentrations are associated with postoperative myocardial infarction (MI) and long-term mortality after non-cardiac surgery[1]. However, little is known about the optimal hscTnT value for predicting complications.
Our aim was to determine the preoperative hscTnT threshold that best predict death or cardiovascular events (Mace) up to 30 days after major non cardiac surgery.
Methods: The study was a prospective cohort evaluation of 391 patients underwent major non-cardiac surgery who were at risk for cardiovascular complications. HscTnT was measured before and 48 and 72h after surgery. The primary outcome registered was a composite of 30 day postoperative mortality or Mace (MI,unestable angina, congestive heart failure, new atrial fibrillation,stroke or pulmonary embolism).
Age, sex, type of surgery and revised cardiac risk index were used in a logistic regression to assess the association of preoperative hscTnT and primary outcome. The optimal hscTnT concentration to predict primary outcome was calculated from receiver-operator characteristic (ROC) curve analysis.
Results: Clinical characteristics of patients are summarized in Table1. Before surgery 188 (48%) patients showed a hscTnT concentration >14ng/L(99th reference percentile) with a median value of 15ng/L (Interquartile range10-24ng/L).The incidence of Mace and overall mortality was 9,7% (38 patients) and 4,7% (18 patients) respectively. Preoperative hscTnT concentration was an independent predictor of Mace or death(Odds Ratio 1,01 95% CI1,0-1,02) whereas a hscTnT ≥23ng/L was the best predictor for these complications by ROC analysis (AUC 0,74 95%CI(0,65-0,83); 66% sensitivity; 78% specificity;positive predictive value 42% and negative predictive value 95%).More than 1 in 4 patients (27%) had preoperative hscTnT concentration ≥ 23ng/L and these values were significantly associated with death or Mace(Odds Ratio 5,3 95%CI 2,3-12,5). Preoperative hscTnT≥23ng/L added incremental prognostic value for discriminating those patients likely to suffer Mace or death at 30 days (Integrated discrimination improvement 5.0% $p<0.001$).
Conclusion: A preoperative hscTnT concentration≥23ng/L is a strong independent predictor of 30-day cardiovascular events and death in high-risk patients undergoing non-cardiac surgery. Use of this threshold could enhance preoperative risk stratification in this kind of patients.
References:
1. Nagele P, etal.Am Heart J 2013;166:325-332.

Study sample n	391
Mean age years (SD)	78,1 (7,6)
Male sex n (%)	200 (51%)
Lee's Revised cardiac risk index n(%) I II III IV	147 (37,6) 159 (40,7) 59 (15,1) 26 (6,6)
Type of surgery n(%) Orthopedic General Vascular Thoracic Other	182 (46,5) 70 (17,9) 96 (24,6) 10 (2,6) 8 (2,1)

[Characteristics of the Study population]

8AP8-2

Unusual cause of angina pectoris in a young female - pre-anaesthetic finding - case report

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Background: Coronary artery fistulae are predominantly congenital anomalies characterized by an abnormal communication between a coronary artery and a cardiac chamber, large vessel or another vascular structure, bypassing the myocardial capillary bed. The preanaesthetic clinical assessment lead to a fortuitous detection of a rare coronary artery anomaly which changed the initial therapeutic option.
Case report: A 21 year old female patient was admitted for a right ankle fracture. She had a history of constrictive chest pain inconsistently generated by effort of medium intensity that was not investigated previously. Clinical examination identified a grade 5 continuous murmur audible on the entire anterior thorax, with no other abnormalities.
Transthoracic echocardiography excluded persistent ductus arteriosus, but showed an aneurismal dilatation of the left main coronary (LMCA) and circumflex artery (LCX), with a very turbulent systolic-diastolic flow which suggested the existence of a coronary fistula originated in the LCX. Trans-esophageal echocardiography confirmed LMCA and LCX dilatation.
Coronary catheterization showed a 17 mm diameter coronary fistula connecting LMCA with superior vena cava - right atrium junction, with a haemodinamically significant left to right shunt.
Discussion: This paper aims to emphasize the risk of inadequate assessment of a young patient with a normal ECG and no other abnormalities except minimal symptoms revealed only after a very painstaking history taking.
Diagnosis was made by transthoracic and transesophageal echocardiography, and coronary catheterization established the anatomy of the fistula and thus helped in the choice of treatment options.
Coronary artery fistulae can cause steal phenomenon which puts the myocardium beyond the origin of the fistula at risk for ischemia.
Surgeons opted for a conservative orthopaedic treatment; the patient continued to present exertional chest pain and is currently scheduled for interventional fistula closure.

Learning Points: Our case confirms the importance of the pre-anaesthetic clinical examination as a gold standard - it was decisive in identifying this rare but potentially lethal congenital anomaly, as it triggered a series of tests which eventually established the diagnosis. Any apparently "healthy" patient may hide a serious medical condition.

8AP8-3

Diagnostic exercise testing: expanding the remit pre-operative cardio-pulmonary testing

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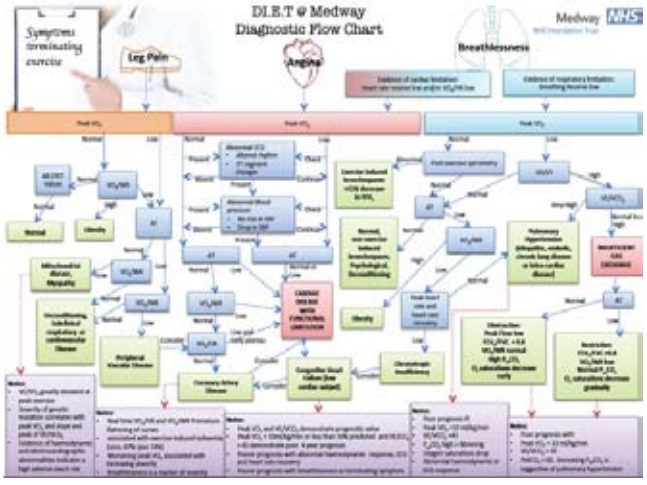
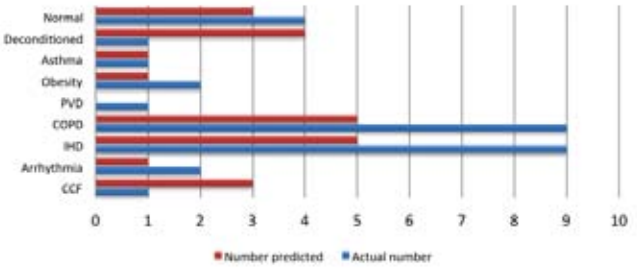
Background and goals of Study: Cardiopulmonary exercise testing (CPET) is an established pre-operative investigation for risk stratifying patients undergoing major surgery. CPET may be useful for diagnosis in the pre-operative period, optimisation of the exercise-limited patient and resource-sparing for the complex medical patient.
The goal of this study is to assess the feasibility of producing a service for medical diagnostics using CPET.
Study: A reference structure for interpretation of the complex and abundant data produced during CPET is required to analyse the information obtained. This study created a diagnostic flow chart to assimilate the CPET data and investigated its diagnostic sensitivity and specificity.
Methods: A literature search was conducted to establish the most sensitive and discriminating CPET data for differential diagnoses of various common medical conditions responsible for exercise limitation. 25 patients were chosen from a database of pre-operative patients who had previously undergone CPET. The physicians were blinded to the patient's co-morbidities. Interpretation of the CPET data was performed with the most likely cause of exercise-limittation documented.
Results and Discussion: The literature search resulted in the flow chart being produced (figure 1). The calculated specificity of the Di.E.T flow-chart was 0.71 and the sensitivity was 0.65. The comparison between documented co-morbidities and identified co-morbidities is demonstrated in figure 2. Errors occurred due to rigid symptom classification which limited the sensitivity. Multiple co-morbidities often gave conflicting results, which needed to be resolved with medical judgment.
Conclusions: The algorithm proved useful in excluding causes of exercise limitation in this sample population. A limitation of the study reducing the calculated sensitivity is the possibility of undiagnosed co-morbidities responsible for the observed exercise limitation. The flow chart had a number of limitations necessitating the use of clinical judgement. Modification to improve sensitivity is underway. A prospective analysis in pre-operative and medical patients will be undertaken allowing further tests to be conducted to confirm the presence or absence of an identified cause for exercise limitation.
Reference:
Huddart et al. Preoperative cardiopulmonary exercise testing in England - a national survey, Perioperative Medicine 2013, 2:4



[CPET flowchart for diagnosis]



[Co-morbidities in study population]

8AP8-4

The influence of epidural versus sistemic analgesia on incidence of cardiac complications in elderly with hip fracture

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Background and Goal of Study: patients with hip fracture are usually older patients. Uncontrolled acute pain and stress of surgery in elderly patients may cause increased cardiac morbidity and mortality (1). Epidural analgesia blocks sympathetic nervous system and reduces the incidence of myocardial ischemia and dysrhythmias and the response to stress (2).
The aim of this study was to compare the effect of continuous epidural versus general analgesia on the incidence of cardiac complications and their analgesic effect in patients with hip fracture.
Materials and Methods: Sixty patients with hip fracture older than 65 years with previously defined high per operative cardiac risk according to ACC/AHA guidelines were included and were randomly assigned to two groups of 30 patients: SA group -patients with sistemic analgesia, niflam 2 x 100 mg/iv and tramadol 1 mg/kg/iv every 8 hours; and EDC group - patients with a continuous epidural analgesia with bupivacaine 0,125% - 5ml/h and fentanyl 3μg/ml. As end points of the study were registered the incidence of cardiac events in both groups: cardiac death, myocardial infarction, congestive heart failure, unstable angina and new-onset atrial fibrillation. In all patients were determined laboratory parameters and pain intensity by using Verbal Descriptive Scale as well as the side effects.
Results and Discussion: The epidural analgesia decrease the incidence of per operative cardiac events in patients with high per operative cardiac risk for surgery for hip fracture (SA group 46,6% vs. 15% in EDC group) and in the same time decrease cardiac mortality (10% in SA group vs. 0% in EDC group).The values of VDS were significantly lower in patients with EDC block versus patients with sistemic analgesia in all experimental times as well as lower number of side effects.
Conclusion(s): Early administration of continuous epidural analgesia in patients with high per operative risk with hip fracture decrease the incidence of cardiac morbidity and mortality and provide superior pre- and post-operative analgesia comparing sistemic analgesia, with minimal side effects.
References:
1. Katsanos S.N. Mavrogenis A. F. et al. Current concepts for preoperative cardiovascular evaluation and perioperative care of the elderly with hip fracture. EEXOT 2009; 60:134-141.
2. Auerbach A. Goldman L. Assessing and Reducing the Cardiac Risk of Noncardiac Surgery. Circulation 2006;113: 1361-1376.

8AP8-5

Perioperative management of pacemakers and implantable cardioverter-defibrillators: what do we know?

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Background and Goal of Study: Although pacemakers (PMs) and implantable cardioverter-defibrillators (ICDs) are commonly encountered in clinical practice, many anesthesiologists are not familiar with their functions [1]. We aimed to determine whether there is a need for specific additional training in our institution.
Materials and Methods: A link to a 12 question survey (61 items) was sent by email to 318 healthcare providers of the Hospices Civils de Lyon working in the anesthesia wards (106 residents, 164 fellows and attending physicians, and 48 nurses). A reminder was send twice over a total period of one month. The first question allowed us to allocate answerers to their professional categories. 10 questions pertained pre-, per- and postoperative management of PMs and ICDs, the last question investigated the wish for a specific training.
Results and Discussion: 106 healthcare providers answered the survey (33.3%): 46 residents, 47 fellows and attending physicians, and 13 nurses. Global correct answers rate was 67% among physicians, but several important points were poorly known: only 40 physicians/93 (43%) stated that the VOO mode is an asynchronous mode and only 19/93 (20%) were familiar with the possibility of having a cardiologist reprogramming the device to an asynchronous mode preoperatively if necessary. 29/93 (31%) made erroneous assumptions about the effects of magnet application on PMs or ICDs. 80/106 (75%) stated not to be familiar with the perioperative management of cardiac implantable electronic devices. 83/106 (78%) ask for a specific additional training.
Conclusion: Despite existing recommendations, perioperative management of PMs and ICDs remains a poorly known topic among healthcare providers from the anesthesia wards. Participants reported a wish for additional education on this topic. This preliminary survey enjoins us to set up a specific training in our institution.

[A moment of doubt]

Reference: 1. Perioperative management of patients with cardiac implantable electronic devices, Stone ME *et al*, British Journal of Anaesthesia 107 (S1): i16-i26 (2011)

8AP8-6

Major cardiac events after non-cardiac surgery

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Background and Goal of Study: The age of the population presented to surgery have increased and so the risk of major cardiac events (MCE). Although MCE are relatively uncommon, their occurrence is related with significant morbimortality. MCE are an important subject since their occurrence is frequently asymptomatic in the perioperative period. The aim of this study was to evaluate the incidence, predictors and outcomes of MCE after non-cardiac surgery at a Surgical Intensive care unit (SICU).
Materials and Methods: After study approval by the institutional ethics committee, an retrospective observational study was conducted. Patients submitted to non-cardiac elective and emergency surgery admitted at the SICU (from Jan 2006 to July 2013) were included. Exclusion criteria: age <18 years old; length of stay <12h, medical patients and patients readmitted in the context of initial admission in the study period. Patients were divided in two groups according the presence or not of MCE (acute myocardial infarction (AMI), acute pulmonary edema, primary cardiac arrest, ventricular fibrillation/other ventricular arrhythmias, complete heart block). Patient's demographics and perioperative data were collected. Descriptive analysis was performed and the Mann-Whitney U test, Fischer's exact test or Chi-square were used. Univariate and multivariate analyses were done using logistic binary regression with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
Results and Discussion: From a total of 4565 patients, 4398 were included in the study and 167 were excluded. The incidence of MCE at SICU was 2.4%, 47.6% of them were AMI events. SAPS II, APACHE II, revised cardiac risk index (RCRI)>2 were considered predictors of MCE in the univariate analyses. Fraction of inspired oxygen (FiO2) (OR 38.97, $p<0.001$), history of ischemic heart disease (OR 3.38, $p<0.001$), history of congestive heart disease (OR 2.39, $p<0.001$), preoperative insulin therapy (OR 2.93, $p<0.001$) and SAPS II (OR 1.03, $p<0.001$) were considered as independent predictors for MCE in the multivariate analyses. Patients, with postoperative MCE, had a longer stay at SICU (OR 1.01, $p<0.001$) and had a higher mortality rate (1.0% vs 15.9%, $p<0.001$).
Conclusion(s): We identified FiO2, history of ischemic or congestive heart disease, preoperative insulin therapy and SAPS II as independent predictors for MCE. Patients with MCE stayed longer in the SICU and had a high mortality rate.

8AP8-7

Perioperative myocardial infarction is for real

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Background and Goal of Study: Perioperative myocardial infarction (PMI) is a severe and often under-diagnosed complication causing mortality, morbidity and considerable extra costs[1]. The magnitude of this sequelae is largely unknown. Accordingly, we investigated the incidence and prognosis of PMI in a prospective cohort of noncardiac surgical patients. We also aimed to test the predictive power of the Gupta score regarding PMI and 90-day mortality[2].
Materials and Methods: This prospective observational cohort study comprised 385 consecutive noncardiac surgical patients (172 vascular, 80 thoracic and 133 gastrointestinal) aged 50 or older with an informed consent. High-sensitivity troponin T (TnT) and electrocardiograph were obtained 5 times: preoperatively, 6 hours postoperatively and during the 3 postoperative days. Symptoms of ischemia were also registered. Perioperative cardiac risk was evaluated with the Gupta score. Our primary outcomes were PMI and 90-day mortality. During enrolment, the consent for ischemia surveillance was missed in 175 eligible patients and their routine clinical data were analysed retrospectively. We used Fisher exact test, AUC (area under curve) analysis and backwards logistic regression for statistical analysis.
Results and Discussion: Of 385 patients, 23 (6.0%) patients presented with PMI. The incidence was highest in vascular surgical patients (9.3% vs. 5.3% and 0% in gastrointestinal and thoracic surgical patients respectively, $P<0.01$). The 90-day mortality rate was 30.4% in patients who had PMI and 5.8% in non-PMI patients ($P<0.001$). In the control group, TnT was measured perioperatively only in 39 (22%) of the 175 patients and of those 3 (1.7%) developed PMI. Gupta score predicted PMI with an AUC of 0.72 (95% CI 0.63-0.81) and 90-day mortality with an AUC of 0.75 (95%CI 0.66-0.85). PMI and urgent operation were independently associated with 90-day mortality. In this unselected cohort of noncardiac surgical patients aged 50 or older, PMI was common and associated with substantial 90-day mortality. Increasing Gupta score was connected with an increased risk of PMI, but its performance was only moderate.
Conclusion(s): PMI was a frequent and grave complication in this prospective noncardiac cohort. Randomized studies in preventing and treating PMI are warranted.
References:
1. Udeh BL, Dalton JE, Hata JS, et al. Anesthesiology 2014;121:36-45
2. Gupta PK, Gupta H, Sundaram A, et al. Circulation 2011;124:381-7

8AP8-8

Pré-operative BNP levels and post-operative complications

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Background and Goal of Study: Cardiovascular diseases lead to higher surgical risk. Biomarkers like *C Reactive Protein, Cardiac Troponin* or *Brain Natriuretic Peptide* (BNP) were proposed as predictors of perioperative complications. BNP is increased in left ventricular dysfunction and volume overload. Some studies suggest a relation between its levels and morbimortality. The aim of this study is to correlate preoperative BNP levels and patients' characteristics with postoperative complications.
Materials and Methods: Prospective, observational, triple blinded study including patients submitted to elective vascular surgery during a month at our hospital. Exclusion criteria: age <18 years, under dialysis, unconscious or uncooperative patients. We collected demographic characteristics, *ASA Physical Status,* medications, hemoglobin, glucose, glycated hemoglobin, BNP, troponins and C reactive protein pre-operatively. We measured mortality, length of stay, cardiac, medical and surgical (infection, dehiscence, hemorrhage) morbidity until 30 days after surgery. Statistical analysis was performed using Mann-Whitney, Chi-square or Fisher's exact tests. Data is summarized as median [IQ25-75] and we considered $p<0.05$ as statistically significant.
Results: We included 24 patients: 15 male, 9 female. Age was 68 [58-78] years. Physical status: 7 ASA II, 14 ASA III, 3 ASA IV. Previous medical history: 7 smokers, 17 hypertension, 9 ischemic heart disease, 6 heart failure, 14 dyslipidemia, 12 insulin dependent diabetes. MET<4 in 4 patients and 4 cases of RCRI>2. We divided the sample in 2 groups using BNP=100pg/ml as cutoff. The median of BNP in the lower group (n=9) was 30.8 [22.7-39.4] vs. 200.8 [109.1-270.5] in the higher group (n=15). The higher group had more morbidity: 83% vs 42%, $p=0.045$. The pre-operative hemoglobin was different between the groups: 13.0 g/dl in the lower group vs 10.4 g/dl in the higher group, $p=0.021$. Patients having insulin dependent diabetes had different levels of pre-operative BNP 39.4 [69.9-176.1] vs 166.3 [104.4-264.3], $p=0.024$ and also had more morbidity: 75% vs 25%, $p=0.039$.
Conclusions: High levels of BNP pre-operatively seem to increase perioperative complications; however, we cannot exclude contributions of factors like insulin dependent diabetes or pre-operative anemia to those complications.

8AP8-9

Predictive factors for perioperative cardiac events in aortobifemoral bypass

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Background and Goal of Study: Aortobifemoral (ABF) bypass is a surgical procedure performed in patients with atherosclerotic disease of the infrarenal aorta and iliac vessels. The mortality for ABF bypass is 2-5%. The most common causes of death after surgery are perioperative acute myocardial infarction (AMI) and stroke. European Society Guidelines on non-cardiac surgery recommend the NSQIP model or the Lee risk index for cardiac perioperative risk stratification. This study aim's were to access predictive factors for perioperative cardiac events and to evaluate the influence of epidural technique on myocardial ischemia.
Materials and Methods: Retrospective observational study of patients undergoing ABF bypass between July 2010 and September 2014. Information was obtained from clinical registers. Descriptive and statistical analysis was performed using SPSS® program (Chi-square, T-student and Mann-Whitney U tests) with 95% confidence interval. An ST-segment depression of at least 1 mm or elevation of at least 2 mm lasting for more than 1 minute were considered a significant episode of intraoperative myocardial ischemia. Major adverse cardiac events (MACE) was defined as one or more of the following, 30 days after surgery: non-fatal cardiac arrest, acute myocardial infarction, congestive heart failure, new cardiac arrhythmia or angina.
Results and Discussion: Sample included 32 patients; they were mostly male (97%) and ASA classification III (72%). Significant episodes of intraoperative myocardial ischemia occurred in ten patients (31%) with maximum duration of 15 minutes. Five patients had MACE (16%), two of them had AMI. The NSQIP model and the Lee risk index did not predict cardiac events in these patients. We found no association between intraoperative myocardial ischemia and MACE. Type of anesthesia (general anesthesia with or without epidural) had no influence on cardiac outcomes. Median hospital stay was 5.5 days and MACE was associated with longer hospital stay ($p=0.026$). No patients died in the 30 days after surgery period.
Conclusions: The NSQIP model and the Lee risk index did not predict cardiac events in these patients. Other stratification models might be useful in this surgery, but these results should be confirmed in larger samples. Type of anesthesia was not a predictor of cardiac events (intraoperative myocardial ischemia or MACE).

8AP8-10

Significant postoperative hypotension after open abdominal surgery - retrospective analysis of risk factors with special regard to antihypertensive therapy

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Background and Goal of Study: Many authors have investigated the area of intraoperative arterial hypotension, but much less is known about fall in blood pressure in the postoperative period. There are many proposed intrinsic and extrinsic risk factors linked to that complication. While the percentage of operated patients treated for hypertension is raising, special emphasis should be given to antihypertensive drugs. The aim of the study was to examine relations between chronic antihypertensive treatment and incidence of significant hypotension in the postoperative period. As there is no widely accepted definition of postopertive hypotension, we decided to define the main end point as arterial hypotension prompting vasopressor use.
Materials and Methods: We have retrospectively analyzed 500 consecutive patients that had undergone major abdominal surgery at the Centre of Oncology, Maria Skłodowska-Curie Memorial Institute in Krakow, Poland (2011-2012). Excluded were 39 patients operated on urgent base or with severe comorbidities. Univariate and multivariate logistic regression analysis was performed to identify factors associated with increased risk of vasopressor use. Apart from antihypertensive drugs, a wide array of potential confounders was analysed. Antihypertensive drugs were tested by class—individually and in combinations.
Results and Discussion: Postoperative hypotension requiring vasopressor use occurred in 59 patients (12,8%). Five independent predictors were identified: rising age (OR=1,06 per year), hypertension treatment with β-blockers (OR=2,91), preoperative estimated glomerular filtration rate (higher values were protective, OR=0,97 per mL/min), lowest haemoglobin concentration postopertively (higher values were protective, OR=0,75 per mg/dL) and the amount of infused fluids on the day of surgery (OR=1,69 per L).
Conclusion(s): Of antihypertensive drugs only β-blocker use was associated with postoperative hypotension requiring vasopressor infusions. Other potentially modifiable factors associated with this end point included lowest haemoglobin concentration in the postoperative period, and the volume of fluids infused over the day of the surgery.

8AP8-11

Preoperative hypotension, but not hypertension, is an independent risk factor for perioperative mortality: identification of numerical thresholds for determining risk

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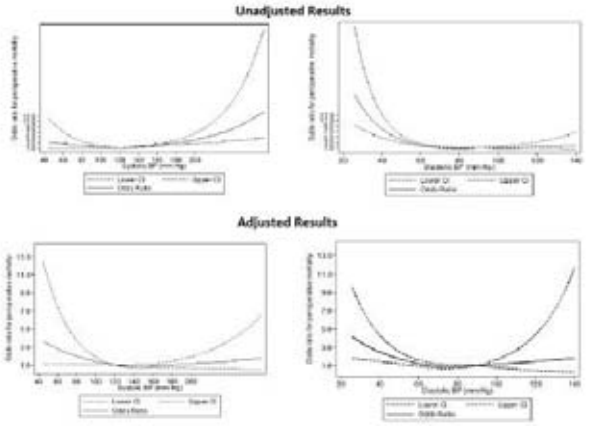
Background and Goal of Study: Despite numerous years of study, the influence of preoperative blood pressure (BP) on perioperative risk remains controversial[1,2]. We investigated the relationship between preoperative BP and thirty-day mortality following non-cardiac surgery.
Materials and Methods: United Kingdom Clinical Practice Research Datalink data from 252,278 patients were obtained. Parsimonious and non-parsimonious multivariate logistic regression models, including restricted cubic splines for preoperative numerical systolic and diastolic BP values, were constructed for thirty-day perioperative mortality. Models included 29 perioperative risk factors including age, gender, race, comorbidities, medications, and surgical risk score.
Results and Discussion: Point estimates from unadjusted analyses showed that both systolic and diastolic BP that deviated from the reference BP were associated with increased odds of perioperative mortality (Figure 1 shows

unadjusted and adjusted data for systolic and diastolic BP). For adjusted risk, parsimonious and non-parsimonious models had similar results; only non-parsimonious results are presented. After risk factor adjustment, the effect of systolic and diastolic hypertension was no longer was associated with increased odds of perioperative mortality. However preoperative hypotension was associated with statistically significant increases in the odds of perioperative mortality (Figure 1). Risk thresholds were identified at preoperative systolic and diastolic BP of less than 100 mmHg (Adjusted Odds Ratio 1.40 (1.05 to 1.86)), and 40mmHg respectively (Adjusted Odds Ratio 2.49 (1.43 to 4.33)). Plausibility was significantly strengthened by dose-dependence: as BP decreased below the threshold (100/40), the odds of mortality increased.



[Figure 1]

Conclusions: The effect of preoperative hypertension on perioperative risk disappeared after adjusting for confounders including end-organ vascular disease. In contrast, adjustment for confounders revealed the increased perioperative risk associated with preoperative hypotension.

References:

1. Sanders. Anaesthesia 2014; 69(9):948-53
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8AP8-12

Impact of preoperative evaluation clinic visit on in-hospital postoperative myocardial infaction

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Introduction: With an increase in the number of patients arriving on the same day of surgery, the preoperative assessment clinic has become a significant component of the perioperative surgical home model of care. We compared the incidence of in-hospital postoperative myocardial infarction (MI) of patients who were evaluated prior to surgery in our institution's Pre-Admission Testing (PAT) clinic to those patients who had surgery without being seen in the clinic.
Methods: We began a quality assurance and improvement initiative in May 2011 to evaluate the outcomes of our surgical patients comparing those who were evaluated in PAT to those who were not. We were able to compare all surgical encounters from May 2011-July 2013 (n=76,821) at a large urban academic medical center. For each encounter we were provided basic demographic data, type of encounter (inpatient vs. outpatient), whether the patient was seen at PAT or not, ASA status, comorbidities defined by ICD-9-CM codes, surgery type, length of stay and development of postoperative MI. We excluded all patients less than 15 year old of age. Propensity scoring methods (matching and inverse weighting) were used to compare postoperative MI rate between patient exposed (n=39,521) and not exposed (n=37,300) to PAT, after controlling for selection bias.
Results: Based on the PS matched sample, those patients who were seen in PAT were less likely to develop a postoperative MI (odds ratio [OR] 0.72; 95% confidence interval [CI], 0.58-0.89) compared to those not seen in PAT. Similar results were obtained after PS weighting, using the average treatment effect on the treated [ATT] (OR 0.77; 95% CI, 0.62-0.95).
Discussion: Our results suggest that patients who were evaluated at PAT clinic were less likely to suffer postoperative MI. Because moderate to high risk patients are encouraged to visit our preadmission clinic, especially those with known cardiovascular risks for postoperative MI, these visits allow us to risk-stratify, optimize, and coordinate the plan of care prior to surgery which we believe leads to improved outcomes.

8AP9-1

Unintended postoperative hypothermia at surgical intensive care unit

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Background and Goal of Study: Unintended Postoperative Hypothermia (UPH) after surgery is an important alteration of physiological steadiness and may be associated with adverse perioperative outcomes. The aim of this study was to evaluate the incidence, predictors and outcomes on admission at Surgical Intensive Care Unit (SICU).
Materials and Methods: After study approval by the institutional ethics committee, a retrospective observational study was conducted in patients submitted to non-cardiac surgery admitted at SICU (Jan 2006 to July 2013). Exclusion criteria: age < 18 years old, length of stay < 12h, medical patients and patients readmitted in the context of initial admission in the study period. Patients were classified as hypothermic (Tc < 35ºC) or normothermic (Tc ≥35ºC). Patient's demographics and perioperative data were collected. Descriptive analysis was performed and the Mann-Whitney U test, Fischer's exact test or Chi-square were used. Univariate and multivariate analyses were done using logistic binary regression with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
Results and Discussion: From a total of 4565 patients, 4398 were included and 167 were excluded. The incidence of UPH on admission at SICU was 30%. In univariate analysis: age, mechanical ventilation, Glasgow coma scale < 9, hematocrit, systolic and mean arterial pressure, respiratory rate, total serum bilirubin, FiO2, pH, PaO2, PaCO2, [HCO3-], [Na+], [K+], organ insufficiency, major cardiac event, high risk surgery, history of cerebrovascular disease, revised cardiac risk index (RCRI), APACHE II and SAPS II were considered predictors of hypothermia. Hypothermic patients had longer stay at SICU. In multiple logistic regression analysis, age (OR 0.99, P<0.001), mean arterial pressure (OR 0.96, P<0.001) and [HCO3-] (OR 0.93, P<0.001) were considered protective predictors of UPH. High risk surgery (OR 1.8, P<0.001), history of cerebrovascular disease (OR 1.57, P<0.001), mechanical ventilation (OR 2.13, P<0.001), organ insufficiency (OR 1.66, P<0.001), systolic pressure (OR 1.02, P=0.001), respiratory rate (OR 1.03, P=0.004), pH (OR 9.78, P<0.001), PaCO2 (OR 1.03, P<0.001), APACHE II (OR 0.97, P=0.008) were considered independent predictors of UPH at SICU.
Conclusion(s): UPH was frequent in our population. UPH is an important outcome that may be associated with postoperative complications. The knowledge about risk factors may account for a better prevention.

8AP9-2

Can be pre-warming a good way to prevent perioperative hypothermia and postoperative shivering?

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Background and Goal of Study: Perioperative hypothermia is a well known problem in general and neuroaxial anaesthesia. Unintended hypothermia in the perioperative period has been shown to cause many adverse effects that impact surgical outcomes. The most significant cause of hypothermia is redistribution temperature drop (RTD) that occurs on induction of anesthesia. On this basis Camus and Sessler introduced pre-warming. Patients are warmed with forced-air systems prior to induction of anaesthesia.
Materials and Methods: The purpose of this study was to examine the effect of pre-warming (active pre-operative skin-surface warming)on body temperature and postoperative shivering.Sixty patients who were scheduled for abdominal surgery at the Private Hospital Medstar 2000 Constanta (1.01.2014-1.07.2014) were recruited as study participants and were randomly assigned to the experimental or control group(30/30). For the experimental group, a forced air warmer was applied for 45-90 min (M=72.25, SD=12.50) before surgery. Body temperature was measured at the tympanic membrane. Shivering was graded by visual inspection. Hypotheses were tested using t-test and repeated measured ANOVA.
Results and Discussion: There were significant differences in changes of core temperature between the non-pre-warmed group and the pre-warmed groups (p<0.00001). Without pre-warming, 22/30 (73.3%) patients became hypothermic (<36 °C) at the end of anaesthesia, whereas only 5/30 (16.6%), patients following pre-warming, became hypothermic (p<0.001 vs no pre-

warming). Shivering was observed in 10 patients without, and in three patients with pre-warming (p = 0.02). Pre-warming of patients before general anaesthesia mostly prevents hypothermia and reduces shivering.
Conclusion(s): Pre-warming is a nursing intervention that could affect surgical outcomes and should be considered for patients receiving general anesthesia. Further research is needed to determine the optimal temperature and duration of pre-warming necessary to further impact temperature drop in the perioperative period.

8AP9-3

Postoperative hypothermia and outcomes in laparoscopic bariatric surgery

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Background and Goal of Study: Perioperative hypothermia is a contributing factor to patients' morbidity and mortality[1]. Obese patients have a better thermal insulation and a reduced heat redistribution from core to periphery after anaesthesia so their temperatures remains higher[1]. The aim of this study is to describe the influence of hypothermia in bariatric surgery patients during postoperative period.
Materials and Methods: After the approval by the ethics commission, a prospective study was conducted in the post-anesthesia care unit (PACU). Patients submitted to laparoscopic bariatric surgery during a 6 months period were included. Tympanic temperature at PACU admission was measured and hypothermia was considered for temperatures <36°C. Additional data collected: patients' demographics, type of surgery, blood gas analysis, Visual analog pain scale (VAS), adverse cardiac and respiratory events, *Richmond Agitation Sedation Scale* (*RASS*) and length of stay at PACU. Mann-Whitney U and Chi-square test (Version 22 SPSS®) were used for descriptive analysis.
Results and Discussion: Fifty-two patients were included, 56% (n=28) of those were hypothermic at PACU admission. Hypothermia was associated with shorter PACU stay (97.5 vs 130 min, p=0.014). Also, association was establish with hypoxia, PaO_2 <80 mmHg (63.3% vs 31.6%, p=0.030) and lower RASS score (p=0.004). Lower levels of pain in the first 24 hours, VAS <30mm were recorded in patients with >0.5°C temperature variations (51.6% vs 81%, p=0.042). Those submitted to gastric bypass surgery were more often hypothermic than patients scheduled for vertical sleeve gastrectomy, respectively 87 vs 13% (p=0.048). No statistical correlation was found between hypothermia and patients' Body Mass Index (BMI) and adverse cardiac and respiratory events.
Conclusion(s): A high incidence of hypothermia was found in our bariatric surgery patients. Hypothermic patients were more likely to stay for a shorter period in PACU and presented hypoxia and a low RASS score. The type of surgical procedure seems to correlate with hypothermia. Surprisingly, lower levels of pain were found in these patients, furthermore, patients' comorbidities and BMI were not found to be related with temperature variations. More active protective measures should be taken to minimize hypothermia and thus complications after bariatric surgery especially for those scheduled for gastric bypass surgery.
References: 1. Anaesthesia 2012, 67, 1364-1369

8AP9-4

Perioperative core temperature monitoring with a forehead zero-heat-flux sensor: a comparison with oesophageal and bladder monitoring

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Background and Goal of Study: Core body temperature is normally tightly regulated. Inadvertent hypothermia is common both after anaesthesia induction and in the early postoperative phase among unwarmed surgical patients. Even mild hypothermia can lead to adverse patient outcomes, anxiety and discomfort, and significant additional healthcare costs (1). Invasive temperature monitoring from bladder, oesophagus and pulmonary artery are often considered the most accurate. However, these monitoring sites are not always available or feasible for surgical patients. A transcutaneous zero-heat-flux forehead monitoring system has recently been introduced into clinical use. This system is non-invasive and stated to approximate the core temperature sufficiently well to use as a routine monitoring in patients in whom more invasive monitoring is neither feasible nor needed (2). We compared a forehead zero-heat-flux temperature sensor with bladder and oesophageal monitoring in the perioperative period.
Materials and Methods: Core temperature was measured with a commercial zero-heat-flux deep tissue thermometer in 80 patients and compared with the readings from oesophageal (n= 40) and bladder (n=61) catheter thermistors. The Pearson correlation coefficient was used for statistical analysis. Fifty-four patients had general anaesthesia and 26 spinal/epidural anaesthesia. Knee/hip arthroplasty (n=28, 8 revisions) was the most common surgical procedure followed by gynaecological (n=20), gastroenterological (n=13), back (n=7) and urological (n=7) surgery.
Results and Discussion: Temperature data were available for all 80 patients(aged 9-84 years, BMI 17.8-40.5 kg/m²) from anaesthesia induction up to first four postoperative hours. There were 1134 sets of matched temperatures recorded with 30 minutes intervals; 625 forehead vs. bladder and 509 forehead vs. oesophageal temperature measures.
The correlation between forehead and bladder/oesophageal temperature readings was strong (R≥0.6) except at the first measurement (R=0.428) where the correlation was moderate. During the first 30 minutes 72% and thereafter 82% of the differences (forehead minus bladder/oesophagus) were ≤0.5°C, similar to that reported by others (2).
Conclusion: These pilot data suggest that the forehead zero-heat-flux sensor temperature monitoring system is a feasible mode for routine clinical practice.
References:
1. Billeter et al. Surgery. 2014;156:1245-52
2. Eshraghi et al. Anesth Analg. 2014;119:543-9

8AP9-5

Prophylactic administration of antibiotics for patients undergoing elective surgery in a general hospital

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Background and Goal of Study: Prophylactic administration of antibiotics is important to reduce surgical site infection and is given to many patients undergoing elective surgery. Antibiotics are traditionally given by anaesthetists and local or regional guidelines provide advise on which antibiotics are most appropriate for different surgical specialities. We monitored the antibiotic administration across 5 surgical specialities and compared them with our local guidelines. Results were discussed at our local audit meeting and one month later we completed a second cycle which showed increased compliance.
Materials and Methods: Administration of antibiotics for elective cases were recorded in 50 patients, 10 in general surgery, 10 in orthopaedic surgery, 10 in gynaecological surgery, 10 in maxillo-facial surgery and 10 in plastic surgery. Local guidelines recommend Cefuroxime 1.5g and Metronidazole 500mg intravenously for elective general surgery and Cefuroxime 1.5 g intravenously for orthopaedic surgery. No guidelines existed for plastic surgery or maxillo-facial surgery.
Results and Discussion: The first audit cycle showed correct antibiotic administration in 20% of patients undergoing general surgery, 100% in gynaecology and 60% in orthopaedics. The second cycle showed correct antibiotic administration in 80% of patients undergoing general surgery, 100% in gynaecology and 90% in orthopaedics.
Conclusion: Completing a second audit cycle is an important service improvement tool and our second audit cycle showed increased compliance with local guidelines. In addition our data was forwarded to our local microbiology department and new guidelines are being produced to include plastic surgery and maxillo-facial surgery.
References: NICE guidelines [CG74], https://www.nice.org.uk/guidance/cg74

8AP9-6

Robotic-assisted laparoscopic colorectal surgery: our experience and results

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Background: Robotic-assisted laparoscopic colorectal surgery (RALCS) has added a new dimension to minimally invasive surgery, giving the surgeon notable advantages, which contributes to improve outocomes.
Our aim is to report our experience, analyzing results and complications.
Material and Methods: A prospective observational study was made during the last 30 month, on 97patients who underwent RALCS.
All procedures were performed under general anesthesia in 45degrees trendelenburg position, using clamping shoulders and taking care with all patient support points, eye protection, thermal blanket, and individual and intermittent sequential pneumatic compression of legs.
Analyzed variables: age, ASA, surgical time, bleeding amount, transfusion rate, conversion to laparotomy, complications, and anesthetic consideration for robotic-assisted-laparoscopic-surgery.
Results:
There were 3cases of diverticulitis and 94carcinomas.
The mean age was 66years-old(33-85).
The mean ASA classification was II(I-III).
The mean operating time was 181minutes(150-320minutes).
The average blood loss was 360ml(100-800ml), with 12'3% of patients needing blood transfusion (from-1-to-4 red-cell-concentrates).
Only 1case was converted to open surgery.
6 anesthetic complications were recorded: 1difficult airway Cormack-IV, getting blind orotracheal intubation, 2cases of upper extremity paresthesias in compression of the brachial plexus with spontaneous recovery, and 3cases of severe bradycardia and hypotension when removing trendelemburg position, which was resolved without sequelae. Perioperative mortality was 0%.
Conclusions and Discussion:

- *Da Vinci Surgical System* allows the surgeon to operate with enhanced vision, precision, dexterity and control, which contributes to provide favorable results, with acceptable operative times and low conversion rates and morbidity.
- It's mandatory to guarantee a proper positioning of the patient on the operating table, protecting bony prominences, eyes, cervical area, and lower limbs. Antithrombotic prophylaxis is necessary, as well as optimal management of fluid and adequate monitoring. It's essential to decrease surgical time.
- Further clinical Studies and long-term follow-up are required to better evaluate the outcomes of robotic colorectal surgery.

References: Papanikolaou, I. Robotic surgery for colorectal cancer: systematic review of the literature. Surgical, Laparoscopy, Endoscopy & Percutaneous Techniques: 2014Dec; 24(6): 478-483.

8AP9-7

Robotic-assisted laparoscopic radical prostatectomy: our experience and results

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Background: Robotic-assisted laparoscopic radical prostatectomy (RALRP) has added a new dimension to minimally invasive surgery for localized prostate cancer, giving the surgeon notable advantages, which contributes to improve outcomes.
Our aim is to report our experience, analyzing results and complications.
Material and Methods: A prospective observational study was made during the last 30month, on 294patients who underwent RALRP.
All procedures were performed under general anesthesia in 45degrees trendelenburg position, taking care with all patient support points, eye protection, thermal blanket, and individual and intermittent sequential pneumatic compression of legs.
Analyzed variables: age,ASA,surgical time, bleeding amount, transfusion rate, conversion to laparotomy, and perioperative complications.
Results: The mean age was 60years-old(42-73).
The mean ASA classification was II(I-III).
The mean operating time was 188minutes(90-420min).
The average blood loss was 660ml(100-3000ml), with 7'5% of patients needing blood transfusion (from-1-to-8 red-cell-concentrates).
3cases were converted to open surgery due to severe bleeding.
The overall complication rate was 15%. There were 2cases of colon perforation that were resolved at that moment. Arrhythmic events were infrequent (6/294patients) and controlled without incidents. As immediate postoperative complications: there was 1case of pleural effusion requiring reintubation, 2cases of deep venous thrombosis that were anticoagulated and 4cases of severe anemia requiring transfusion. The other postoperative complications were minor and resolved without incidents. Perioperative mortality was 0%.
Conclusions and Discussion: *Da Vinci Surgical System* allows the surgeon to operate with enhanced vision, precision, dexterity and control, which contributes to reduce morbidity, mortality and lengh of hospital stay.
It's mandatory to guarantee a proper positioning of the patient on the operating table, protecting bony prominences, eyes, cervical area, and lower limbs. Antithrombotic prophylaxis is necessary, as well as optimal management of fluid and adequate monitoring.
Further clinical studies and long-term follow-up are required to better evaluate the outcomes of robotic radical prostatectomy.
References: Willis DL et al. Comparison of outcomes between pure laparoscopic vs robot-assisted laparoscopic radical prostatectomy: a study of comparative effectiveness based upon validated quality of life outcomes. BJU Int. 2012Mar;109(6):898-905

8AP9-8

Bacterial contamination of anaesthetic drugs and vasopressor in the operating theatres: a cross-sectional study

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Background and Goal of Study: Prepared anaesthetic drugs are necessary for anaesthetic teams, especially in emergency situations. However, the sterility of prepared drugs may be questionable. The objectives of this study were to determine the incidence of bacterial and fungal contamination of anaesthetic drugs and vasopressor before and after use in operating theatres, and to evaluate the effectiveness of the drug preparation and storage processes.
Materials and Methods: A cross-sectional study was conducted in an operating theatre of a university hospital. We collected 945 samples of three drugs consisting of propofol, vecuronium, and ephedrine from 20 operating rooms, and refrigerators that stored the residual drugs. Each drug was divided into two groups, pre-use group, and post-use group. The pre-use group contained drugs that were cultured before the patient received the drug. The post-use group contained drugs that were cultured after the patient received the drug or drug transferal to other syringes. The culture results were reported as positive or negative. Microorganisms were also identified after positive results.
Results and Discussion: Twenty-six of nine hundred and forty five (2.8%, 95% confidence interval = 1.8% - 4.0%) drug sample cultures were positive. Twenty (6.3%) of 317 propofol samples were found to have bacterial contamination, 11 in the pre-use group, and nine in the post-use group. Six (1.9%) of 318 ephedrine samples were found positive on culture, one in the pre-use group, and five in the post-use group. Vecuronium had no positive samples. The propofol and ephedrine samples were contaminated at 3.0-8.2 hours, and 19.9-71.4 hours after preparation, respectively. All organisms were non-pathogenic organisms, and no fungal contamination was found.
Conclusions: The incidence of bacterial contamination of anesthetic drug, and vasopressor was 2.8%. Anaesthetic teams must be aware of contamination of anaesthetic drugs pre-prepared for later use and methods of transferring drugs to each patient to prevent contamination.
Acknowledgements: We thank Miss Natnicha Ingwiya of Department of Pathology, Faculty of Medicine, Prince of Songkla University, for her assistance in microbial testing.

8AP9-9

Water-repellent moisturizing cream protects a patient against pressure injury of skin during prone position surgery: a prospective, double-blind, randomized study

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Background and Goal of Study: Although we sometimes encounter direct pressure injuries of skin such as redness, swelling and ulcer after the prone position surgery, there have been few systematic reports of these complications (1). Anesthesiologists should keep a vigilant watch for skin protection as well as physiological changes during anesthesia in the prone position. We examined whether skin water-repellent moisturizing cream decreases the redness of the patient's skin after spinal surgery using four-poster spinal frame.
Materials and Methods: We examined the patients who underwent lumbar spinal surgery using four-poster spinal frame. We randomly divided the patients into cream rubbed group (n=34) and control group (n=36). Patients in the cream rubbed group were rubbed the skin water-repellent moisturizing cream (Remois®, Alcare Co., Ltd., Tokyo, Japan) to the skin where four-poster spinal frame touched before prone positioning of the patients. Patients in the control group were not rubbed anything. We measured the pressure between the body and the spinal frame at 4 points. We recorded the incidence of redness of skin in the immediate postoperative period, and observed the skin redness for every 60 min to measure the duration that it took to diminish. The results were shown as mean ± SD. Chi-square test and Student-t test were used for intergroup comparisons, with $P < 0.05$ being statistically significant.
Results and Discussion: There was no significant difference in terms of duration of prone position, pressure between the body and the spinal frame, patients' age, height, weight and sex between the two groups. The percentages of patients with redness of skin just after surgery were 25% and 56% in the cream rubbed group and in the control group, respectively ($P < 0.05$). The duration of skin redness was significantly shorter in the cream rubbed group (82±75 min) than the control group (248±219 min, $P < 0.05$). These results suggest that thin waterproof layer of the cream likely keeps the moisturizing of skin and protects the epidermal from constant external irritation.
Conclusion: Both the incidence of skin redness and its duration after the prone position surgery decreased by rubbing water-repellent moisturizing cream. Our results indicate that the cream is effective to reduce direct pressure injury of skin in a patient with the prone position surgery.
Reference: 1. Edgcombe H, et al. Br J Anaesth 100: 165-83, 2008.

8AP9-10

How far should we go in our trust - or mistrust - in ECG monitors?

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Background and Goal of Study: The introduction of ECG monitors into clinical practice has led to an increased safety when caring for unstable patients, so much so that it has long become a standard of monitoring during anesthesia. However, there are some caveats to this technique that are not widely known or understood by many of the health care professionals who use them on a daily basis, and who seldom take full advantage of the customization options of theses machines.
Materials and Methods: We set out to ascertain whether ECG tracings in clinical practice could be significantly altered by changing the monitor's filter definitions - either in a good or a bad way. We implemented a prospective, longitudinal, descriptive study whereby, during one month, we systematically changed the filter definitions of the monitors used intraoperatively and looked for clinically significant changes in the tracings.
Results and Discussion: Changing filter definitions allowed for a better tracing in a significant proportion of patients, especially when electrosurgical units were used. However, such deed often produced artifacts. In most cases these consisted of a reduction in overall voltage, but in approximately 11% of patients there were artifactual changes in the ST segment which, under appropriated circumstances, might have been a cause for concern had they not been recognized as artifactual in nature.
Importantly, filter settings were not routinely checked or altered in over 90% of the anesthetics.
Conclusion(s): Though invaluable in current clinical practice, ECG monitoring should be performed with a sound knowledge of its basis and customization options. The application of different filters allows for a much smoother tracing in situations with high electromagnetic interference, but may cause artifactual distortions of its own, especially significant when they address the ST segment of the T wave. Concepts like Fourier analysis and passband filters are not usually mentioned in medical literature, but offer an insight into what happens to the ECG signal before it appears graphically on the screen, and into which definitions produce reliable tracings and which ones make distortion more likely.

8AP9-11

Peri-operative management of anaemia in proximal femur fractures - an audit

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Background and Goal of the Audit: Peri-op management of haemoglobin (Hb) in hip fracture patients has been mentioned in various UK national guidelines (1). Our local hospital guidelines mirror this, aiming for a Hb of 10 g/dl including the availability of 2 units of cross matched blood in theatre for such patients. The aim of the audit was to assess adherence of hospital guidelines (All should have pre-operative Hb, pre-op transfusion should be considered for a Hb concentration < 9 g.dl1 or < 10 g.dl1 with a history of Ischaemic heart disease and repeat Hb alternate days if normal, daily if abnormal). An attempt was also made to assess the effect of peri-op fluids and prior anticoagulation on blood loss and transfusion.
Materials and Methods: We retrospectively reviewed 40 such patients over a period of two months looking at timely blood investigations, triggers for blood transfusion, intra-op fluids transfused, documentation of blood loss, post-op haemacue etc. Data was collected by reviewing case notes and electronic notes.
Results and Discussion: There was a preponderance of female patients (31:9) with 90% being operated within 24 hours of arrival in the hospital. All of them had timely blood tests done and were transfused if required. However four patient's post-op Hb monitoring was less than adequate. Of the 10 pts that had > 2 litres intra-op fluids, 3 required blood transfusion. Similarly of the 31 pts with > 1 litre intra-op fluids, 7 had blood transfusion (22.5%). Blood loss was not recorded in 42.5 % of cases while post-op haemacue was done in only 15% of cases.
Conclusion and Recommendations: There were lots of positives like timely pre-op blood investigations, intra-op transfusion and surgery. This reflects the high ranking achieved by our hospital in the National Hip Fracture Database (2). Due to the low number of cases, it was not possible to establish a relationship between blood transfusion and peri-op fluids transfused or prior anticoagulation. Areas of improvement included better documentation and communication (especially regarding the blood loss) in order to improve post-op care. This was done by including such events in the patients Integrated Care Pathway. The regular use of haemacue was also emphasised upon.
References:
1.Kearns RJ, Moss L, Kinsella J. A comparison of clinical practice guidelines for proximal femoral fracture. Anaesthesia 2013;68:159-66.
2. http://www.nhfd.co.uk

8AP10-1

Intraoperative hidroelectrolitic, acid-base balance and blood gases as predictor of outcome of renal function after kidney transplantation

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Background and Goal of Study: Kidney transplantation (KT) is the first choice treatment to improve chronic kidney disease health status. The aim of our study was to evaluate the influence of intraoperative hidroelectrolitic, acid-base balance and blood gases on renal graft (RG) function after KT.
Materials and Methods: Retrospective observational study of KT patients from January 2010 to December 2012. Data collected from medical records included: age, sex, medical diseases, anesthetic and surgical procedure duration, cold ischemia time, mortality rate and intraoperative gasometry values

(pH, pCO_2, pO_2, HCO_3^-, Na^+, K^+, Cl^-, anion-gap, glucose, lactate, hemoglobin and hematocrit) at pre-induction, post-induction and after renal artery unclamping. To evaluate RG outcome we analyze the glomerular filtration rate (GFR) at hospital discharge, 1, 3, 6, 12, 18 and 24 month. Descriptive and univariate statistical analysis were made using IBM SPSS Statistics v.21. Categorical data are presented as percentages, continuous data as mean ± standard deviation. Pearson correlation was used to assess the relation between blood parameters and GFR (significance level $p< 0,05$).

Results and Discussion: 193 patients analyzed, 122 male. Recipient and donor age (years) was 47,6±13,0 and 49,7±1,71. Most frequently observed comorbidities were high blood pressure (83,4%), dyslipidemia (22,3%) and smoking (21,8%). Anesthesia and surgery duration was 164,6±44,0min and 107,6±34,7min. Cold ischemia time was 707,0±463,9min. Mortality rate was 6,2%. We observed a negative relation between pre-induction K^+ ($r=-0,193$; $p<0,05$) and lactate ($r=-0.190$; $p<0,05$) and a positive relation between post-induction pO_2 ($r=0,322$; $p<0,001$) with postoperative GFR upon discharge but that is lost on the other follow-up periods. We found a consistently positive relation between Na^+ after renal artery unclamping and GFR upon discharge ($r=0.2$; $p<0,05$), 1st month ($r=0,171$; $p<0,05$), 6th month ($r=0,198$; $p<0,05$), 1st year ($r=0,225$; $p<0,01$), 2nd year ($r=0,217$; $p=0,05$). The other analyzed variables were not related with GFR.

Conclusion(s): Despite the constant concern regarding the intraoperative blood gases values, only Na^+ after renal artery unclamping was negatively related to RG function during the first 2 years after KT. To our knowledge, this association has not been reported elsewhere.

This study provides the rationale for further investigation to derive the optimal Na^+ value target for this surgery.

8AP10-2

Postoperative microangiopathic haemolytic anaemia with renal failure - what to do?

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Background: Microangiopathic haemolytic anaemia (MHA) have many causes. The most dreaded are thrombotic thrombocytopenic purpura (TTP) and atypical haemolytic uraemic syndrome (aHUS). These are acute, rare and serious causes requiring rapid diagnosis and treatment. They share similar features, presenting with MHA and thrombocytopenia with renal impairment in aHUS and neurological and cardiological sequelae in TTP [1,2].

Case report: Female, 46 years old, ASA II, previously submitted to a gastric sleeve (no complications), treated for depression, proposed for hepatic pericystectomy due to hydatid cyst. Pre-operatory analysis: slight normocytic normochromic anemia (hemoglobin 10.2g/dL). Surgery lasted for 4h30 with no complications. A few hours later the patient became oliguric with coluria. Vital stats were normal with no clinical signs of hemorrhage. However, given the progressive drop in hemoglobin, fluid therapy and transfusion was initiated. Analysis showed decreased hemoglobin (8.0 g/dL to 6.5 g/dL) and platelet count ($271x10^9$/L to $84x10^9$/L), worsening of creatine (2.47mg/dL, baseline 0.97 mg/dL), increased LDH (2395U/L), increased total bilirubin. Urine analysis presented bilirrubinuria, hemoglobinuria and proteinuria. Peripheral blood smear showed schizocytes. Abdominal and renal ultrasound was normal.

A presumptive diagnosis of aHUS was made. Plasma exchange (PEx) and hemodyalisis were began. Response to therapy was only mild, having the patient been admitted for continuing hemodialysis and PEx. The main differential diagnosis was between aHUS and TTP. ADAMTS13 activity was normal and antibodies anti-ADAMTS13 were negative. Genetic causes for aHUS were sought and mutations in CFH were detected: c.3172T>C (p.Tyr1058His) and c.3178G>C (p.Val1060Leu), and polymorphisms (p.Gln1076Glu), haplotypes with increased risk for aHUS.

Creatine values decreased slowly over the course of 30 days to normal values.

Discussion: aHUS is an extremely rare post-operative complication in non-transplant patients and is frequently associated with genetic predisposition [2]. The "trigger" has not always been clearly depicted, having been hypothesized that surgery itself might be the "second hit".

References:

1. British Journal of Haematology, 2014, 164, 759-766;
2. *Case Reports in Nephrology*, Volume 2014, Article ID 784943

Learning points: aHUS must be considered as a cause of post-operative acute kidney with an MHA, and genetic causes investigated as a main etiological factor.

8AP10-3

Consent and organ donation - a survey of healthcare workers

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Introduction: Organ donation is an emotive issue with strong opinions being held by the public and healthcare workers.

In this study, we surveyed a sample of healthcare workers in a district general hospital. We determined the number that are on the organ donor register. We then assessed if healthcare workers believe that their family would be aware of their personal wishes regarding organ donation. Finally, we assessed if they have discussed organ donation with their families.

Methods: We developed a questionnaire regarding the issues mentioned above. We handed this out to 100 healthcare workers within our hospital.

Results: We received 100 forms at data collection. 1 form was discarded as it was handed out to a non-healthcare worker. This left 99 completed forms.

Question 1

Are you on the organ donor register?

58/99 (59%) were on the organ donor register. 39/99 (39%) were not on the organ donor register. 2/99 (2%) of people were unsure of their organ donor register status.

Question 2

If you were critically unwell and could not communicate, do you believe that your family would be aware of your wishes regarding organ donation?

82/99 (83%) believed that their family would be aware of their wishes regarding organ donation. 17/99 (17%) did not believe their family would be aware of their wishes.

Question 3

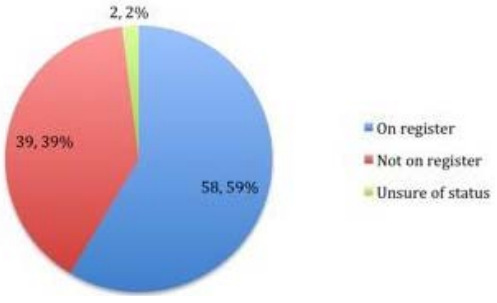
Have you explicitly discussed your wishes regarding organ donation with your family?

69/99 (70%) had discussed their views on organ donation with their family. 30/99 (30%) had not discussed their views with their family.

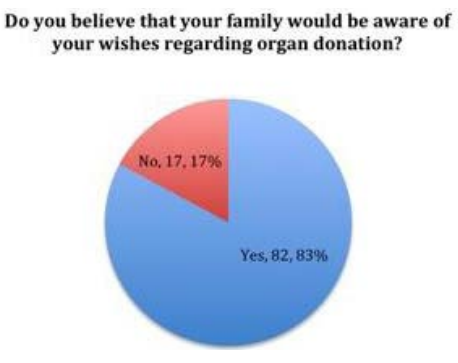
Discussion: Only 59% of the participants in this survey were on the organ donor register. It should raise a concern that a failure to fully engage a cohort of the population who should be more informed and "on message" reflects a wider problem in the general perception and discussion of the organ donation process

Most participants felt that their relatives would be aware of their wishes regarding organ donation. However there were 17 people who had not explicitly discussed this with their family. This suggests that some people simply believe that their family would "do the right thing" when it came to making decisions of this nature.

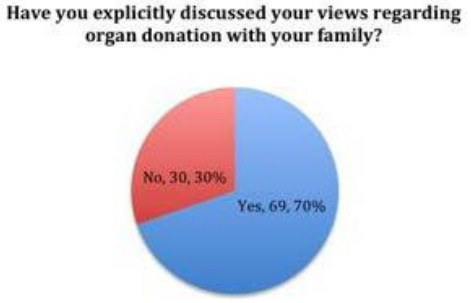
Conclusion: More work must be done to remove the taboo surrounding the discussion of organ donation.



[Figure 1]



[Figure 2]



[Figure 3]

8AP10-4

Renal graft outcome: does donor or recipient age act as a factor?

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Background and Goal of Study: Chronic Kidney Disease (CKD) is becoming more prevalent nowadays with a huge impact on life quality of this population. First choice treatment is kidney transplantation. Studies have been made in order to identify factors that might influence the outcome of renal graft (RG). The aim of our study was to evaluate the influence of donor or recipients age on RG outcome.
Materials and Methods: Retrospective observational study of kidney transplanted (KT) patients from January 2010 to December 2012. Data collected from medical records included: recipient and donor age, sex, medical diseases, anesthetic and surgical duration, cold ischemia time and mortality rate. To evaluate RG outcome we analyzed the serum creatinine concentration and the glomerular filtration rate (GFR) at 24 hours postoperative, 7th day, hospital discharge and 1st, 3rd, 6th, 12th and 24th month. Statistical analysis was carried out using IBM SPSS Statistics v.21. Descriptive analysis presented as absolute value, percentage or mean ± standard deviation. Pearson correlation was used to assess the relation between age and GFR (significance level $p<0,05$).
Results and Discussion: 257 patients were KT.193 medical records fulfilled. 122 male. Recipient and donor age (years) was 47,6±13,0 and 49,7± 1,7. Most frequently observed comorbidities were High Blood Pressure (83,4%), dyslipidemia (22,3%) and smoking (21,8%). Anaesthesia and surgery duration was 164,6±44,0 min and 107,6±34,7 min. Cold ischemia time was 707,0±463,9 min. Mortality rate was 6,2%. We observed a negative relation between receptor age and GFR postoperative at: hospital discharge ($r=-0,402$; $p<0,001$), 1st month ($r=-0,331$; $p<0,001$), 6th month ($r=-0,282$; $p<0,001$), 1st year ($r=-0,296$; $p<0,001$), 2nd year ($r=-0,232$; $p=0,003$). A negative relation was also observed between donor age and postoperative GFR at: hospital discharged ($r=-0,177$; $p=0,17$), 1st month ($r=-0,184$; $p<0,013$), 6th month ($r=-0,252$; $p=0,001$), 1st year ($r=-0,265$; $p=0,001$), 2nd years ($r=-0,237$; $p=0,003$). The other analysed variables were not related with GFR.
Conclusion(s): Donner and recipient greater age seems to have a negative impact in RG, 2 years outcome, when analysing renal function using GRF. According to our results we may say that sex, comorbidities, anaesthesia and surgery duration don't have influence on GFR during the same period.
References: Saudi J Kidney Dis Transpl 2013;24(4):673-681.

8AP10-5

Is pre-transplant residual urine output a renal graft outcome predictor?

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Background and Goal of Study: Chronic kidney disease (CKD) is becoming more prevalent nowadays with a huge impact on life quality of this population. Kidney transplantation (KT) is the first choice treatment to improve CKD health status. There is a continued search to identify factors that might modify the renal graft (RG) function after transplantation. The aim of our study was to evaluate the influence of pre-transplant residual urine output (RUO) on RG outcome.
Materials and Methods: Retrospective observational study of KT patients from January 2010 to December 2012. Data collected from medical records included: age, sex, medical diseases, anesthetic and surgical procedure duration, cold ischemia time, mortality rate and presence or absence of RUO. To evaluate RG outcome we analyze the glomerular filtration rate (GFR), calculated using the Cockcroft-Gault equation, at hospital discharge, 1, 3, 6, 12, 18 and 24 month. Descriptive analyses presented as absolute value, percentage or mean ± standard deviation. Student's t-test was used to analyze the relation between ROU and GRF (significance level $p< 0.05$).
Results and Discussion: 257 kidney transplants, 193 medical records fulfilled and analyzed. 122 male: 71 female. Recipient and donor age (years) was 47,64±13,00 and 49,70± 1,71. Most frequently observed comorbidities were high blood pressure (83,4%), dyslipidemia (22,3%) and smoking (21,8%). Anesthesia and surgery duration in minutes was 164,57±44,04 and 107,59±34,66. Cold ischemia time was 707,01±463,91min. Mortality rate was 6,2%. RUO and no RUO GFR (ml/min) were as follows: hospital discharge 53,72±22,17 and 44,98±25,70, 1 month 56,93±20,05 and 47,64±24,06, 6 month 60,78±19,33 and 56,34±21,08, 12 month 64,61±21,39 and 54,92±25,22, 24 month 64,82±21,99 and 52,82±24,24.
The group with pre-transplant RUO had higher GFR at hospital discharge ($p=0,022$), 1 month ($p=0,008$), 6 month ($p=0,014$), 12 month ($p=0,013$) and 24 month ($p=0,03$).
Conclusion(s): No RUO is correlated with dialysis duration and represents a major risk factor among urological complications. In our study we observed that the presence of RUO seems to be a predictor of a better 2 years RG outcome. This study provides the rationale to further investigate this association.

8AP10-6

Impact of patient's comorbidities on graft function after kidney transplantation

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Background and Goal of Study: End-stage renal disease's (ESRD) prevalence is rising as well as its impact on patient's quality of life, with an increasing number of patients on renal replacement therapy. Kidney transplantation (KT) is the treatment of choice and the most cost effective to improve health status of ESRD patients. Several studies identified factors that may influence graft function (GF), such as cardiovascular disease. The aim of this study was to identify the impact of comorbidities on GF.
Materials and Methods: Retrospective observational study of ESRD patients transplanted between January 2010 and December 2012. Clinical data collected from medical records included sex, age at KT, co-existing diseases, operation time, cold ischemia time. Outcome was graft function evaluated by estimated glomerular filtration rate (eGFR) upon discharge and at 1, 3, 6, 12 and 24 months after KT. Statistical analysis was carried out using IBM SPSS Statistics v.21. Quantitative variables are presented as mean ± standard deviation. Student's t-test was used to analyze differences between co-existing diseases and eGRF (significance level $p< 0.05$).
Results and Discussion: The study analyzed 193 patients: 63,2% males; age 47 ± 13 years; operation time 107 ± 34 min; cold ischemia time 707 ± 463 min. Regarding co-existing diseases, 83,4% of patients had hypertension; 22,3% hyperlipidemia, 21,8% were smokers; 11,4% were diabetic; 5,2% suffered from ischemic heart disease; 4,7% had hyperuricaemia; 4,7% had history of stroke and 4,1% had peripheral arterial occlusive disease. The eGFR upon discharge was 86±38 ml/min, 71±34 ml/min at 1-month and 61±21, 61±21, 58±21 and 63±29 ml/min at 3, 6, 12 and 24 months, respectively. Only diabetes was associated with a decrease in eGFR at 1-month follow-up ($p=0,035$). The eGFR was 44±21 ml/min for diabetic patients versus 55±21 ml/min for non-diabetic patients. The rate of graft failure was 3,14% upon discharge and at 1-month and 4,21%, 4,83%, 5,65%, 7,56% at 3, 6, 12 and 24 months, respectively.
Conclusion(s): Unlike previous reports, in our study there was no association between graft dysfunction and cardiovascular disease during the first 2 years of follow-up. On the other hand, it seems that diabetic patients are more prone to early decrease in eGFR.

8AP10-7

Does intraoperative furosemide dose regimen act as an outcome renal graft factor?

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Background and Goal of Study: There is a continued search to identify factors that might modify renal graft (RG) function after kidney transplantation (KT). The aim of our study was to evaluate the influence of intraoperative furosemide dose on RG outcome.
Materials and Methods: Retrospective observational study of KT patients from January 2010 to December 2012. Data collected from medical records included: age, sex, medical diseases, anesthetic and surgical procedure duration, cold ischemia time, mortality rate and intraoperative total doses of furosemide. To evaluate outcome measures of renal function we analyze the glomerular filtration rate (GFR) upon discharge, at day 7 and 1, 3, 6, 12 and 24 month. Descriptive and univariate statistical analysis was made using IBM SPSS Statistics v.21. Categorical data are presented as percentages, continuous data as mean ± standard deviation. Pearson correlation was used to assess the relation between blood furosemide dose and GFR (significance level $p< 0,05$). Student's t test to analyze the difference between >=150 or < 150mg furosemide dose and GFR.
Results and Discussion: 193 patients were included, 122 males. Recipient and donor age (years) was 47,64±13,00 and 49,70±1,71. Anesthesia and surgery duration in minutes was 164,6±44,0 and 107,6±34,6. Cold ischemia time was 707,0±463,9min. Mortality rate was 6,2%. The mean dose of furosemide/Kg was 2,8±0,9mg/Kg (absolute dose of 178±46mg).
We observed a negative relation between the absolute dose of furosemide and GFR upon discharge ($r=-0.207$; $p<0,005$), 1st month ($r=-0,189$; $p<0,01$), 3th month ($r=-0,151$; $p<0,05$), 6th month ($r=-0,183$; $p<0,05$), 1st year ($r=-0,167$; $p<0,05$), 2nd year ($r=-0,155$; $p<0,05$). We also found a negative relation between the dose of furosemide by weight and GFR upon discharge ($r=-0.212$; $p< 0,005$), 1st month ($r=-0,217$; $p< 0,005$), 3th month ($r=-0,244$; $p<0,001$), 6th month ($r=-0,292$; $p<0,001$), 1st year ($r=-0,301$; $p<0,001$), 2nd year ($r=-0,328$; $p<0,001$).
When divided into 2 groups, <150mg and ≥150mg of furosemide, we found a statistical difference between groups, with the ≥150mg group showing a lower GFR at all follow-up times ($p<0.05$).
Conclusion(s): Intraoperative furosemide seems to have a negative relation with the GFR as showed in our results. To our knowledge, this association has not been reported elsewhere. More studies are necessary to investigate this association and derive the optimal furosemide dose for this type of surgery.

8AP10-8

Does chronic kidney disease duration influence renal graft outcome?

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Background and Goal of Study: Kidney transplantation is the first choice treatment for stage 5 CKD. Studies have been made in order to identify factors that might influence the outcome of renal graft. The aim of our study was to evaluate the influence of CKD duration on the outcome of renal function in kidney transplanted patients.
Materials and Methods: A Retrospective observational study of kidney transplanted (KT) patients from January 2010 to December 2012. Data collected from medical records included: age, sex, medical diseases, anesthetic and surgical duration procedure, cold ischemia time, mortality rate and duration of renal disease. To evaluate renal function outcome we analyzed glomerular filtration rate (GFR) at hospital discharge and 1st, 3rd, 6th, 12th and 24th month. Descriptive, univariate and multivariate statistical analysis was made using IBM SPSS Statistics v.21.
Results are presented as absolute value, percentage or mean±standard deviation. Spearman correlation was used to assess the relation between CKD duration and GFR (significance level $p<0,05$).
Results and Discussion: During study period, 257 patients were kidney transplanted. 159 medical records fulfilled. 105 male. Recipient age (years) 47,75 ± 12,94, donor age (years) 49,89 ± 11,44. Most frequently observed comorbidities were High Blood Pressure (83,64%), Dyslipidemia (31,52,3%) and smoking (23,41%). Anaesthesia and surgery duration (minutes) was 160,84±37,86 and 104,34±26,88. Cold ischemia time (minutes) was 717,27±463,15. Mean CKD duration was 132,24±109,38. Mortality rate was 6,2%.
We observed a negative relation between CKD duration and GFR postoperative at: hospital discharged ($r=-0,233$;$p=0,003$), one month ($r=-0,201$;$p=0,012$), three months ($r=-0,187$;$p=0,02$), six months ($r=-0,227$;$p=0,005$), one year ($r=-0,254$;$p=0,002$), two years ($r=-0,226$;$p=0,008$). Linear regression equation showed that for every month of CKD, GFR decreases an average of 0,06 ml/min [GFR(ml/min)= 68,95-0.06*CKD(months duration)].
Conclusion(s): Our study showed that CKD duration influence renal function outcome in kidney transplanted patients, with a relation between every month of disease duration and a decrease in postoperative GFR. These results reveal the importance of transplant CKD patients earlier.
References: TransplantInt.2014.27.19-27.

8AP10-9

Role of postoperative urinary output as a predictor of allograft function in renal transplantation

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Background and Goal of Study: Kidney transplantation (KT) offers patients with end-stage renal disease the greatest potential for longevity. Evidence has showed that postoperative urine output (PUO) at 7th day was a significant predictor of graft function[1]. The aim of this study was to analyze the influence of PUO on graft function after KT.
Materials and Methods: Retrospective observational study. Data collected from medical records of KT patients, January 2010-December 2012. We analyzed PUO ate day 1, day 7 and upon discharge. Main outcome was graft function evaluated by glomerular filtration rate (GFR) and Creatinine values (Cr), at 7th day, discharge, 1st, 3rd and 6th month, and 1st and 2nd year postransplant. Spearmen's correlation was used to analyze the association between GFR and Cr with PUO. ROC curves were used to analyze specificity and sensitivity of threshold values of the examined measures. (IBM SPSS Statistics v.21). Statistic significance was set as $p< 0.05$.
Results: 193 patients included, age 47.6±13.0 years. PUO was 2146±1996 mL at day 1, 1929±1117 mL at day 7 and 2016±930 mL upon discharge. We found a significant positive association between PUO and GRF at all times of follow-up ($p<0,05$): PUO at 1st day was related with GFR at discharge ($r=0.497$; $p< 0.001$), 1st month ($r=0.460$; $p< 0.001$), 3rd month ($r=0.319$; $p<0.001$), 6th month ($r=-0.405$; $p< 0.001$), 1st ($r=0.368$; $p< 0.001$) and 2nd year ($r=0.300$,$p<0.001$). PUO at 7st day was related with GFR at discharge ($r=0.356$; $p<0.001$), 1st month ($r=0.338$; <0.001), 3rd month ($r=0.211$; $p<0.01$), 6th month ($r=-0.298$; $p<0.001$), 1st ($r=0.344$; $p<0.001$) and 2nd year ($r=0.280$$p=0.001$). PUO at discharge was related with GFR at that time ($r=0.253$; $p=0.001$), 1st month ($r=0.320$; $p<0.001$), 3rdmonth ($r=0.270$; $p<0.001$), 6thmonth ($r=-0.353$; $p<0.001$), 1st ($r=0.373$; $p< 0.001$) and 2ndyear ($r=0.315$, $p<0.001$).
PUO was a good predictor of graft dysfunction(GFR< 30ml/min)(area under the curve of IC 95% 0.606-0.947). Only day 1 PUO correlated significantly with Cr, at discharge, 1st and 6th month, and 1st year postransplant ($p<0.01$).
Discussion and Conclusion: We found that PUO was associated with better outcome until the 2nd year postransplant, as assessed by GFR on these occasions. Moreover, it was a reliable predictor of graft dysfunction. Prospective studies should be conducted to identify protective measures that can positively influence the PUO as it represents the first sign of graft function.
Reference:
1. TransplantProc.2010;42(4):1090-2.

8AP10-10

Factors related to AKI (acute kidney injury) after HIPEC (hyperthermic intraoperitoneal chemotherapy) with platinum antineoplasic derivatives: case series report

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Background: HIPEC (hypothermic intraperitoneal chemotherapy) is becoming the election procedure for tumors whose extension involves peritoneum[1]. Antineoplasic platinum derivatives are demonstrating as superior in some of these patients, such as the ovarian cancer ones. Renal toxicity of iv. platinum derivatives is well know[2].
But, although its intraperitoneal administration plays a major role in the onset of renal failure, several perioperative factors may also favor changes in postoperative renal function.
Case report: We report a series of 46 cases undergoing HIPEC with platinum derivatives.
Demographic data and possible predisposing comorbilities such as hypertension (HTA), diabetes, hyperlipidemia (HLP) or peripheral vascular disease, which could influence the renal outcomes were collected. Renal function parameters included creatinin, urea and albumin at baseline and first postoperative days. Post-operative fluid balance was also included. Need of blood transfusion was also analysed. RIFLE classification was used to asses renal function. Patients were divided into two groups: patients with renal risk, injury or failure and patients with no renal alteration or renal risk.
Discussion: Renal function alteration was observed on 18 (39,1%) of them. None of them achieved loss grade according to RIFLE criteria until second postoperative day. Six (3,5%) patients required extra-renal depuration techniques. After one week renal function of 31 patients (67,4%) was normal.
Ten (83%) of the HTA patients and and 8 (72,7%) with HLP matched RIFLE criteria for AKI.
Blood transfusion was required in 26 patients (56,5%). Eleven (42,3%) of transfusions were required during the post-operative period. Blood unit number required during first days is related with the incidence of AKI.
References:
1. Bristow RE, Tomacruz RS, Armstrong DK et al. Survival effect of maximal cytoreductive surgery for advanced ovarian carcinoma during the platinum era: a meta-analysis. J Clin Oncol 2002;20:1248-59.
2. Zanon C, Clara R, Chiappino I, et al. Cytoreductive surgery and intraperitoneal chemohyperthermia for recurrent peritoneal carcinomatosis from ovarian cancer. World J Surg. 2004;28:1040-1045.
Learning Points:
- HTA and HPL are predisposing factors for the developent of AKI after HIPEC with platinum derivatives.
- Amount of blood transfusion is related with AKI in this case series.
- Studies should go deeper on the influence of this parameters on AKI development.

8AP10-11

Optimising preoperative haemoglobin in liver transplantation: fact or fiction?

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Background and Goal of Study: Red Blood Cell (RBC) transfusion is still highly prevalent in Orthotopic Liver Transplantation (OLT) and a coagulation disorder has been considered as a major cause. However the role of preoperative anaemia and his optimization has not been considered as a major factor contributing to blood transfusion.
Materials and Methods: We retrospectively analysed immediate preoperative haemoglobin and all hematimetric and anaemia related parameters available in the previous 3 months in all cirrhotic patients underwent OLT in our institution in the last five years.
Results and Discussion: 271 patients were analysed; 88% of patients were male and the mean age (SD) was 56 (9.2) years. Child-Puhg score A/B/C was in 25%, 30%, 45% of patients respectively. 64 % of patients had Hb value <12g/dL whereas 38% of patients had Hb under 10 g/dL. Anaemic profile for the last group was mostly macrocytic (47%) and normocytic (46%). Anaemia assessment was evaluated in only 17% patients.
Conclusion(s): Severe preoperative anaemia in cirrhotic patients undergoing OLT is high. Specific anaemia studies should be addressed to this population in order to decrease red blood cell transfusion in OLT.

8AP10-12

Does preoperative haemoglobin influence graft function after kidney transplantation?

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Background and Goal of Study: End-stage renal disease's (ESRD) prevalence is rising as well as its impact on patient's quality of life, with an increasing number of patients on renal replacement therapy. Kidney transplantation (KT) is the treatment of choice and the most cost effective to improve health status of ESRD patients. Anaemia is a frequent complication in chronic renal disease. Some studies suggest a positive correlation between haemoglobin concentration and graft function at 1-year. The aim of this study was to assess the impact of preoperative haemoglobin in graft function.
Materials and Methods: Retrospective observational study of ESRD patients transplanted between January 2010 and December 2012. Clinical data collected from medical records included: sex, age at KT, preoperative haemoglobin (Hb), operation time, cold ischemia time. Outcome was graft function evaluated by estimated glomerular filtration rate (eGFR) upon discharge and at 1, 3, 6, 12 and 24 months after transplantation. Pearson correlation was used to assess the relation between Hb and graft function (IBM SPSS Statistics v.21). Quantitative variables are presented as mean ± standard deviation. Statistical significance was set at $P<0.05$.
Results and Discussion: The study analyzed 193 patients: 63,2% males; age 47 ± 13 years; operation time 107 ± 34 min; cold ischemia time 707 ± 463 min. Preoperative Hb was 12,4 ± 1,6 g/dl, minimum Hb was 7,7 g/dl and maximum 18.0 g/dl. Only 1 patient (0,5%) had Hb <8g/dl and 7 (3,6%) had Hb <10g/dl. The eGFR upon discharge was 86±38 ml/min, 71±34 ml/min at 1-month and 61±21, 61±21, 58±21 and 63±29 ml/min at 3, 6, 12 and 24 months, respectively. Preoperative Hb was not correlated with graft function for any time of follow-up ($p>0,05$).
Conclusion(s): Unlike previous reports, in our study there was no association between graft dysfunction and preoperative haemoglobin, which may be related to the low incidence of anaemia in our sample.

8AP11-1

Effect of perioperative imnunonutrition on postoperative infectious and non-infectious complications: a systematic review and meta-analysis

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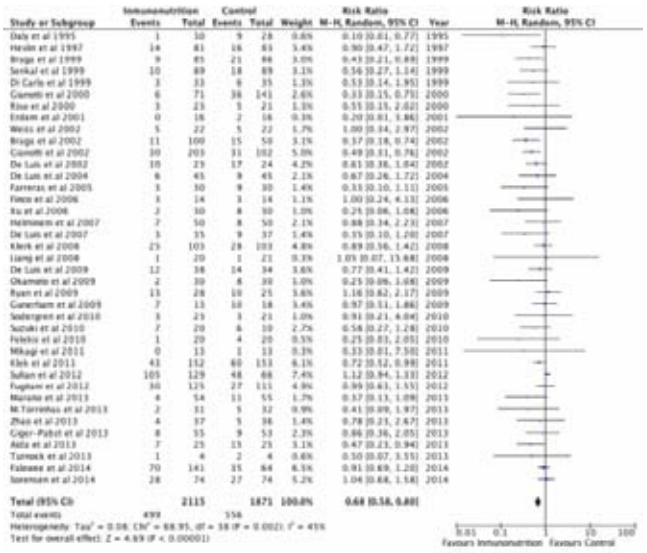
Background and Goal of Study: Malnutrition increases the risk of developing postoperative infection following gastrointestinal and head and neck surgery, and has negative impact on clinical outcome. The aim of the present meta-analysis was to assess the effects of perioperative imnunonutrition (IN) on postoperative infectious and non-infectious complications.
Materials and Methods: The meta-analysis was prepared in accordance with Preferred Reporting of Systematic Reviews and Meta-Analyses (PRISMA) recommendations. We performed a comprehensive search in MEDLINE, the Cochrane Central Register of Controlled Trials and Embase. Controlled clinical trials that compared perioperative IN diet with standard diet, reporting postoperative infectious and/or non-infectious complications following major surgery in adult patients were included.
Review manager ("Revman") for MAC was used for statistical analysis. Meta-analysis was carried out using the Mantel-Haenszel random- model, with results presented as risk ratio (RR) with a 95 percent confidence interval (CI). Forest plots were then constructed, considering $p<0.050$ as a statistically

significant effect. Sensitivity analysis was performed restricting to high quality studies (no random sequence generation and/or allocation concealment bias). Publication bias was assessed using a funnel plot.

Results and Discussion: 41 studies including a total of 4016 patients were selected for this study. The combined results showed that perioperative IN decreases postoperative infectious complications ([RR] 0.68, 95% [CI] 0.58 to 0.80; $I^2 = 45\%$)

(Figure 1), whereas there were no differences in non-infectious complications ([RR] 0.92, 95% [CI] 0.80 to 1.05; $I^2 = 1\%$). The analisys of overall complications,the use of perioperative IN in different time, formulations, surgeries and risk groups results in moderate heterogeneity in our analysis. Sensitivity analysis confirm our results. The asymmetry test result for the funnel plot was not statistically significant.



[Figure 1]

Conclusion(s): Perioperative IN contributed to reducing overall postoperative infectious complications whereas there were no differences in non-infectious complications.

8AP11-2

Could the severity of the inflammatory response predict the development of postoperative delirium after neoplastic colo-rectal surgery?

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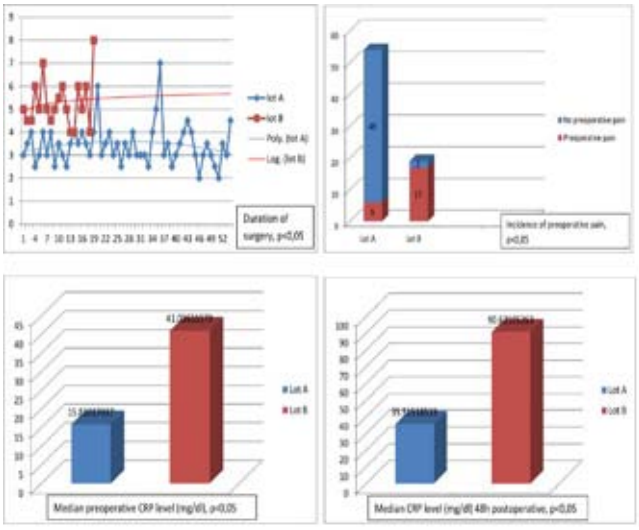
Background and Goal of Study: The aim of the study was to assess if there is a correlation between the severity of the disease and inflammatory response of surgical patients with colorectal neoplasia with the development of postoperative delirium.

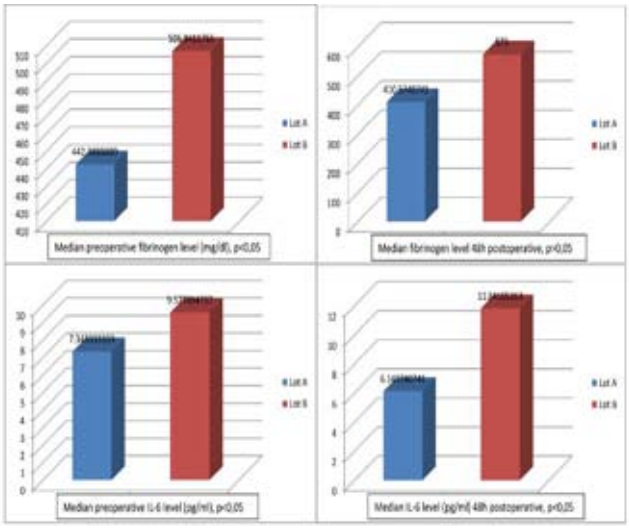
Materials and Methods: A retrospective observational study of 73 patients with surgery for colorectal cancer allocated in 2 groups. Group A 54 patients with no postoperative delirium

Group B 19 patients who developped delirium the first 48h.We compared the duration of surgery, incidence of preoperative pain, the CRP, fibrinogen, IL6, TNFα level preoperative, at 24 and 48h postoperative, $p<0,05$ statistically significant.

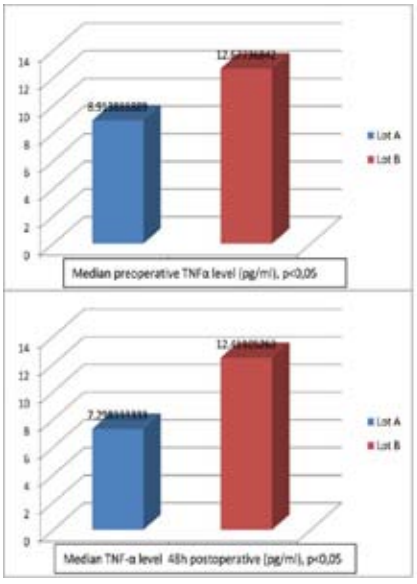
Results and Discussion: Significant differences concerning the duration of surgery, incidence of preoperative pain, significant lower CRP, TNFα, IL6 levels in group A, no significant difference in fibrinogen level.



[Results-1]



[Results-2]



[Results-3]

Conclusion(s): The severity of inflammation, the duration of surgery could be implied in the development of postoperative delirium.

8AP11-3

A validation study of the non-invasive measurement of oxygen consumption and delivery after elective major abdominal surgery

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Background and Goal of Study: Shoemaker[1] described an increase in oxygen consumption (VO_2) in patients after major surgery and presented evidence that the inability to meet this demand was associated with severe postoperative complications and mortality. Shoemaker used the pulmonary artery catheter to calculate VO_2 and DO_2. This is inconsistent with contemporary practice, which promotes minimally or non-invasive monitoring of patients. Indirect calorimetry is non-invasive and is the gold-standard method of estimating energy expenditure by directly measuring VO_2 and VCO_2. The esCCO monitor (Nihon Kohden, Japan) is a new non-invasive tool for estimating cardiac output (CO), deriving it from the pulse wave transit time estimated from the ECG and plethysmographic wave. The Pronto-7 (Masimo, USA) calculates haemoglobin using pulse co-oximetry. These can be combined to calculate VO_2 and DO_2 non-invasively. This study aims to assess the validity of non-invasive bedside estimations of VO_2 and DO_2.
Materials and Methods: A prospective observational study of paired minimally invasive (LiDCOrapid estimation of CO with arterial and venous blood gas analysis) and non-invasive measurements of VO_2 and DO_2 in the first 24 hours post-operatively in patients undergoing elective liver resections.
Results and Discussion: A total of 108 paired measurements from 21 patients were collected. Bland-Altman analysis corrected for repeated measures showed a bias (limits of agreement), percentage error for VO_2 and DO_2 of 68.2 (-95.5 to 231.8) $ml.min^{-1}$, 66.3% and -19.0 (-343.0 to 305.1) $ml.min^{-1}$, 39.6% respectively. Four-quadrant plot demonstrated concordance rates of 64.1% and 71.9% respectively. Polar plot analysis showed an angular bias (± radial limits of agreement) of -15.5 (±52)° and 1.98 (±50)° for VO_2 and DO_2 respectively, with 30° and 45° angular concordance rates of 60.0% and 86.7% for VO_2, and 82.5% and 92.5% for DO_2 demonstrating moderate/moderate-to-good trending ability.
Conclusion: Although there is a bias towards a lower VO_2 and slightly higher DO_2 with wide limits of agreements when measured non-invasively, these techniques demonstrate moderate to good trending ability and have the advantage of being totally non-invasive and therefore could be useful for the bedside monitoring of post-operative VO_2 and DO_2 patterns of ward patients.
References: 1.Shoemaker WC,Appel PL,Kram HB.Chest 1992;102:208-15

8AP11-4

Outcomes of surgery in neutropenic patients - tertiary cancer centre experience

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Background: Surgery in neutropenic patients is associated with significant mortality, however only limited data quantifying this risk is available. The aim of this study was to assess 30-day mortality following surgical procedures in this patient population.
Methods: We used electronic hospital database to retrospectively identify neutropenic patients undergoing surgical procedures at the Royal Marsden Hospital between 2010 and 2014. Neutropenia was defined as a neutrophil count (NC) of less than 1500 cell/mm^3 of blood. Primary outcome, 30-day mortality, was analysed in surgical subgroups (minor, intermediate, major, major+) based on procedure severity grades classified by the National Institute for Clinical Excellence (NICE) CG3 guidelines. Correlation between the severity of neutropenia and mortality was analysed as a secondary outcome. Comparisons between the groups were made using Fisher Exact Test.
Results: 96 procedure records were identified during the initial search. Of these, 34 operations were performed during the episode of confirmed neutropenia. 10 of them were classified as minor, 17 as intermediate, 2 as major and 5 as major+ operations. There was one death recorded in each of these groups, the only exception being the major subgroup with no mortality, resulting in overall mortality of 8.8%. There was no statistically significant correlation between the mortality and severity of neutropenia, with 2 mortalities in NC<500 (p=0.59) and 1 in NC 1000-1500 (p=0.37). No deaths were recorded in NC 500-1000 patient group. Further individual case analysis revealed that all three mortalities followed salvage procedures in acutely deteriorating patients already reliant on critical care input preoperatively.
Conclusions: Our data shows that surgery on a neutropenic patient in a specialist cancer hospital can be safely performed regardless of the severity of the operation and severity of neutropenia. We recognise that due to the small sample further studies are necessary to establish absolute safety of surgery in the neutropenic patients.

8AP11-5

C-reactive protein as a predictor of postoperative infective complications after elective colorectal surgery: is there an ideal cut-off value?

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Background and Goal of Study: Infective complications are the main cause of postoperative morbidity after elective colorectal surgery and it usually appears on postoperative day 6[1]. Therefore, an early detection is important before it becomes clinically apparent. C-reactive protein (CRP) seems to be a promising biomarker for the early diagnosis of anastomotic leakage after elective colorectal surgery[2]. However cut-off values and optimum days for CRP measurement remain unclear. The aim of this study was to assess the diagnostic accuracy of CRP in predicting major infective postoperative complication. The best cut-off value for each postoperative day (POD) was also assessed.
Materials and Methods: We conducted a single-centre, prospective study including all the patients undergoing elective colorectal surgery between 2011 and 2013. CRP was measured for the first 5 postoperative days (POD 1-5). Postoperative infectious complications included wound infection, anastomotic leakage and intrabdominal abscess. The best cut-off value for each day was calculated by receiver operating characteristic curve analysis. We also determined the positive and negative predictive value.
Results and Discussion: We included 282 patients. 25% of patients presented a postoperative infectious complication. Highest diagnostic accuracy was obtained for a CRP concentration of 17.0 mg/dl on POD5 (AUC 0,86), with a sensitivity of 86,4%, a specificity of 90,9%, a negative predictive value of 96% and a positive predictive value of 73%.
The best cut-off values and their respective area under the curve (AUC) for each POD are shown in the table.

	POD1	POD2	POD3	POD4	POD5
CRP (mg/dl)	13	23	22	17	17
AUC	0,74	0,75	0,83	0,85	0,86

[CRP Values]

Conclusions: CRP value of 17 mg/dl on POD5 presents a high negative predictive value for infective postoperative complications (96%). Therefore, CRP measurement allows safe and early discharge of selected patients after colorectal surgery.
Bibliography:
1. Singh PP et al. Systematic review and meta-analysis of use of serum C-reactive protein levels to predict anastomotic leak after colorectal surgery. Br J Surg. 2014;101(4):339-4.
2. Scepanovic MS et al. C-reactive protein as an early predictor for anastomotic leakage in elective abdominal surgery. Tech Coloproctol. 2013;17(5):541-7.

8AP11-6

The intraoperative continuous administration of norepinephrine during radical cystectomy and urinary diversion for urothelial carcinoma does not seem to influence cancer related-outcome: a follow-up study of a randomized clinical trial

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Background and Goal of the Study: The use of norepinephrine to compensate intraoperative hypotension has gained increasing acceptance. There is also evidence suggesting that norepinephrine may be implicated in angiogenesis and metastasis via oxidative stress[1]. Evidence exists that the anaesthetic technique applied during surgery impacts disease recurrence. The objective of this study was to assess if, depending on the intraoperative administration of norepinephrine, a difference in disease progression and survival could be determined after radical cystectomy.
Material and methods: We conducted a follow-up analysis of 166 patients, who were included in a previous RCT (83 patients with general anesthesia, epidural analgesia and intraoperative norepinephrine administration and 83 with general anesthesia and epidural analgesia). Patients underwent open radical cystectomy and urinary diversion between November 2009 and September 2012. Mean follow-up was 3.25 years [95% CI 2.98-3.52]. Cancer-specific, and overall survival were estimated using the Kaplan-Meier technique. The multivariate Cox-proportional-hazards regression model included all relevant variables.
Results and Discussion: Baseline anaesthesiological, preoperative oncological parameters and surgical data did not differ significantly between the two groups. Kaplan-Meier survival estimates for cancer-specific survival and overall survival did not differ significantly between the 2 groups (Log-rank P=0.73, hazard ratio: 1.21 [95% CI: 0.69-2.12] and P=0.51, hazard ratio: 0.91 [95% CI 0.53-1.56] respectively). Significant negative predictors for cancer-specific survival were a neoadjuvant chemotherapy (HR 3.43 [95%CI 1.74-6.79], P<0.001), poorly differentiated tumor (G3) (HR 2.05 [0.87-4.84], P=0.10) and pT stage (HR 2.74, [95% CI 1.52-4.94], P=0.001). Significant predictors of negative outcome for overall survival were neoadjuvant chemotherapy (HR 2.38 [95%CI 1.11-5.08], P=0.025), pN stage (HR 3.06 [95%CI 1.30-7.23], P=0.01), pT stage (HR 4.04, [95% CI 2.37-8.01], P<0.001) and elevated Charlson comorbidity score (age adjusted) (HR 1.40, [95% CI 1.56-1.69], P=0.001).
Conclusions: The intraoperative continuous administration of norepinephrine seems to have no significant negative impact on cancer related outcome in this patient population after radical cystectomy.
References:
1. Fitzgerald RJ: Is norepinephrine an etiological factor in some types of cancer? Int J Cancer 2009; 124: 257-63

8AP11-7

Local anesthetics inhibit the growth of human hepatocellular carcinoma cells

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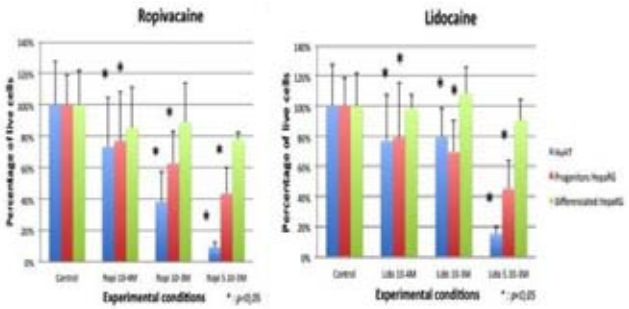
Background: Hepatocellular carcinoma (HCC) is a frequent and aggressive cancer with limited therapeutic options. The main treatment for early stage HCC is surgery despite a high risk of recurrence (70% after 5 years). Retrospective studies have shown that the administration of local anesthetics (LAs) during cancer surgery could reduce cancer recurrence (1). The purpose of this study was to investigate the effects of LAs on human HCC cells.
Materials and Methods: Two HCC cell lines were studied: HuH7 and HepaRG, the later as progenitor cells or differentiated into mature hepatocyte-like cells. Cells were cultured with or without different doses Lidocaine and Ropivacaine. Cell viability was assessed by a MTT assay after 48 hours of treatment. Cell cycle was studied with optical microscopy. Unsupervised genome-wide expression profiling was performed to identify relevant genes in Huh7. Those genes were then studied by RT-qPCR in HuH7 and HepaRG cell-lines.
Results: LAs decreased viability and proliferation of HuH7 cells and HepaRG progenitor cells in a dose-dependent manner. LAs had no effect on well-differentiated HepaRG (control group).



[Effect of LAs on HuH7 and HepaRG cell-lines]

The effects observed after Ropivacaine and Lidocaine treatments were different:
- Ropivacaine stopped the cell cycle in G2 phase. This was associated with a decrease in the mRNA abundance of key cell cycle regulators, especially involved in the G2-M transition phase, namely Cyclin A2 (CCNA2) (fold-change FC>2; p<0.001), Cyclin B1 (CCNB1) (FC>2; p<0.001), Cyclin B2 (CCNB2) (FC>2; p<0.001) and Cyclin-dependent kinase 1 (CDK1) (FC>1.5; p<0.01). Ropivacaine also decreased the expression of MKI67 (FC>2; p<0.001) a nuclear marker of cell proliferation.
- Lidocaine had no specific effect on cell cycle. Lidocaine increased by 10 times the mRNA level of adenomatous polyposis coli (APC) (FC > 1.5; p< 0.01), which acts as an antagonist of the Wnt/β-catenin pathway.
- Those results were confirmed by RT-qPCR in HuH7 and HepaRG.
Conclusion: Lidocaine and Ropivacaine were shown to specifically inhibit the growth of HCC cells *in vitro* in a dose-dependent manner.
References: 1. Aristomenis et al; Anesthesiology 2006.

8AP11-8

Is preoperative exercise test a predictor for extubation success in morbid obese patients?

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Background and Goal of Study: Our aim was to evaluate the success of "60 seconds 60 meters walk test" in predicting the extubation success and postoperative ICU need in morbid obese patients undergoing "laparoscopic sleeve gastrectomy".
Materials and Methods: After getting the ethical committee approval and patient consent, Fifty ASA status I-III patients between 18 and 60 years old with BMI higher than 40 undergoing laparoscopic sleeve gastrectomy were included to the study. Preoperative arterial blood gas (ABG) sample was taken. Before exercise (BE) peripheral oxygen saturation (SpO2), , respiratory rate (RR) and forced vital capacity (FVC) measured with Wright Respirometer were noted. Patients were asked to walk a preset 60 meters distance under 60 seconds with a fast walking pace. Following test, SpO2, RR and FVC were measured and ABG sample was taken. Standard morbid obese anesthesia was induced and at the end of the surgery patients with successful extubation were transferred to post anesthesia care unit (PACU) then to the ward (group I). Patients with unsuccessful extubation or patients with respiratory difficulty in the postoperative care unit were admitted to ICU (group II) On 30th minute, SpO2, RR and FVC and on 60th minute ABG values were recorded. Friedman test and Wilcoxon for posthoc, and multivariate test and Hotelling's Trace was used for statistical analysis.
Results and Discussion: 47 patients completed the study. All 47 patients were extubated and 40 were admitted to ward after PACU. In all 40 patients FVC values increased following the walk test. 7 patients were admitted to ICU. 5 of them had a decrease in FVC values after walk test and 2 of them had no change in FVC values. Post exercise (PE) and postoperative (PO) FVC values of group II were significantly lower compared to group I. In both groups BE and PE FVC values were significantly higher compared to POFVC. PO RR values of group II were higher, PE SpO2, PO SpO2, PEPaO2, POPaO2 levels were lower in group II compared to group I. In every patients who did not need ICU support, FVC values increased with exercise. In contrast, this increase was not observed in patients who needed postoperative ICU support.
Conclusion: We believe "60 seconds 60 meters walk test" can be valuable in predicting the extubation success and postoperative ICU need in morbid obese patients undergoing "laparoscopic sleeve gastrectomy".

8AP11-9

A comparison of three spontaneous breathing trial techniques

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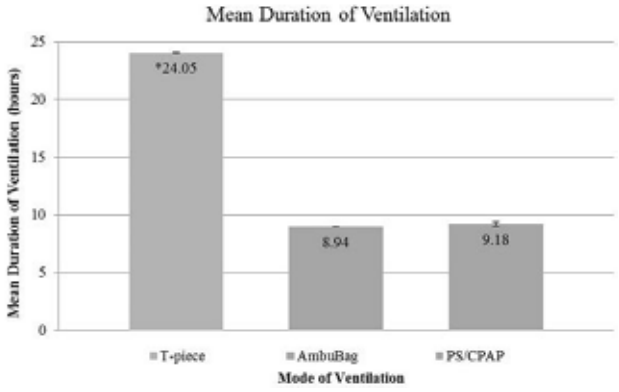
Background: Unplanned extubation in intensive care requires a patient to be re-intubated, prolongs duration of stay in hospital and is associated with increased mortality[1]. In order to test extubation readiness, spontaneous breathing trials (SBTs) are performed. Various SBT techniques can be used in clinical practice and include low-level pressure support continuous positive airway pressure (PS/CPAP), and unassisted T-piece circuits. We evaluated these two techniques against another less commonly described. This third technique relies on using an AmbuBag/resuscitation bag to increase the work of breathing.
Methods: A retrospective study examining all records between 2010-2012 of patients who were intubated in the ICU of a tertiary cardiothoracic hospital in the UK (n=6202). Patients admitted following coronary artery bypass graft (off/on pump), valve repair/replacement, atrial/ventricular-septal defect repair or transcatheter aortic valve implantation surgery were included (n=4836). The total duration of ventilation, type of SBT prior to extubation and whether the patient required re-intubation were analysed. Data were analysed using excel and a chi-square test was used to test differences. Values are presented as mean ± 95% CI.
Results: The T-piece had a significantly higher rate of re-intubation when compared to the other two techniques (*p = $0.047x10^{-8}$ (2d.f)) (table.1). The T-piece population's mean duration of ventilation was also significantly higher (*) (Figure 1).

	T-piece	PS/CPAP	AmbuBag	Total
No re-intubation	322	3545	889	4756
Re-intubation	22*	49	9	80
Total	344	3594	898	4836

[Table 1]



[Figure 1]

Conclusion: The modified SBT technique using the AmbuBag was as effective as low-level PS/CPAP and better than T-piece circuits. There was no significant difference in duration of ventilation between those tested with the AmbuBag and PS/CPAP. Those on T-piece circuits, however, were ventilated for significantly longer durations and incurred a significantly higher rate of extubation failures suggesting that the patient population were more difficult to wean from ventilator support.

8AP11-10

Utility of preoperative CPAP in obese patients with obstructive sleep apnea

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Background: The obese patient has a high risk of OSA (Obstructive Sleep Apnea) and would take multiple benefits with the use of preoperative CPAP.
Materials and Methods: A systematic multicentric and retrospective review of our recorded data were analyzed. Were enrolled 24 patients with BMI>40 kg /m² started to general anesthesia for abdominal surgery. All patients underwent preoperative respiratory STOP-BANG evaluation. Rx chest, spirometry and EGA were performed. The patients were divided into 2 groups. Group A: it was planned preoperative CPAP therapy after polysomnographic examination in patients with respiratory disease and the presence of risk factors (sleep apnea, BMI>35 kg/m², neck circumference >40 cm). Grup B: In the absence of the criteria previously exposed was not carried preoperative CPAP. It was evaluated the occurrence of respiratory complications (SpO2 <90% in air, upper airway obstruction, pulmonary edema, bronchospasm, pneumothorax).
Results: According to the above criteria 112 patients were included in Group A and 130 patients in Group B. In Group A 67 patients with pulmonary restrictive pathology, hypoxemic chronic respiratory failure, STOP-BANG> 3, underwent a polysomnography (PSG) and perioperative CPAP with diagnosis of OSA; 45 patients with major risk factors to STOP-BANG questionnaire were undergoing treatment for perioperative auto-CPAP.
In Group B 52 patients required respiratory monitoring (1-12h) after extubation for obstruction of the upper airways (SpO_2 < 90% on air) and respiratory care by CPAP with improvement of EGA; in 9 patients was required reintubation and the use of invasive ventilation due to bronchospasm.
Discussion and Conclusion(s): Studies report the benefits of CPAP in the perioperative period: improves SpO_2, reduces complications, hospitalization, the need for reintubation, allows to handle the administration of analgesic without complications. In obese patients subjected to intervention, it is essential the use of PSG to make diagnosis of OSA and start CPAP therapy or simply clinical judgment and the use of devices APAP (Automatic Positive Airway Pressure, auto-CPAP). The literature reports algorithms to use in patient with high risk of sleep apnea to clinical evaluation that allow to undertake therapy using auto-CPAP, reserving the PSG in those patients do not respond adequately to treatment.
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8AP11-11

Creation of a preoperative optimization protocol for patients with obstructive sleep apnea high risk in elective surgery

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Background and Goal of Study: The Obstructive Sleep Apnea (OSA) Syndrome is the sleep respiratory alteration with systemic[1] affectation more prevalent and under-diagnosed. The anaesthetic considerations in front of an OSA patient are well known. Our objective is the creation of an established preoperative circuit to identify and optimize patients with OSA high risk.
Materials and Methods: An interdisciplinary group was created. During the pre-assessment clinic the STOP-BANG[2] questionnaire was filled. Using general data, it was estimated that in our hospital approximately 1567 patients/ year present OSA high risk. It was agreed the application of all the measures in the preoperative manage proposed by the different scientific societies.
There were proposed three circuits of preoperative optimization, according with the surgical risk and prioritization.
- *A very fast circuit:* For patients waiting for a high risk surgery with general anaesthesia.
- *A normal circuit in no deferred surgery:* The sleep study is requested but without postponing surgery.
- *A normal circuit in deferred surgery:* Sleep study is requested preferentially and surgery is postponed until it.

At the same time it was created a postoperative protocol to treat complications in these patients.
Results and Discussion: The STOP-BANG questionnaire rises the pre-assessment clinic time. The very fast circuit is effective in approximately one month since the request. The postoperative protocol has never been activated from this moment.
Conclusion: The patient manage recommendations have to be adjusted to the center possibilities and they are not easy to achieve in the daily practise. The creation of new circuits and manage measures cause almost always an increase in the use of resources which is not always assumable. Many improvable things still have to be done, especially in patients monitoring.
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Acknowledgements: Thanks to Bassols MD and Cañellas MD for all their knowledge shared with us.

8AP12-1

Do local anaesthetics frequently cause perioperative allergic reactions?

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Background and Goal of Study: Local anaesthetics (LA) are often suspected as a possible cause of allergic reactions during procedures in local anaesthesia. Perioperatively, LA are used as a supplement to general anaesthesia or alone as spinal anaesthesia. The Danish Anaesthesia Allergy Centre (DAAC) is the national reference centre for investigation of perioperative allergic reactions, and patients have been investigated since 1999. It has not previously been examined how frequent perioperative exposure to LA cause allergic reactions. The purpose of this study was to investigate the incidence of perioperative allergic reactions to LA.
Materials and Methods: In the period 2004 - 2013, a total of 409 patients (244 women/165 men; median age 49 yrs, range 1-86 yrs) were investigated in DAAC on suspicion of allergy associated with anaesthesia and surgery. Investigations comprised a combination of in-vitro tests, skin tests and provocation with all drugs and substances the patient was exposed to.
A total of 165 (40%) patients were exposed to one or more LA. Suspected allergy to LA was investigated by prick test, intradermal test and subcutaneous provocation with the suspected drug. Patients with positive skin tests still underwent subcutaneous provocation, as false positive skin tests can occur.
Results and Discussion: A total of 207 test series with LA were carried out on 165 patients (89 women/76 men; median age 54 yrs, range 2-85 yrs) with the following drugs: Lidocaine n=80 (48%), bupivacaine n=84 (51%), ropivacaine n=31 (19%) and mepivacaine n=12 (7%). All 165 patients had negative subcutaneous provocation for all tested LA (confidence interval 0-1.8%). Two patients had positive skin tests and both tolerated subsequent subcutaneous challenge with the same LA, and skin test results were deemed false positive. Investigations revealed another allergen in 55 out of 165 patients, and most frequent were: chlorhexidine n = 12, cefuroxime n = 8 and patent blue n = 7.
Conclusion: None of the 165 patients with suspected perioperative allergic reactions and exposure to LA reacted on subcutaneous provocation with the relevant LA. Thus, no patients have been diagnosed with allergy to LA in DAAC in the period 2004-2013 and allergy to LA must be considered very rare in this population.
The incidence of allergy to LA during minor procedures performed in LA alone, is not known, and should be further investigated using subcutaneous provocation with the relevant LA.

8AP12-2

Epidural analgesia in gynae-oncology patient - does it influence postoperative renal and cardiac function, hospital length of stay and 30 day outcomes?

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Background and Goal of Study: Epidural anaesthesia provides the gold standard for analgesia for major surgery, whilst also obtunding the surgical stress response and reducing peri-operative complications[1]. However, they carry the risk of peri-operative hypotension which may lead to adverse cardiac events and renal dysfunction in the post-operative period. Treatment strategies to counteract hypotension may require increased fluid and vasopressor administration which in itself may be detrimental. These concerns about renal and cardiac dysfunction have led to a review of our standard practise for gynae-oncology surgery.
Materials and Methods: We audited the casenotes of 54 patients undergoing major gynae-oncology surgery at our hospital between October 2013 - September 2014. Data on the incidence of hypotension, defined as 20% outwith of the patient's baseline blood pressure, was collected for the intraoperative and 24 hours postoperative period. We also collected data for age, pathology, type of surgery, pre and postopearative urea and creatinine, renal and cardiac morbidity for the first 24 hour period, 30-day mortality and length of stay.
Results and Discussion: The average age of our cohort was 57 years (range 21 - 84). Total abdominal hysterectomy with bilateral salpingo-oophorectomy and omentectomy was the most common surgical procedure performed. The episodes of intraoperative hypotension were - 0 episodes (10%), 1-10 episodes (35%), 11-20 episodes (22%), 21-30 (24%) and >30 episodes (9%). The episodes of postopertive hypotension were - 0 episodes (24%), 1-10 episodes (54%) and 11-10 episodes (22%). Our observed data confirms that the vast majority of our patients remain hypotensive in the perioperative period. Two patients had an abnormal renal function preoperatively which continued into the postoperative period. No other patient developed renal dysfunction 24 hours postoperatively. There was no adverse cardiac events in the first 24 hour period and 30 day mortality was 0%. Average length of stay was 7 days (range 4 - 27).
Conclusion(s): Our data, albeit from a small cohort, shows that despite the episodes of perioperative hypotension, epidural analgesia use in our cohort does not appear to increase the incidence of renal dysfunction, adverse cardiac event, length of stay and 30 day mortality.
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8AP12-3

Factors associated with GI dysfunction after elective colorectal surgery in patients receiving epidural analgesia

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Background and Goal of Study: Epidural analgesia is routinely used for open midline colorectal surgery. A high incidence of hypotension with consequent fluid overload is reported as a side effect. This may compromise splanchnic blood flow, and in turn lead to gut dysfunction. We conducted a retrospective cohort study to identify factors that may be associated with postoperative gastrointestinal dysfunction following elective colorectal surgery in patients who received epidural analgesia.
Materials and Methods: The patient cohort in question was identified over a three-year period from our Enhanced Recovery Database. Age, gender, comorbidities, intraoperative interventions, postoperative blood pressures, fluid balance data and outcome parameters were collected.
Results and Discussion: Gut dysfunction was recorded in 43 of 192 patients (22%) i.e. 35 (18%) of ileus and 8 (4%) of anastomotic leak. The mean age and severity of illness of those with and those without gut dysfunction were similar. The proportion of males with and without gut dysfunction was 79% compared to 58%, (95% CI 5% to 37%, p=0.02). Risk-adjusted outcome analysis showed

hospital length of stay to be 18.1 days vs 10.9 days (p<0.001) for gut dysfunction and non-dysfunction cases respectively. Mean Systolic Blood Pressure was 122 vs 117 mm Hg (p=0.06), Diastolic Blood Pressure was 64 vs 60 mm Hg (p=0.01) and Mean Arterial Pressure was 83 vs 79 mm Hg (p=0.008) for gut dysfunction group compared to non-gut dysfunction. No significant difference was found in fluid balance.
The rate of ileus (18%) and anastomotic leak (4%) in our study appears to be consistent with the range reported in the literature. We also note that there was a high preponderance of men in our gut dysfunction group (79%) and again previous literature is consistent with this finding.
Conclusions: As might be expected, patients with gut dysfunction had a prolonged hospital length of stay. None of the factors, recognised as both side effects of epidural analgesia and also linked to post-operative gut dysfunction, showed correlation in our cohort. In the absence of any clinical indications for critical care, managing this patient group in a ward area does not appear to confer any additional risk for gut dysfunction.
Future studies should investigate whether alternative analgesic techniques such continuous wound infusions or rectus sheath catheters provide any advantages in terms of gut dysfunction compared to epidural analgesia.

8AP12-4

Can preoperative multimedia information provision decrease perioperative patient anxiety during regional anesthesia? A randomized controlled trial

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Background and Goal of Study: Preoperative information provision is the most effective approach for alleviating the patient's anxiety during the operation. We aimed to investigate the effect of showing pre-recorded spinal anesthesia procedure video on perioperative anxiety of the patients undergoing surgery under spinal anesthesia.
Materials and Methods: A total of 110 patients undergoing inguinal hernia operation under spinal anesthesia were allocated into study (Group I, n = 55) and control (Group II, n = 55) groups. The study group watched an informative pre-recorded short film depicting the spinal anesthesia procedure. Patient anxiety levels were assessed via Visual Analogue Scale (VAS), Hospital Anxiety Depression Scale (HADS) and State Trait Anxiety Inventory (STAI). The importance of difference for means and medians between the groups was tested by Student's t-test and Mann Whitney U tests, respectively. Categorical variables were analyzed by Pearson's Chi-Square test. Wilcoxon signed test was used to analyze the presence of significant difference between pre- and postoperative scores within the groups. Spearman's Correlation test was used to investigate the presence of any significant relation between constant variables. P<0.05 was accepted as significant.
Results and Discussion: The operation morning State Anxiety score was lower in the Group I, (P=0.007). There was positive correlation between the education level and the preoperative HAD Anxiety scores of the patients (r=0.256, P=0.010), whereas the education levels and the postoperative State Anxiety scores were negatively correlated (r=0.256, P=0.008). Significantly positive correlation was determined between preoperative VAS scores and HAD Anxiety (r=0.386, P<0.001), as well as State Anxiety scores (r=0.300, P=0.002). Preoperative HAD-anxiety and HAD-depression scores of the patients were high for both groups. This can be linked to cessation of pharmacological sedation preoperatively.
The authors suggest the usage of pharmacological sedation routinely.
Conclusion: Preoperative multimedia information of the patients scheduled for the operation under spinal anesthesia had favorable effects on perioperative anxiety levels.

8AP12-5

An audit of enhanced recovery anlagesia guidelines in colorectal patients

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Background and Goal of Study: The enhanced recovery after surgery (ERAS) pathway is now used routinely in elective colorectal operations. We audited the use of the pathway's pain management guidelines to assess to what extent the guidelines are being followed and how effectively pain control after surgery is being achieved.
Materials and Methods: We looked at all patients undergoing a colorectal operation within one month who were managed on the ERAS pathway. We collected data on analgesia prescribed, type of regional anaesthesia used, pain scores and analgesia used post operatively as well as length of stay. Patients were collected prospectively and all data submitted to a pre-prepared database.
Results and Discussion: A total of 31 patients were studied. Compliance to prescription of analgesia pre-operatively was variable - the majority (n=23) were prescribed paracetamol but less than half (n=13) were prescribed ibuprofen. Perioperatively, 9 patients were given epidurals, however 5 of these were for laparoscopic cases where the ERAS guidelines suggest spinal anaesthesia. Length of stay in this group of patients was increased (8 days) when compared to those who had spinal anaesthesia for similar operations (6.2 days). In those patients who had spinals (n=18), pain scores were higher overall when compared to those with epidurals and there was also a significant use of breakthrough IV morphine. However, overall lengths of stay were shorter in those with spinals (5.6 days) compared to the epidural group (7.1 days). 95% (n=29.5) patients used regular paracetamol (IV or oral) however very few patients (18% n=5.5) where given regular NSAIDs. 55% (n=17) were started on oral analgesia on the day of operation however 5 patients had prolonged ileus which necessitated conversion back to the IV route.
Conclusion(s): More work needs to be done to ensure patients are prescribed the appropriate analgesia pre-operatively and if the decision is taken not to use NSAIDs this needs to be documented in the notes. The use of epidurals in patients undergoing laparoscopic procedures needs to be assessed as they could increase length of stay these patients.

8AP12-6

How expensive is the quality in treatment of postoperative pain? Evaluation of the costs for analgesic drugs, involved in the implementation of the quality management system

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Background and Goal of Study: The implementation of a quality management system (QMS) for treatment of postoperative pain (POP) allows the reduction of pain intensity with a simultaneous decrease of analgesic-induced side effects (1,2). The aim of this study was to evaluate the costs of the analgesic drugs, involved in QMS implementation.
Materials and Methods: Total annual costs and the sum of the "Daily Defined Dose" (DDD) of the analgesic drugs, given to the patients in 4 surgical departments (visceral and trauma surgery, orthopaedics and gynaecology) were calculated and compared before (2007) and after (2009) QMS implementation. In addition to the actual costs, the costs were considered on the basis of the list prices of the corresponding years in order to exclude effects of price adjustments in the hospital.
Results and Discussion: The annual costs of the analgesics, based on the list price, increased by 10.3% after implementation of the QMS (2009) in comparison with the level before (2007). The sum of DDD in 2009 increased by 22.3 % compared to 2007, this increase can be explained by an increased use of peripheral analgesics: the consumption of the peripheral analgesic metamizol only has almost doubled from 14,185 to 27,938 DDD, the use of ibuprofen increased from 24,708 to 34,639 DDD. The use of opioids and local anaesthetics slightly decreased.
Conclusion(s): The costs of analgesics during the implementation of the QMS for POP at the university hospital increased by 22% due to more frequent use

of peripheral painkillers. The latter change might have contribute to the lower level of opioid-induced side effects, measured in previous investigation (2).

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8AP12-7

Quality of life 3 months after surgery

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Background and Goal of Study: The EQ-5D is a questionnaire frequently used to measure changes in health-related quality of life (QoL) over time. The aim of this study was to evaluate the QoL 3 months after surgery.
Materials and Methods: Patients undergoing amputation, knee/hip arthroplasty, mastectomy, inguinal hernia, cholecystectomy, thyroidectomy, hysterectomy and lung surgery on 3 consecutive months were prospectively included. Patients unable to give informed consent or with cognitive impairment (Mini-mental State Examination < 24) were excluded. The EQ-5D consists of a visual analogical scale (VAS) from 1-100 and 5 questions: mobility (MO), self-care (SC), usual activities (UA), pain or discomfort (PD), and anxiety or depression (AD) with 5 choices each (1-5, score≥3 indicating problems). It was performed pre-operatively (T0) and 3 months after surgery (T3). Parametric and non-parametric tests were used for comparisons. Results were considered statistically significant when $p < 0.05$.
Results and Discussion: At T0, 196 patients were evaluated and 173 at T3. Comparing T0 with T3, there was an improvement on EQ-5D VAS (78 vs. 80, $p < 0.001$), UA ($p=0.033$) and AD ($p < 0.001$). The median of age was 63, older patients had lower VAS ($p=0.001$) and more problems on MO ($p < 0.001$), SC ($p=0.001$) and UA ($p=0.001$). Male patients had lower VAS at T0 (70 vs. 80, $p=0.037$) and more problems on MO at T3 ($p=0.03$). Patients with higher ASA physical status had lower VAS (50 vs.80, $p=0.002$) and more problems on MO ($p=0.002$), SC ($p=0.001$) and UA ($p=0.016$). History of arterial hypertension (AHT), chronic obstructive pulmonary disease (COPD) and diabetes mellitus (DM) were related with problems at T3 on MO ($p=0.003$, 0.013 and 0.011) and SC ($p=0.001$, 0.003 and 0.043), respectively.
Patients submitted to amputation had lower VAS before (50 vs. 80, $p=0.001$) and after (60 vs. 80, $p=0.011$) surgery. Problems on MO, SC and UA were identified in patients who underwent amputation or knee/hip arthroplasty ($p < 0.001$). Patients submitted to amputation had more complaints on PD ($p=0.019$) and AD ($p < 0.001$). Patients with problems on MO ($p < 0.001$), SC ($p < 0.001$), UA ($p < 0.001$), PD ($p=0.026$) had longer hospital stay.
Conclusions: QoL improved after surgery. Age, gender, history of AHT, COPD or DM influenced the occurrence of problems on some dimensions. Patients submitted to amputation or knee/hip arthroplasty had lower scores in some domains. Problems on MO, SC, UA, PD prolonged the hospital stay.

8AP12-8

Can surgical approach affect postoperative analgesic requirements following laparoscopic nephrectomy: transperitoneal versus retroperitoneal?

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Background and Goal of Study: There are multiple studies comparing transperitoneal and retroperitoneal approach for laparoscopic nephrectomy in terms of surgical outcomes, although not much is known for acute postoperative pain. Primary outcome of this study was to compare epidural analgesic consumption in laparoscopic nephrectomy patients operated via transperitoneal or retroperitoneal approach.
Materials and Methods: Following institutional ethical committe approval (2009/1789) and informed consent of participants, 44 patients were enrolled in this randomized controlled trial. For both groups, standard general anesthesia was induced after insertion and testing of low thoracic epidural catheter. Nephrectomy was completed via transperitoneal (Grou p T) or retroperitoneal (Group P) approach. Patients were given epidural 10 mL %0.25 bupivacaine and iv 1 g paracetamol following removal of laporoscopic ports. Both groups received patient controlled epidural analgesia (1 mg/mL bupivacaine and 1 μg/mL fentanil solution, basal:5 mL, bolus: 4 mL, lock out interval 20 min, 4-h limit 30 mL). Dynamic and static pain was evaluated using visual analog scale (0-10 cm). Rescue analgesia (VAS≥4) was iv tramadol 1 mg/kg. Patient demographic data, surgery and general anesthesia duration, VAS scores at extubation, postoperative 30th min, 2nd, 6th, 12th, 18th, 24th, 36th and 48th h as well as epidural analgesic consumption were recorded. Outcomes (Incidence of nausea-vomiting, time to first mobilization, return of bowel sounds, hospital stay) were also documented. Student’s t test and Mann Whitney U test was used for quantitive data depending on data distribution. Categorical data was analyzed using chi-square.
Results: Data from 40 patients were analyzed. Groups T (n=20) and P(n=20) were similar in terms of demographics and duration of surgery and anesthesia. Group R had higher static and dynamic VAS scores till 6th hour and higher dynamic VAS scores till 12th hour. Epidural analgesic comsumption was higher in Group R until postoperative 12th hours (69.9±13.5mL in Group T, 78.9±10.9 in Group R;p=0.025). More patients in Group R required rescue analgesia in early period. Groups were similar in terms of outcomes except shorter hospital stayin Group R.
Conclusion: Retroperitoneal laparoscopic nephrectomy is related with more severe pain compared to transperitoneal approach in early postoperative period.

8AP12-9

Do differences in pain management practices in the USA versus internationally affect patient reported outcomes?

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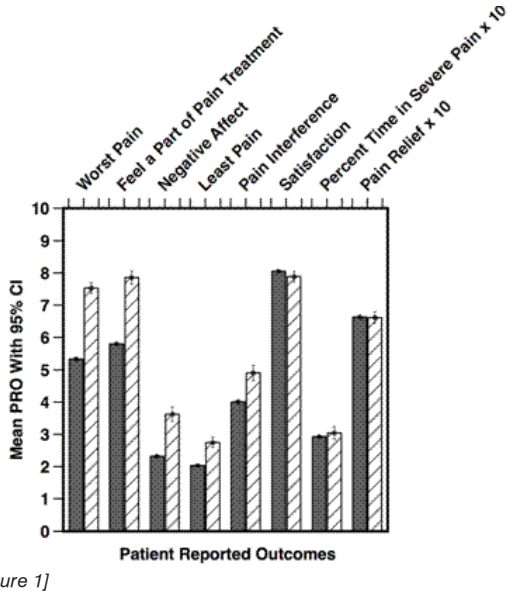
Background and Goal of Study: Poorly controlled pain after surgery is a major problem despite efforts to improve it. USA hospitals regularly assess pain because it is a credentialing requirement. We hypothesized that this would result in meaningfully lower pain reports on the first day after surgery in USA hospitals vs in other countries.
Methods: Using the PAIN-OUT international acute pain registry (www.pain-out.eu) to examine perioperative pain control in orthopedic surgery patients, we compared patient reported outcomes (PROs) in a pooled patient sample from four American (N = 1011) vs 45 International hospitals (INT) hospitals (N = 28,510).
Results and Discussion: Figure 1 summarizes the scaled PROs, contrasting the means with 95% confidence intervals for the USA (striped) and INT (solid) samples. Because of the large sample sizes, statistical inference focused on effect size, not on significance. All PROs had large-medium effect sizes except for last 3 on the right. USA patients, contrary to prediction, had higher mean Worst Pain reports than INT patients.



[Figure 1]

To determine whether American patients were under medicated, we tallied perioperative opioid administration in the two samples, creating the variable 'Opioid Load'. Mean opioid load (+/- SD) = 3.28 (.685) for USA & = 2.20 (.864) for INT patients, large effect size. USA patients received more opioid medication than INT patients.
Heavy opioid medication in USA patients may sensitize them to nociception, creating higher mean Worst Pain. Using Opioid Load, we identified patients in the lowest quartiles of each sample (N = 99 USA and 13,601 INT) as minimal opioid recipients. Means for Worst Pain (+/- SD) were 6.62 (2.85) for USA and 4.93 (2.80) for INT, a medium effect size. The higher mean Worst Pain score in the USA sample does not appear to result from high opioid medication.
Conclusion: The higher mean Worst Pain score in USA patients on the first day after orthopedic surgery eludes simple explanation. USA patients receive more pain medication than INT patients and yet report worse pain. This merits further investigation.
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8AP13-1

Early increase of arterial lactate level as a predictor of anastomotic leakage after esophagectomy: a retrospective analysis

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Background: Anastomotic leakage (AL) is a serious complication after esophagectomy and it increases morbidity and mortality. Therefore, it is important to predict it early before it becomes clinically apparent. Previous study [1] showed some risk factors for the development of AL after esophagectomy. However, arterial lactate level as a predictor of AL has not been made sufficiently clear. This study was conducted to identify variables associated with AL after esophagectomy.
Methods: After obtaining approval of our Ethical Review Board, we reviewed retrospectively 52 patients who underwent esophagectomy with intrathoracic procedure by the same surgical team from October 2010 to September 2014. We evaluated their preoperative status, anaesthetical and surgical procedures. Postoperative variables on postoperative day (POD) 1 including body temperature (BT) and laboratory date such as C-reactive protein (CRP) level, white blood cell (WBC) count, lactic acid value were collected from medical records. Postoperative AL was defined as patients needed starvation cure and/or drainage after image diagnosis or physical examination. Univariate analysis was performed using Mann-Whitney *U* test or χ^2 test and multivariate analysis was performed using logistic regression model. All data was expressed as mean ± SD. $P < 0.05$ was considered statistically significant.
Results: AL developed in 21 patients (40.4%) and on between POD 4 and 38 (median, POD 8). All cases were treated conservatively and there was no early death within POD 30. There were no differences in profiles of patients (age, gender, body mass index and complication such as diabetes or renal insufficiency). In the univariate analysis, duration of surgery in patients with AL was significantly longer than in those without AL (685±102 vs. 605±107 min: $p=0.017$). The patients with and without AL had no difference in CRP level, WBC count and BT on POD 1. Arterial lactate level on POD 1 in those who developed AL tended to be higher than in those without AL (2.91±1.35 vs. 2.32±0.97 mmol/L: $p=0.079$). Multivariate analysis demonstrated that the duration of surgery (unit odds ratio 1.67: $p=0.040$) and arterial lactate level on POD 1 (unit odds ratio 2.11: $p=0.037$: 95% confidence interval, 1.11-4.67) were significant factors for AL.
Conclusion: According to this limited evidence, arterial lactate level on POD 1 may be useful as an indicator to consider AL.
Reference: 1. Kassis, et al. Ann Thorac Surg 2013;96:1919-26

8AP13-2

Poor quality of recovery after major bariatric surgery

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Background and Goal of Study: Quality of recovery (QoR) after anesthesia is an important measure of the early postoperative health status of patients. The aim of our study was to determine factors associated with poor QoR in laparoscopic bariatric surgery (LBS).
Materials and Methods: Observational prospective study approved by the institutional ethics committee and written informed consent was obtained. All consecutive adult Portuguese-speaking patients submitted to major LBS, during a 6-mont period of time. Demographics data and perioperative variables were recorded. The Quality of Recovery 15 was used to measure QoR after anesthesia. Poor Quality of Recovery (PQR) was defined for patients with a QoR-15 score lower to the mean QoR-15 score minus 1 standard deviation.
Descriptive analyses of variables were used to summarize data and non-parametric tests were performed for comparisons (the Mann Whitney U -test).
Results and Discussion: Thirty-nine patients were evaluated. Mean QoR-15 score was 99.23 ± 17.10 and PQR patients were identified if their QoR-15 score was lesser than 82. PQR occurred in 7 patients (18%). Patients with PQR had higher median cervical perimeter (43 [42-44] vs. 41 [40-43], p=0.049), higher median emergence time (7 [5-9] vs. 4 [3-4], p=0.003) with similar duration of anesthesia (180 [170-180] vs. 156 [130-170], p=0.053).
In the first 24h postoperatively these patients presented higher VAS scores in rest (3.7 vs. 1.8, p=0.04) and in movement (6.6 vs. 3.8, p=0,014) and they needed more opioid administration to treat pain (71% vs. 22%, p=0.002). PQR patients had lower median QoR-15 scores (74 versus 102, p<0.001) and had lower scores at items related with pain evaluation "moderate pain" (p=0.01) and "severe pain" (p=0.003) and in items related to physical comfort (item 3, p=0.002; item 4, p=0.018; item 10, p<0.001), physical independence (item 8, p=0.027) and emotional state (item15, p=0.02).
There were no associations between PQR and gender, comorbidities, arterial blood gases sampling, hypothermia, length of stay in PACU or in hospital after surgery.
Conclusion: The incidence of PQR in bariatric was 18%. An effective analgesic management needs to be done as pain seems to have an important role in PQR.

8AP13-3

Assessing the impact of critical care for postoperative hip fractures

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Background and Goal of Study: AAGBI and NICE published safety guidelines for multi-disciplinary practice of hip fractures including time goals, anaesthesia techniques, recovery aims and adjuncts such as dementia and falls screening.
Neither qualify the need for critical care post-operatively. Background literature searches revealed little on this subject. Currently it is the remit of the anaesthetist, case by case, referring to ICU after assessing comorbidities preoperatively or after an untoward event peri-operatively. This audit of local practice was to assess the critical care resources used by hip fracture patients and whether this conferred a survival benefit.
Materials and Methods: A review of St Richards Hospital's audit data for the National Hip Fracture Database was analysed and merged with ICNARC data (2011-2013) - with admission reason "NOF, proximal femoral fracture or long bone fracture (leading to femoral operation)". We analysed proportion admitted to ICU and compared mortality in unit and 30 days compared to hospital total data. During this time the methods of anaesthetising generally followed Enhanced Recovery Protocols (standardised as per AAGBI guidelines). The admission decision was not specified as these cases are emergency by their nature (booked via anaesthetist pre-procedure or after if deterioration had occurred).
Results and Discussion: 2011 - 6.4% NOFs admitted to ICU, for average 2.3 days, with predicted mortality 16.3% (ICNARC) and 17.4 % (APACHE). Actual mortality was 12%.
2012 - 6.1% NOFs admitted to ICU, for 2.1 days, with predicted mortality of 14.4 % (ICNARC) and 18 % (APACHE). Acutal mortality was 13.6%.

2013 - 9.4% NOFs admitted to ICU for 4.5 days, with predicted mortality of 12.3% (ICNARC) and 17.7% (APACHE). Actual mortality was 2.6%.
ICU stay led to a significant reduction in the actual mortality ($p<0.05$).
Conclusion: The improved mortality (2013) could be related to increased proportion of admissions to ICU or longer stay on the unit. We conclude that a higher risk group benefit from the intensive nursing and medical care. We appreciate the need for individual modification of standardised perioperative pathway to maintain reduction of complications.
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8AP13-4

Prediction of the need for intensive care after abdominal surgery in cancer patients

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Background and Goal of Study: Patients undergoing abdominal surgery for solid tumours frequently develop severe postoperative complications that can be prevented or minimized with intensive care. The aim of this study was to identify factors predictive of intensive care need in patients undergoing abdominal surgery for cancer.
Materials and Methods: We prospectively evaluated 308 cancer patients following abdominal surgery for 30 days with regards to major complications. The need for treatment in the intensive care unit (ICU) and ICU length of stay were also evaluated. Univariate and multivariate analyses were performed to determine risk factors for intensive care need in the selected population. To evaluate the stability of the effect estimates, bootstrapping was applied for 1000 samples. All variables that remained significant after the bootstrap procedure were kept in the model. A receiver operating characteristic (ROC) curve was constructed, and the area under the ROC curve (AUC) determined to assess the discriminant ability of the multiple logistic regression model to predict complications.
Results and Discussion: ICU was needed for 142 patients. Were identified as predictors of need for postoperative intensive support after internal validation for 1,000 replications of bootstrap the presence of preoperative heart failure (OR 10.16, 95% CI 3.18 to 92.85, $p = 0.001$), preoperative coronary insufficiency (OR 6.83; 1.19 to 120.30, $p = 0.028$), changes in electrocardiogram prior to surgery (OR 3.14 , 95% CI 1.37 to 8.24 ; $p = 0.007$) and total volume administered intraoperatively (L) (OR 2.66, 95% CI 2.13 to 3.88; $p = 0.001$). The ROC curve identified an area under the curve 0.88 (95% CI 0.84 to 0.91, $p<0.0001$), showing a good discriminatory power of the model.
Conclusion(s): Understanding specific populations, such as cancer patients undergoing abdominal surgeries may help hospital logistics, specially regarding ICU shortage of beds, a worldwide problem. ICU bed reservations based on concrete risk factors may lead to efficient use of resources, in a cost-effective and simple way.
More studies are needed for the external validation of the model and also development of an easy to use score based on these findings.
References: Jhanji S, Thomas B, Ely A, Watson D, Hinds CJ, Pearse RM. Mortality and utilisation of critical care resources amongst high-risk surgical patients in a large NHS trust. Anaesthesia. 2008;63:695-700.

8AP13-5

QoR-15 - evaluation of quality of recovery after anaesthesia

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Background and Goal of Study: Assessment of quality of recovery is important for quality assurance and patient satisfaction. This study aims to determine the incidence of Poor Quality of Recovery (PQR); investigate the applicability of the Quality of Recovery-15 (QoR-15) questionnaire in the preoperative period as a predictor of PQR and characterize patients' quality of life (QoL) one month after surgery.
Materials and Methods: The institutional ethics committee was obtained for this observational prospective study. After written informed consent all consecutive adult Portuguese-speaking patients submitted to elective non-cardiac non-neurological surgery during one month were eligible for this study. Exclusion criteria: patient refusal; poor Portuguese comprehension; emergent or urgent surgery, outpatient, cardiothoracic or neurological procedures; age <18 years old and lack of telephone contact. The QoR-15 was applied before (T0) and 24 hours after surgery (T1). The EuroQOL five dimensions-five levels questionnaire (EQ-5D-5L) was used to measure QoL at T0 and one month after surgery (T2). PQR was defined as a QoR-15 score lower than the mean QoR-15 score at T1 minus 1 standard deviation. Patient's demographics and perioperative data were collected. Descriptive analysis was performed, non parametric tests were used for comparisons, and associations were measured using Spearman rank (ρ) correlation coefficient.
Results and Discussion: From a total of 137 patients, 93 were enrolled in study and 44 were excluded. Thirteen patients (14.0%) had PQR, defined as a QoR-15 score lower than 85.9. Patients with PQR had lower median QoR-15 scores at T0 (108 vs. 132, $p<0.001$), particularly in three dimensions: emotional state (24 vs. 32, $p=0.005$), physical independence (12 vs 20, $p=0.005$) and pain (16 vs. 20, $p=0.029$). There was a fair and significant correlation between QoR-15 scores at T0 and T1 ($\rho=0.481$, $p<0.001$). Finally, at T2, the medians of EQ-5D-5L index value and of the EQ-5D-5L visual analogue scale were significantly lower in patients with PQR (0.73 vs. 0.86, $p=0.037$; 40 vs. 75, $p=0.019$, respectively).
Conclusion(s): Patients with PQR had lower QoR-15 scores before surgery and worse self-assessed QoL 1 month after surgery. Therefore, the QoR-15 may be used preoperatively to identify these patients, so that earlier and more effective support strategies can be implemented to improve the postoperative recovery.

8AP13-6

The risk factors for delaying the length of stay after surgery of patients undergoing elective gastrointestinal surgery

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Background and Goal of Study: Many gastrointestinal surgeries are processed every year.To find the risk factors for delaying of the length of stay after surgery of patients undergoing elective gastrointestinal surgery.
Materials and Methods: We performed a retrospective clinical study using data from January 2013 to March 2013 in West China hospital, Sichuan University. We selected the patients undergoing elective gastrointestinal surgery, and according the length of stay after surgery we divided them into two groups. Group A included the patients discharged from hospital in average days($\leq$ 9 days). The patients in Group B stayed in hospital more than average days(> 9 days) after the surgery. We used descriptive statistics, cross-tabulation, to describe patient characteristics. And logistic regression was used to identify risk factors for delay the length of stay after surgery.
Results and Discussion: Among many potential risk factors, we found that postoperative infection(OR=14.620; CI,2.880-74.217,P=0.001) and long operation time(OR=6.267; CI,2.403-16.346,P=0.000) made patients stay longer in hospital after surgery.
Conclusions: Length of stay after surgery is a complex outcome influenced by multiple factors. Postoperative infection and long operation time are risk factors for delaying the length of stay after surgery.

8AP13-8

Severity of disease scoring systems and mortality after non-cadiac surgery

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Background and Goal of Study: Mortality related to surgery is a rare event, although still a very important outcome. Monk *et al* reported an incidence of 5.5%. The aim of this study was to evaluate the relation between APACHE II score and mortality and identify independent predictors of mortality after surgery.

Material and methods: Retrospective, observational study including patients submitted to non-cardiac elective and emergency surgery admitted to the Surgical Intensive Care Unit (SICU) from Jan 2006 to July 2013. Exclusion criteria: age < 18 years old; length of stay < 12h, medical patients and patients readmitted in the context of initial admission in the study period. Patient's demographics and perioperative data were collected including data variables present in severity of disease scoring systems that were studied for their association with mortality. Descriptive analysis was performed and the Mann-Whitney U test, Fischer's exact test or Chi-square were used. Univariate and multivariate analyses were done using logistic binary regression with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
Results and Discussion: From a total of 4565 patients, 4398 were included and 167 were excluded. The mortality rate at SICU was 1.4%. In univariate analysis: age, emergency surgery, mechanical ventilation, hematocryt, body temperature, systolic and mean arterial pressure, heart rate, respiratory rate, urea and creatinine levels, total bilirubin, FiO_2, PaO_2, $PaCO_2$, serum bicarbonate and sodium concentration, pH, Glasgow coma scale< 9; major cardiac event, organ insufficiency, previous renal insufficiency, high risk surgery, history of congestive heart disease, chronic renal failure, revised cardiac risk index ≥2, APACHE II and SAPS II scores were considered predictors for mortality. In multiple logistic regression analysis, serum bicarbonate concentration (OR 0.89, P=0.002) was considered a protective factor for mortality. Major cardiac events (OR 3.0, P=0.014), FiO_2 (OR 14.3, P=0.001), serum sodium concentration (OR 1.06, P=0.014), emergency surgery (OR 4.1, P< 0.001), APACHE II (OR 1.24, P< 0.001) were considered independent predictors for mortality at SICU.
Conclusions: We observe a mortality rate lower than previously reported. Independent risk factors for mortality were major cardiac events, emergency surgery, higher FiO_2, serum sodium concentration and APACHE II score.

8AP13-9

Incidence of residual neuromuscular block (RNMB) in the postanesthesia care unit. Observational cross-sectional study of a multicenter cohort. Part 2

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Background and Goal of Study: RNMB after nondepolarizing neuromuscular agents (NMBA) is an important problem. *We evaluated the incidence of RNMB in Spain. In the second part of the study we performed a uni and multivariate analysis to know which factors influence RNMB.*
AEMPS CEO-BNM-2014-01, ClinicalTrials.gov: NCT02226809.
Materials and Methods: Individual Ethics Committee approval obtained. Prospective cross-sectional multicenter study of a cohort of patients receiving at least one NMBA dose. *Besides incidence of RNMB and relationship with some factors, we did an univariate and multivariable logistic regression analysis in patients showing RNMB at PACU arrival, including factors that were near significant in the previous analysis.*
Results and Discussion: In the univariate logistic regression analysis: atracurium use (OR 2,951 ; 1,044-8,346; p=0,041), balanced anesthesia vs TIVA (OR 1,975 ; 1,108-3,52; p=0,021), non-reversal vs sugammadex (OR 2,781 ; 1,732-4,464; p=0,00002), neostigmine vs sugammadex (OR 2,164, 1,261-3,716; p=0,005) were significant. Multivariate logistic regression analysis revealed that independent predictors of RNMB were atracurium use, inhaled anesthetics use, absence of NMBA reversal or reversal with neostigmine.
Conclusion(s): The incidence of RNMB in Spain is similar to that published in other settings and countries. When presenting for surgery, use of benzilisoquinolines, especially atracurium (despite relative low doses used), balanced anesthesia including halogenated agents, no reversal or reversal with neostigmine should be cautiously considered.

8AP13-10

A preliminary evaluation of the influence of ePAQ-PO on the duration of anaesthetic pre-assessment consultation time

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At Sheffield Teaching Hospitals, patients undergoing anaesthetic preoperative assessment (POA) are all allocated the same duration of clinic time with a nurse practitioner, leading to potential inefficiencies in patient flow through clinic. We have validated a patient (self-completed) POA questionnaire (ePAQ-PO[1]) that estimates ASA status. We wanted to evaluate the impact of our online tool on the duration of POA consultation.
The project was registered with the service evaluation department.
Data were collected between October 2013 and March 2014. Fourteen nurse practitioners recorded the age, ASA grade[2] and duration of consultation of all gynaecology patients being preassessed. The nurse practitioner used either the routine POA document or the ePAQ-PO assessment. Data were analysed using SPSS 21.
A total of 742 patients were assessed. 181 were excluded from analysis due to incomplete data. The mean (SD) age was 46 (16) years; 28.7% were ASA1, 65.2% ASA2 and 6.1% ASA3. ePAQ-PO was used in 105 patients. The mean (SD) assessment duration for all patients was 48 (13) minutes. Table 1 illustrates the duration for each ASA grade by method of POA.

	Standard POA (n=456)	ePAQ-PO (n=105)
ASA1	40(9)	40(10)
ASA2	50(12)	44(12)
ASA3	70(19)	57(5)
Overall	48(14)	43(11)

[Mean (SD) time in mins: ePAQ-PO vs standard POA]

Univariate analysis found that the total POA time was significantly influenced by the method of assessment (p< 0.005). This difference in consultation time increased with escalating ASA grade.
This data shows that using ePAQ-PO decreases consultation time by an average of 5 minutes when compared to the standard method of POA. This could result in each nurse practitioner being able to assess one extra patient a day in an average clinic, thus streamlining the POA process. We intend to maximise completion of ePAQ-PO by patients, and standardise the use of ePAQ-PO by nurse practitioners. Continuous data collection will measure any further resultant benefits of ePAQ-PO on POA clinic efficiency.
References:
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8AP14-1

Propensity-score-matched comparison of postoperative stroke between patients given a general or a neuraxial anaesthetic for total knee arthroplasty: a population-based study

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Background and Goal of Study: The effect of the mode of anaesthesia on postoperative stroke in patients undergoing total knee arthroplasty (TKR) is still not conclusive and needs to be verified by a large-scale nationwide study.
Materials and Methods: The Taiwan National Health Insurance Research Database claims data for all adult patients, who had undergone TKR between 2000 to 2005, were reviewed. Overall, 49,599 adult patients had TKR, 15,328 (30.90%) had general anaesthesia (GA) and 34,271(69.10%) had neuroaxial anaesthesia (NA: Spinal or epidural anesthesia). To adjust for any selection bias, propensity scores were matched, which left 15,327 patients receiving GA and 15,327 patients receiving NA. All patients were followed up from the date of entry until the development of stroke, mortality or the end of 2008, which ever was earlier. Stroke as defined as new onset of neurological impair-

ments including ischemic (ICD-9-CM codes 433, 434, and 437), hemorrhagic (ICD-9-CM codes 430, 431, and 432), transient ischemic attack (TIA, ICD-9-CM code 435.9), and unspecified (ICD-9-CM code 436) strokes. The risk of outcomes was assessed with Kaplan-Meier curves and the effect of the mode of anaesthesia was estimated using Poisson regression analysis and Cox proportional hazards models.
Results and Discussion: The postoperative stroke incidence rate for patients receiving GA or NA was 18.20 and 18.26 per 1000 person-year, respectively, with an incidence rate ratio of 0.99 for GA to NA (95% confidence interval 0.92-1.06, p = 0.7639). Moreover, adjusted Cox proportional regression indicated that GA was not associated with a greater risk than NA for subsequent stroke (Hazard ratio = 0.97, 95% CI = 0.90-1.04, p = 0.4087) and mortality (Hazard ratio = 1.01, 95% CI = 0.93-1.09, p = 0.8480) in patients receiving TKR.
Conclusion(s): We conclude that, for adult patients underwent total knee arthroplasty, those given GA were not associated with greater risk for subsequent stroke than those given NA.
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Acknowledgements: This study is based on data from the National Health Insurance Research Database provided by the Taiwan Bureau of National Health Insurance, Department of Health, and managed by the National Health Research Institutes.

8AP14-2

Postoperative cognitive decline in a post-anaesthesia care unit

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Background and Goal of Study: Postoperative cognitive decline (PCD) is described as a decline in cognitive function from preoperative levels that influences variouys domains of cognition. The incidence of PCD varies among studies, possibly due to the lack of formal assessment and disgnosis criteria. The aim of this study was to evaluate the incidence of PCD in surgical patients admitted in the POst-Anaesthesia Care Unit (PACU) 3 months after surgery and to evaluate its risk factors.
Materials and Methods: Observational, prospective study, conducted in patients, aged above 45 years, admitted in the PACU (from June to July 2013) after elective major surgery. Patients submitted to cardiac, obstetric or neurosurgery, as well as those incapable to give informed consent were excluded. Cognitive function was assessed using a neuropsychological test, the Montreal Cognitive Assessment (MOCA), performed preoperatively (T0) and 3 months after surgery (T3). A change of at least 2 points between the scores at T0 and T3 was considered as clinically significant and qualified as cognitive impairment (CI).Patient characteristics and intraoperative variables were collected. Descriptive analyses of variables were used to summarize data and non-parametric tests were performed for comparisons.
Results and Discussion: Fifty eight patients were enrolled. Patients with CI had lower median MOCA scores at T3 (18 versus 27, p< 0.001). But at T0 their median scores were similar to patients without CI (22 versus 24, p=0.284).
The incidence of cognitive impairment (CI) 90 days after surgery was 41.4% (n=24). Patients with CI were more frequently aged above 65 years old (58.3% vs. 29.4%, p=0.028), and had a history of diabetes (33.3% vs. 5.9%, p=0.006).
Conclusion(s): The incidence of cognitive impairment was 41.4%. Patients with CI were older and more frequently diabetic. Patients with CI had similar MOCA scores before surgery.

8AP14-3

Validation of an easy questionnaire by phone call at 3 and 6 months to detect postoperative cognitive dysfunction after cardiac surgery

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Background and Goal of Study: Postoperative Cognitive Dysfunction (POCD) after cardiac surgery can last up to several months.A battery of time consuming neuropsychological tests are used to detect POCD.Moreover, they require the presence of the patient. This can result in a considerable dropout. We aimed to validate an easy questionnaire by phone call to assess cognitive domains such as attention, memory and motor skills to detect late POCD after cardiac surgery in adult patients of all age.
Materials and Methods: This study is a subanalysis of an ongoing prospective trial including all cadiac surgical patients(NCT02006212).The aim is to evaluate the impact of cerebral monitoring on short and midterm neurologic outcome. The occurrence of delirium and POCD is recorded. A Mini Mental State Examination (MMSE) is assessed preoperatively and on day 5. Patients are contacted by a phone call at 3 and 6 months to detect their cognitive function. POCD is defined as Z-score ≤ -2 based on preoperative and postoperative MMSE or if the patient reports any cognitive decline.No objective tests were used to detect delirium but caregivers were sensitized for signs and symptoms of hypoactive and hyperactive delirium. A Mann Whitney test was used to compare the questionnaire results between patients with and without POCD or delirium.
Results and Discussion: Figure 1 illustrates the questionnaire used to detect late POCD.

1. Before your surgery you accepted to participate in a study. Do you remember this? (1=Yes, 0=No)

2. What is the exact date of today? (5=Exact, 0=Incomplete or Incorrect)
If incorrect or incomplete response, ask the following questions:
a) What is today's year? (1= Correct, 0=Incorrect)
b) Can you tell me what season it is? (1= Correct, 0=Incorrect)
c) What is the month? (1= Correct, 0=Incorrect)
d) What is today's date? (1= Correct, 0=Incorrect)
e) What day of the week is today? (1= Correct, 0=Incorrect)

3. Can you tell me the exact date of your operation? (1=Correct, 0=Incorrect)

4. What is the complete address of where you are living? (1=Correct, 0=Incorrect)

5. What is the date of your birthday? (1=Correct, 0=Incorrect)

6. How old are you? (1=Correct, 0=Incorrect)

7. I am going to tell you 3 numbers. Please memorize them as I am going to ask you to repeat these numbers later on. (44; 3; 15) (25; 10; 89) (17; 56; 2)

8. Do you ever forget to take any of your medications? If yes, did this also happen to you before your operation? (1=No, 0=De Novo, 1= It was already the case before surgery)

9. Do you forget the daily things you should do? If yes, did this also happen to you before the surgery? (1=No, 0=De Novo, 1= It was already the case before surgery)

10. Do friends or family tell you that you easily forget things? (1=No, 0=De Novo, 1= It was already the case before surgery)

11. Do you feel more tired than before the operation? (1=No, 0=Yes)

12. Have you started to do the activities and/or work you were doing before the operation? (1=Yes, 0=No)

13. I am going to tell you 3 words. Please memorize them as I am going to ask you to repeat these words later on. (Orange/Hat/Boat) or (Painting/Car/Fork) or (Telephone/House/Paper)

14. How do you spend your day? Is it as before the operation? (1= As before the operation, 0=Worse than before the operation)

15. Please repeat the 3 numbers I gave you previously. (1=Correct, 0=Incorrect)

16. Please spell the word « GROUND » backwards (1=Correct, 0=Incorrect)

17. Please count backwards by 9 starting with 80. Any exact substraction by 9 is a correct response.
71: (1=Correct, 0=Incorrect)
62: (1=Correct, 0=Incorrect)
53: (1=Correct, 0=Incorrect)
44: (1=Correct, 0=Incorrect)
35 (1=Correct, 0=Incorrect)

18. Please repeat the 3 words I gave you previously. (1=Correct, 0=Incorrect)

Total: 25

[Questionnaire]

200 patients were analysed with the questionnaire completed at 3 months. The results at 6 months were not analysed. POCD and delirium occurred in respectively 35(18%) and 37(19%) of the patients.

No Delirium	22(19-24)
Delirium	21(18-24)
No POCD	23(20-24)
POCD	19(18-21)

[Postoperative questionnaire results]

Data are expressed as median (P25-P75).Patients with POCD scored significantly lower at postoperative questionnaire (P< 0.000). There was no difference between patients with or without delirium (P=0.103).
Conclusion(s): These preliminary data illustrate that our questionnaire can be used to detect late POCD.Our ongoing large study will confirm these results.

8AP14-4

Comparing outcomes after perioperative beta-blockade, long-term beta-blockade and no beta-blockade in a population-based cohort undergoing major elective noncardiac surgery

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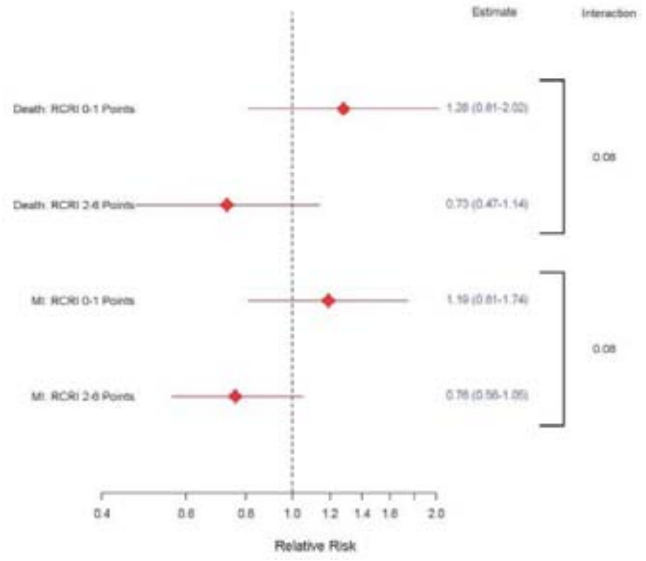
Background and Goal of Study: Guidelines recommend starting perioperative beta-blockade days to weeks before surgery. Nonetheless, randomized trials aside for the DECREASE trials started treatment ≤1 day before surgery, and observational studies did not distinguish between long-term *vs*. perioperative beta-blockade. We conducted a cohort study to evaluate perioperative beta-blockade and long-term beta-blockade in noncardiac surgery.
Materials and Methods: After research ethics approval, we conducted a population-based cohort study of patients (≥66 y) who underwent noncardiac surgery in 2003-2012 in Ontario, Canada. In the primary analysis, we used propensity-score matched-pairs methods to compare patients on perioperative beta-blockade (started 8-60 days before surgery) *vs*. controls (no beta-blockade). In a secondary analysis, patients on long-term beta-blockade (started >60 days before surgery) *vs*. controls were compared. The outcomes were death, MI, and stroke 30-days post-surgery, as well as death 1-year post-surgery. We performed subgroup analyses based on Revised Cardiac Risk Index (RCRI) and prior coronary artery disease.
Results and Discussion: Of the cohort, 4268 received perioperative beta-blockade, 45,007 received long-term beta-blockade and 154,357 were controls. For patients on perioperative beta-blockade, metoprolol (median daily dose 50 mg) was prescribed to 36%, atenolol (median 25 mg) to 26%, and bisoprolol (median 5 mg) to 37%. For patients on long-term beta-blockade, metoprolol (median 100 mg) was prescribed to 36%, atenolol (median 50 mg) to 41%, and bisoprolol (median 5 mg) to 16%. Perioperative beta-blockade was not associated with death (RR 0.96; CI 0.70-1.32), MI (RR 0.92; 0.72-1.17), and stroke (RR 1.31; 0.68-2.52) at 30-days, or death at 1-year (RR 0.93; 0.80-1.09). Results were similar when long-term beta-blockade was compared to control. RCRI class may influence associations of perioperative beta-blockade with 30-day death or MI (Figure).



[Figure]

Conclusions: Perioperative beta-blockade was not associated with improved overall outcomes, but may be associated with benefit if RCRI ≥2. A large randomized trial is needed to confirm these findings.

8AP14-5

Influence of preoperative administration of ACE inhibitors on hypotension during anaesthesia

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Background and Goal of Study: The discussion about premedication with angiotensin-converting enzyme inhibitors (ACEI) is still controversial. There are numerous studies confirming that these medications should be discontinued preoperatively because they increase the risk of hypotension. Since there is no clear recommendations on discontinuing premedication with ACEI in our institution, we reviewed anesthetic charts of the patients in whom ACEI were continued including on the day of surgery. The goal of our study was to find out if continuing ACEI effects intraoperative haemodynamics.
Materials and Methods: In this retrospective study we included 50 ASA II and III patients scheduled for elective, non-cardiopulmonary surgery in general anesthesia. We reviewed anesthetic charts of the patients in whom ACEI were continued including on the day of surgery. Hypotensive response in anesthetic chart, application of sympathomimetic drugs or colloid solutions boluses during the surgery were noted.
Results and Discussion: There was no refractory hypotension registered in any of the reviewed patient. Significant hypotension was noted in only two cases (4,0%). In one case infusion of 250 ml of 6% HES was applied 1 hour after the induction of anesthesia for bowel resection. In other case, 10 mg of ephedrine, divided in two boluses, was applied in the prolonged period between induction of anesthesia and start of the surgery. In both cases, hypotension was promptly corrected and no resistance to applied therapy was observed. Hypotension cannot be strongly associated only with the ACEI premedication.

	Without significant hypotensive response	Significant hypotension	Ephedrine	HES 6%	Refractory hypotension
Number of patients	48	2 (4.0 %)	1	1	0

[Table 1]

Generally, cardiac medications and antihypertensive drugs are continued preoperatively. ACEI have been shown to prolong survival in patients with congestive heart failure and left ventricular disfunction, to reduce oxidative stress, improve anti-inflammatory properties, prevent events related to myocardial ischemia and LV disfunction and provide better renal protection after cardiac surgery. Continuing or discontinuing these drugs depends also on the intravascular volume, hemodynamic status of the patient, the degree of cardiac dysfunction and the adequacy of arterial blood pressure control.
Conclusion(s): In our study we confirmed that premedication with ACEI can be safely continued until the day of surgery with low incidence of clinically significant hypotension.

8AP14-7

Does smoking increase the anesthetic requirement?

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Background and Goal of Study: Tobacco smoke consists of more than 4,000 particles of toxic and carcinogenic properties in gas and particle phase.[1] A limited number of studies exist indicating that smoking increases anesthetic requirements; however anesthetic agent requirements for individuals exposed to environmental tobacco smoke (passive smokers) has not been studied at all. The aim of this study is to investigate whether there is a difference among smokers, passive smokers, and nonsmokers in terms of intraoperative anesthetic and analgesic consumption.
Materials and Methods: Total of 90 adults ASA I-II patients undergoing total abdominal hysterectomy were enrolled in our study. The patients were divided into three groups based on confirmed by measurement of serum cotinine: Group S consisted of smokers, Group PS consisted of passive smokers, and Group NS consisted of history of smoking and were not exposed to smoke. Standard total intravenous anesthesia has performed to all patients. BIS value was maintained between 40-60. After the operation, the total amount of propofol and remifentanil used was recorded.

Results and Discussion: Side stream cigarette smoke with smaller particles is more dangerous than mainstream smoke.[2] The amount of propofol used in induction of anesthesia was significantly higher in Group S compared to Groups PS and NS. Moreover, the total consumption of propofol was significantly higher in Group S compared to Groups PS and NS. Group PS's total propofol consumption was significantly higher than group NS's ($p< 0.05$). Lysakows et al.[3] reported that smokers required more propofol than non-smokers. In our study total remifentanil consumption was significantly higher in Group S compared to group NS ($p< 0.05$). In addition, there was a statistically significant difference between groups in terms of serum cotinine levels.
Conclusion: We concluded that amount of the anesthetic and analgesic required to ensure equal anesthetic depth in similar surgeries was higher in active smokers and passive smokers compared to non-smokers.
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8AP14-8

Obesity is associated with increased morbidity but not mortality in critically ill patients

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Background and Goal of Study: The incidence of obesity is increasing worldwide. As one consequence impaired outcome in postoperative patients has been described. One part of it maybe, that antibiotic prescribing is complicated by a different pharmacology in this population. To evaluate mortality and morbidity of obese postoperative patients and to explore a possible relationship to antibiotic therapy this study was conducted.
Material and methods: Secondary analysis of a prospective interventional study conducted at Charité University hospital from 2009 to 2010. Postoperative patients on 5 ICUs with >48 hours of ICU treatment and documented body mass index (BMI) were enclosed. Included measurements were ICU mortality, ventilation parameters and investigation of antibiotic therapy comprising therapeutic drug monitoring (TDM) for vancomycin. Obese patients ($BMI \geq 30 kg/m^2$) were compared with non-obese patients including propensity score matching.
Results and Discussion: Altogether 451 patients with a $BMI < 30 kg/m^2$ were included and compared with obese 130 patients. There was a significant heterogeneity of baseline characteristics but not in ICU mortality. It was 7.5% in non-obese and 7.7% in obese patients ($p>0.999$), 65.4% of the obese patients required mechanical ventilation but only 53.2% of the non-obese patients ($p=0.016$). Multivariate regression analyses validated these findings (adjusted OR for ICU mortality for obese patients 0.53, 95% CI 0.188-1.321, $p=0.197$ and adjusted OR for mechanical ventilation of 1.841, 95% CI 1.113-3.076, $p=0.018$). Results were further confirmed by propensity score matching. TDM results connote that both, underdosing and overdosing arised more often in obese patients and sufficient TDM levels were less often achieved.
Conclusion: Obesity is associated with increased morbidity compared to a non- obese population but ICU mortality seems to be equal. This circumstance might be explained by pharmacological differences observed in antibiotic therapy in obese patients and for this cohort TDM might be of special importance.

8AP14-9

What anesthesiologists know about the cost of frequently used drugs

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Background and Goal of Study: Rational use of drugs taking into account their cost is of vital concern for health institutions,and has gained special importance in the current economic setting. This study aims to verify the attitude and the knowledge of the anesthesiologists of our institution with regards to the cost of drugs used frequently in their practice.
Materials and Methods: We carried out a survey about the price of frequently used drugs belonging to the following classes: benzodiazepines,hipnotics, opioids, non-opioid analgesics, neuromuscular blocking agents, drugs used as antiemetics, vasoactive drugs and local anesthetics. A questionnaire was elaborated and distributed to the anesthesiologists of our department. Authors of the questionnaire were excluded.
Results and Discussion: Of a total of 36 doctors we received 30 completed questionnaires: 4 trainees of the 1st or 2nd year; 4 trainees of the 3rd or 4th year; 6 specialists with less than 5 years experience, 9 specialists with 5 to 10 years experience and 7 specialists with more than 10 years experience. The majority of the respondents (93,3%) agree that the anesthesiologist should be aware of the cost of the most frequently used drugs, but 66,7% consider that the cost of the drug should not be the primary factor when selecting it.Most of the respondents (86,7%) agree that the existence of a chart listing the costs of drugs is important,that it should be frequently up-dated and displayed in an easily accessible place, and 82,8% admit that there is much avoidable wastage of drugs.Lastly, 89,7% consider that strategies to minimize this waste should be implemented. The overall average of right answers concerning the price of the drugs was 20,53%, of which 54,9%was given by trainees and by specialists with less than 5 years of experience. The respondents gave more right answers in the hypnotic drugs group and less right answers in the antiemetic drug group. The drug with the highest percentage of right answers was Lidocaine 2% (10ml). Table 1shows the relation between the cost the respondents thought the drug had and its' real cost.

Drugs thought to be more expensive than the real cost	Drugs with more right answers or close to the real price	Drugs thought to be cheaper than the real cost
Alprazolam 0,25mg COMP Alprazolam 0,50mg COMP Alprazolam 1mg COMP Cetoprofene 100mg/2ml AMP Dexametasone4mg/1ml AMP Diazepam 10mg/1ml AMP Dobutamine 250mg/20ml AMP Dopamine 200mg/5ml AMP Fentanil 0,25/5ml AMP Mepivacaine 200mg/10ml Ondasetrom 8mg/4ml AMP Paracetamol 1000mg FR Remifentanil 1mg/1ml AMP Ropivacaine 100mg/10ml Ropivacaine 150mg/20ml Ropivacaine 40mg/20ml Ropivacaine 75mg/10ml Sufentanil 0,01mg/2ml AMP	Adrenaline 1mg/1ml AMP Alfentanil 1mg/2ml AMP Bupivacaine 25mg/10ml Cetorolac 30mg/1ml AMP Diazepam 10mg COMP Diazepam 5mg COMP Etomidate 20mg/10ml AMP Lidocaine 100mg/10ml Lidocaine 100mg/2ml Hiperb Lidocaine 200mg/10ml Metoclopramide 10mg/2ml AMP Midazolam 15mg COMP Propofol 1000mg/50ml FR Propofol 200mg/20ml AMP Rocuronium50mg/5ml AMP Succinylcholine 100mg/2ml AMP Tiopental 500mg AMP	BupivacaineHiperb 20mg/4ml Cetamine 500mg/10ml AMP Cisatracurium 10mg/5ml AMP Droperidol 2,5mg/1ml AMP Ephedrine 50mg/1ml AMP Fenilephrine 10mg/1ml AMP Levobupivacaine 50mg/10ml Meperidine 50mg/1ml AMP Midazolam 15mg/3ml AMP Morfine10mg/1mlAMP Norepinephrine 5mg/5ml AMP Parecoxib 40mg/2ml AMP Sevoflurane 250ml FR Vecuronium 10mg/5ml AMP

[Table 1]

Conclusion: Although the degree of knowledge about the price of drugs amongst physicians of our department proved to be insufficient, concern about the price of a drug and taking this into account when choosing a drug was common amongst the respondents, however it should not be the sole criteria.

Acute and Chronic Pain Medicine

9AP1-1

Intraperitoneal ropivacaine nebulization in major bariatric surgery

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Background and Goal of Study: Respiratory changes in morbidly obese patients could be aggravated by depressant respiratory effects of opioids.[1] Intraperitoneal ropivacaine nebulization is a novel analgesic technique opioid-sparing in laparoscopic surgery.[2]Aim of our study: evaluate effects of intraperitoneal ropivacaine nebulization on perioperative outcomes in major bariatric surgery (BS).
Materials and Methods: After obtaining ethics committee approval a randomized, double-blind, placebo-controlled trial was conducted during 6 months.After informed consent, patients undergoing major laparoscopic BS were randomized to receive 3 ml intraperitoneal nebulization of ropivacaine (1%) - nebulization group (NG), or normal saline - placebo group (PG). Nebulization was performed with Aeroneb Pro® at pneumoperitoneal insufflation and exsufflation.Perioperative anaesthetic management was standardized. Demographic variables and perioperative data were collected, including: arterial blood gas samples (ABG); pain score, rescue morphine consumption, nausea or vomiting (PONV), adverse respiratory and cardiovascular events. Exclusion criteria: inability to give consent, documented chronic pain, anaesthetic or surgical protocol violation.Parametric test (One-way ANOVA) and non-parametric test were performed for comparisons (Qui-square; Fisher's exact test; Mann-Whitney U test). A p-value < 0.05 was statistically significant.
Results and Discussion: Patients included: 52 (NG-24;PG-28). Demographic characteristics, ASA physical status score, co-morbidities and surgical duration were similar in both groups.NG patients needed lower doses of rescue morphine at PACU (morphine>10mg: 0% vs 100%, p=0,04) and surgical ward (morphine>5mg: 0% vs 100%, p=0.019). NG patients had lower $PaCO_2$ at PACU discharge (95% CI: 39.74-44.24 vs 43.35-47.94, p=0.024).Incidence of PONV, respiratory and cardiovascular events and PACU length of stay were similar in both groups.
Conclusion: Peritoneal ropivacaine nebulization was safe in BS and enabled to reduce morphine requirements in the post-operative period. It seems to allow better pulmonary gases exchange.
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9AP1-2

Acute pain in total hip and knee arthroplasty: is there any difference?

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Background and Goal of Study: Pain following major orthopaedic arthroplasties, Total Knee Arthroplasty (TKA) and Total Hip Arthroplasty (THA), is common and often suboptimally managed. The aim of this study was to assess and compare the severity of pain and its influence on function and social aspects, using the Brief Pain Inventory (BPI) in two groups of patients submitted to major orthopedic surgery: THA and TKA. Authors also studied the effect of epidural analgesia and subarachnoid blockade in the BPI levels in both groups.
Materials and Methods: Ethical approval was obtained. A prospective study was performed in patients undergoing elective THA and TKA and was started in june. Exclusion criteria: age <18 years, ASA IV physical status, analgesic allergy. Pain severity and its interference on patient life (function and social aspects) was assessed with the Brief Pain Inventory (BPI), performed preoperatively (T0) and 48h after surgery (T1). The variables at T0 and T1 moments in the two groups of patients were compared. The effect of epidural analgesia and subarachnoid blockade at T1 using BPI, was studied and compared between groups. All analyses were calculated with SPSS 2.0. Statistical significance with p<0.05.
Results and Discussion: Sixty-three patients were enrolled. 2 groups: TKA-57.1%, THA-42.9%. Women reported higher minimum pain at T0 (p=0.036). Patients had a significant decrease in BPI questions "minimum pain" and "pain at this moment" at T1 compared with T0 (p=0.002; p=0.011 respectively). THA, at T0, had more pain interference with general activity and with walking, compared TKA, (p=0024; p=0.017 respectively). THA, at T1, had lower "maximum pain", compared to TKA (p=0.003).
Pain after TKA had less influence in the "sleeping" (p=0.02). In TKA with epidural analgesia authors found lower "maximum pain" (p=0.029) and "pain at this moment" (p=0.000).
Conclusion(s): Acute postoperative pain had lower scores than preoperative pain. In THA preoperative pain had greater interference in general activities of daily life and in walking but maximum postoperative pain was lower. Women consistently reported higher preoperative pain scores. In TKA with epidural analgesia had lower maximum pain and pain at 48h. This is an ongoing study and these are preliminary data. Further results of the present study may bring important insights to the study of postoperative pain.

9AP1-3

Local anaesthetic wound infiltration to reduce peri-incisional hyperalgesia

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Background and Goal of Study: Both inflammation induced by tissue trauma and exposure to potent intra-operative opioids are responsible for the N-Methyl-D-Aspartate receptor activation and a consequent central sensitization leading to peri-incisional hyperalgesia, pain and increased opioid consumption. In previous studies low-dose of Ketamine[1], has been proposed to reduce peri-incisional hyperalgesia. Our hypothesis is to reduce the hyperalgesic area with a local-anesthetic wound infiltration.
Materials and Methods: Patients scheduled for anterior rectum resection by a laparotomic approach received a balanced general anesthesia remifentanil-based, using as ipnotic agent desflurane at a 0.6 MAC. A loading dose of 0,2mg/Kg of morphine were administered. Patients were provided with PCA-pump (bolus: 1 mg, lock-out 10 min, no basal infusion). In the treatment group 10 minutes before incision the region of the surgical wound was infiltrated with 20 ml of ropivacaine 0.5%. Before the skin closure a wound catheter was placed and loaded with 20 ml of ropivacaine 0.4% and an infusion of ropivacaine 0.6% 4ml/h started. Our primary end-point was the extent at 24 hours of mechanical hyperalgesia to von Frey hair stimulation around surgical incision. Secondary end-points were pain measured with NRS at rest and movement and cumulative opioid consumption.
Results and Discussion: Surgery duration, remifentanil consumption and morphine load don't differ significantly in the two groups. Peri-incisional hyperalgesia at 24 hours is lower in the treatment group (10.6±9.81cm) compared with the control group (19.5±12.76cm) but not statistically significant. Static and Dynamic pain and opioid consumption don't are not different. 40% of patients of the treatment group, while only 9% in the control group, don't show any hyperalgesia together with an anesthesia of the peri-incisional region. This findings, despite our data don't show any statistically significant results, suggests that wound infiltration may reduce the hyperalgesia. Lack of randomization and the small number of patients in the treatment group limited our study.
Conclusion: Local anaesthetic wound infiltration could contribute to reduce the peri-incisional hyperalgesia even though more data are needed to proof it.
Reference:
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9AP1-4

Acute pain management in morbid obesity - an evidence based clinical update

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Background: The goal of this review was to present an evidence based clinical update on the management of acute pain in patients with morbid obesity (MO) with focus on patient safety and outcomes.
Methods: We performed a search of peer reviewed literature for the relevant keywords. We screened the abstracts for population (obese, morbidly obese); intervention (study drug for acute/ postoperative pain management), comparisons (placebo or standard of care) and outcomes (pain scores, analgesic consumption, side effects, LOS, Satisfaction and Recovery Scores). We did not apply any limitations to study design.
Results: Our initial search resulted in approximately 430citations. After removing irrelevant and duplicate studies, we present a narrative review summary based on 58 studies. Majority of the studies relate to bariatric anesthesia and weight loss surgery.
Evidence confirms the role of multimodal analgesia with the goal of reducing opioid analgesics. Patients with MO have an increased risk of postoperative sedation and respiratory depression, airway obstruction and hypoxemia [1]. Regional anesthesia (central, neuraxial and plexus) techniques have been used successfully [2]. A step wise approach to systemic analgesia for acute pain reduces pain, analgesic requirements and side effects [3]. Recognition of acute neuropathic pain and pronociception has led to the widespread use of “adjuvant” drugs- ketamine, lidocaine, dexmedetomidine and pregabalin. In combination, multimodal analgesia protocols are very effective in further improving patient safety and achieving enhanced recovery outcomes. Opioid use in morbidly obese patients is safe if limited and used judiciously. When required in the postoperative period IVPCA’s (without continuous infusions) increase the safety of parenteral opioid therapy in MO. We also list the risk factors for poorly controlled pain and emphasize importance of the accurate diagnosis (and appropriate management) of OSA and its relationship to opioid analgesic use in the perioperative period.
Conclusions: Acute Pain management in morbid obesity requires careful adherence to standardized protocols and care plans. Opioid sparing and opioid free protocols can be used effectively in some MO patients undergoing certain procedures. Systemic multimodal analgesia can provide high quality pain relief with both short and long term benefits. Evidence for individual modalities is lacking and role for novel regional anesthesia techniques is evolving.

9AP1-5

Postoperative epidural analgesia in thoracic surgery: continuous administration by electric push-syringe diffusion versus elastomeric diffuser

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Background and Goal of Study: Thoracotomy is the cause of severe postoperative pain and prolonged (3-5 days) purveyors of multiple complications mainly respiratory ones.
The thoracic epidural analgesia (TEA) is currently considered as the “gold standard” analgesic. This technique requires prolonged hospitalization in intensive care unit (ICU) to administer continuous mixing (local anesthetic + opioid) using an electric syringe pump (ESP) [1].
Purpose: If elastomeric pumps (EP) have already demonstrated their effectiveness in orthopedics and visceral surgery, their place in TEA remains unclear. We report our experience with their use for the maintenance of TEA in thoracic surgery.
Materials and Methods: All consecutive patients operated January to June 2012 for lung surgery (lobectomy, pneumonectomy or atypical resection) by thoracotomy were studied prospectively in the early postoperative period (first 5 days) in ICU.
The patients were operated under general anesthesia (GA) and TEA is systematically proposed, the epidural catheter is in place at T4-T5 before induction of GA. Postoperatively, patients were randomized into 2 groups: group A received a mixture containing a local anesthetic (LA), in this case 0.125% bupivacaine and morphine (fentanyl: 1 mg / ml of AL). This mixture was continuously administered to the patient using an ESP while Group B received the same mixture from an EP.
Several parameters were analyzed during the 96 hours post-operative sensory level, Bromage score, complications, analgesic consumption, visual analogue scale (VAS) at rest, cough and mobilization as well as overall patient satisfaction.
Results and Discussion: After thoracotomy, continuous administration of a mixture containing 0.125% bupivacaine associated to fentanyl through an epidural catheter with a PE provides effective postoperative analgesia with few side effects.
Conclusion(s): To reduce the cost of hospitalization in the ICU and reduce consumption of analgesics after surgery, the PE could be used in surgical services subject to rigorous monitoring, and continues with a highly trained nursing staff.
References:
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9AP1-6

Postoperative pain evaluation after total hip replacement surgery: results of an acute pain unit

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Background: Postoperative pain is often the rehabilitation limiting factor in patients after hip arthroplasty (HA). The aim of our study was to evaluate the analgesic techniques implemented in pain management after hip surgery in a Portuguese centre.
Material and methods: A retrospective analysis of medical records from patients submitted HA in the first semester of 2014 was performed. Demographic variables, American Society of Anesthesiologists classification (ASA), anesthetic and analgesic techniques and analgesic drugs administration were registered. Acute pain unit (APU) records of pain evaluation with a categoric scale were also evaluated. A descriptive statistical analysis was performed.
Results: Data from 107 patients were analyzed. The average age was 69 years, 56% of patients were female and 20% underwent urgent surgery. The majority was classified as ASA 2 (49.5%). Conventional systemic analgesia was used in 33.6% of patients, with two different analgesics in the majority of them. Epidural was performed in 24.3% of the patients. Peripheral nerve blocks (femoral nerve, lateral femoral cutaneous nerve and fascia iliaca compartment blocks) were the analgesic technique of choice in 24.3%. Patient controlled analgesia (PCA) with morphine was applied in 12.2% and PCA plus femoral or lateral cutaneous nerve blocks in 4.7%.
A total of 49.5% patients (including all patients with conventional analgesia and patients with single shot peripheral nerve blocks) were not referred to the APU. The patients who were evaluated by that Unit had an average time to the first evaluation of 22h. Pain at rest and at movement was absent or mild for patients with epidural, peripheral nerve blocks and PCA techniques. In the majority of patients with epidural rescue bolus of local anesthetic no administration was needed.
Discussion/Conclusion: Our results show that conventional analgesia and single shot nerve blocks were used in a significant number of patients that were not followed by the APU. Patients referred to the APU had an effective control of postoperative pain regardless of the analgesic technique. Previous studies have shown that a similar pain relief can be achieved by a variety of techniques, although the best option should be the one with fewer side effects. To attain this purpose a more accurate pain scale should be used and pain score evaluation should be applied to all the patients in order to identify which of the techniques is better for our patients.

9AP1-7

Comparison of thoracic epidural analgesia and intravenous patient controlled analgesia after open colorectal cancer surgery

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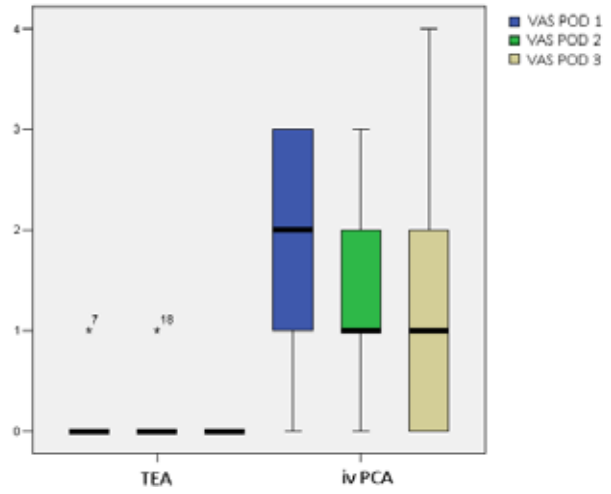
Background and Goal of Study: Thoracic epidural analgesia (TEA) is often considered the most effective technique for pain relief in patients undergoing open colorectal surgery. Despite advances of TEA, it is rarely used for post-operative pain control in clinical settings in Serbia. The purpose of our study was to compare TEA and intravenous patient controlled analgesia (iv PCA) and to evaluate pain intensity, patient satisfaction, incidence of postoperative complications and side-effects, recovery of gastrointestinal function, time out of bed and length of hospital stay.
Materials and Methods: This prospective study included sixty patients scheduled for elective open colorectal cancer surgery and randomized to either postoperative i.v.PCA (n = 30) or TEA (n = 30).PCA group patients received morphine (1 mg/ml,bolus 1-2 ml bolus,LI 8 min,max 3 doses/h).TEA group received mixture of levobupivacaine 1 mg/ml,fentanil 3μg/ml, adrenalin 2 μg/ml,5-10 ml/h.The primary outcomes were postoperative quality of analgesia,patient satisfaction, bowel function, nutritional intake and time out of bed. The secondary outcomes included side effects (nausea, vomiting, pruritus, respiratory depression, motor block, hypotension, bradycardia, urinary retention, sedation), perioperative complication rate and length of hospital stay.
Results and Discussion: There were no significant differences in the clinical characteristics between two patient groups.Intensity of pain during the first 3 postoperative days was significantly lower at rest, on coughing and on walking in TEA group ($p<0.001$). Satisfaction scores were better in the TEA group ($p<0.001$). Recovery of postoperative ileus occurred sooner ($p<0.001$) and resumption of dietary intake was achieved earlier ($p<0.001$) in TEA group. Mobilization was much more efficient in TEA than in i.v.PCA group ($p<0.005$). There was no difference in hospital stay and side effects,except nausea and sedation which occurred less frequently in TEA group ($p<0,05$, $p<0,001$, respectively). There was statistically significant difference in postoperative delirium (TEA group 0/30, iv PCA group 6/30, $p<0.05$).
Conclusion(s): TEA has demonstrated significantly better effectiveness than i.v.PCA and had a positive impact on patient satisfaction, bowel function, dietary intake and early mobilization. The results of this study demonstrates importance of implementation of TEA as a prefered method for postoperative pain control after major open colorectal surgery.



[Patients distribution]

9AP1-8

PCA: effectiveness, safety and correct use

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Background and Goal of Study: Patient controlled analgesia (PCA) is one of the most widely used methods of analgesia in postoperative period and it's proved to be more effective than conventional analgesia[1]. The objective of this study consisted in analyzing the cases of patients who used this analgesic method, focusing on its effectiveness, safety and correct use.
Materials and Methods: All patients submitted to a major abdominal surgery using PCA as postoperative analgesic method were analyzed during a four month period. The data collected were: analgesic provided, duration of analgesia, VAS pain scale, attempts of bolus and administered bolus, existence of explanation and understanding of the functioning, existence of errors in the programming and handling the equipment and the degree of satisfaction. Obtained data were analyzed using Pearson $\chi 2$ test and *Cramer's V association measure* of SPSS 20.0®
Results and Discussion: Of the 124 patients analyzed the scale of average pain at rest was 1,7(+/-0,2) and at mobilization 4,2(+/-0,2). The explanation of PCA functioning was given to 94,3% of the patients, mainly postoperatively (67,5%), having 63,7% mentioned that understood its functioning. The average attempts was 35,6(+/-2,7) and average effective attempts was 20,7(+/-1,4). We found that 68,5% of the patients had a >20% difference between the average number of attempts and the average number of achieved attempts, which we consider a significant value. Insufficient analgesia was responsible for 40% of the cases whilst the incorrect use of the PCA for 60%. Its incorrect use has a statistically significant relationship with >20% difference ($p< 0,001$, V Cramer=0,5). The most prevalent handling errors were: unawareness of the possibility of using the PCA, assignment of a wrong function, inadvertent bolus button use. No prescription errors have been reported. 83% of patients were satisfied with this analgesic method.
Conclusion(s): With this study we were able to conclude that PCA is a very effective and safe method of analgesia, associated with a high degree of satisfaction from patients. However, most patients did not use it correctly. A post-operative explanation may have been the main reason. We consider the correct patient clarification the milestone in the success of the PCA. So, we had established a timeframe of one year to implement the correct preoperative patient information, and its posterior re-evaluation.
References: 1. Anesthesiology 2010;113:1427-32

9AP1-9

Comparison of efficiency and safety of two different types of postoperative analgesia in patients who underwent thoracotomy

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Introduction: Epidural analgesia (EA) is the "gold standard" for postoperative pain relief in thoracic surgery. Intrapleural blockade (IPB) in some cases may be an alternative to EA.
Purpose: To make a comparative assessment of efficiency and safety of post-operative analgesia in patients who underwent thoracotomy with prolonged EA and IPB.
Materials and Methods: Two groups were formed (EA and IPB), each comprising 15 persons, who underwent lobectomy through thoracic access. Catheterization of epidural space at the level of Th_5-Th_7 was made in the EA group. Then epidural infusion (EI) of 0,2% naropin at 6-8 ml/hour was performed. Anesthesia with sevoflurane (1,0-1,5 MAC) as well as fentanyl in an amount of 3-4 μg/kg per hour was carried out to all patients. At thoracostomy a catheter was inserted through the upper drainage in the IPB group. After suturing the wound and inflation of lung 20-25 ml of 0,375% naropin was injected into it with clamping of drainage for 10-15 min. After the surgery patients of the EA group received EI with 0,2% naropin at 8-10 ml/hour and the patients in the IPB group received 20-25 ml of 0,375% naropin every 4-6 hours intrapleurally.

Results and Discussion: Figures in the upper case indicate the authenticity of the PPS changes compared to the corresponding time intervals within each row. PPS logically grew during the day after the surgery in proportion to the increasing degree of the patients activation. At the same time its intensity did not exceed the permissible limits of 3-4 scores both at rest and when coughing. Furthermore, there were no significant differences in the PPS intensity between groups EA and IPB in any of the time intervals, thus indicating the high analgesic potential of IPB. Moreover, within each of the groups during the same time period when coughing PPS did not differ significantly in intensity in comparison when being at rest, and did not exceed 3-4 scores according to VAS, which is indicative of a significant contribution to the technique in the process of early activation and postoperative rehabilitation of patients. As for the daily consumption of naropin, it was 425±35 mg in the IPB group, which was significantly higher than in the EA group, where the corresponding figure was 215±25 mg.
Conclusions: Blockade IPB seems to be an effective, safe, technically more simple alternative to EA for analgesia after thoracotomy.

9AP1-10

Effects of perineural dexamethasone on femoral nerve blockade outcomes: a randomized, double-blind, placebo-controlled study

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Background and Goal of Study: Perineural dexamethasone has been investigated as an adjuvant for brachial plexus nerve blocks, but it is not known whether the beneficial effect of perineural dexamethasone on analgesia duration leads to a better quality of surgical recovery. We hypothesized that patients receiving dexamethasone would have a better quality of recovery and better analgesia than patients not receiving dexamethasone.
Material and methods: Patients undergoing elective total knee replacement were recruited over a 9-month period in a double-blinded, placebo-controlled trial, after local ethics committee approval was obtained.
Patients received ultrasound-guided femoral nerve blocks by using 0.5% Ropivacaine 20mL and were randomized into 3 groups: group 1= perineural dexamethasone 8 mg, group 2= dexamethasone 8 mg iv (intravenous). And group 3 (Control group)= perineural and iv saline.
The primary outcome is the duration of sensory block measuring time to first analgesic request. The secondary outcomes included numeric pain rating scores (EVA), opioid consumption, patient satisfaction, and postoperative neurologic symptoms and complications.
Results and Discussion: 49 patients were enrolled. Results are showed in tables 1 to 3.

	PERIDURAL DEXAMETASONE N=17	IV DEXAMETASONE N=14	CONTROL N=18
AGE	71,94 +/- 6,9	66,00 +/- 9,4	68,23 +/- 8,3
WEIGHT (KG)	85,82 +/- 14,4	87,6 +/- 14,3	78,95 +/- 12,0
SEX	29% MALE/ 71%FEMALE	40% MALE/ 60%FEMALE	28% MALE/ 72%FEMALE
ASA CLASIFICACTION	2,47 +/- 0,5	2,20 +/- 0,4	2,19 +/- 0,4

[Table 1. Baseline characteristics]

	PERIDURAL DEXAMETASONE N=17	IV DEXAMETASONE N=14	CONTROL N=18
EVA 24H	2.50 +/- 1,8 *	5.65 +/- 1.6*	5.69 +/- 2.4*
EVA 48 H	3.06 +/- 1.3	4.50 +/- 1,19	4.36 +/-2.0
TIME TO FIRST ANALGESIA (min)	1046,12 +/- 1068*	150,80 +/- 176*	232,05 +/- 334*
OPIOID CONSUMPTION 24H (mg of Morphine)	12,9 +/- 15,2	80 +/- 75,8	22,5 +/- 18,3
PATIENT SATISFACTION (1-4)	1,4 +/- 0,5	1,6 +/- 0,5 1,7 +/- 0,6	1,7 +/- 0,6
TIME TO RECOVERY days	4.76 +/- 1.2	4.10 +/- 0.8	4.66 +/- 1.8

EVA: 0 = no pain, 10 =worst possible pain SATISFACTION: 1 = Highly satisfied, 2 = Satisfied, 3 = Not satisfied 4 = Not at all satisfied. *P<0,05

[Table 2. Results]

	PERIDURAL DEXAMETASONE N=17	IV DEXAMETASONE N=14	CONTROL N=18
NEUROPATHY	0	0	0
INFECCTION	0	10%	9%
NAUSEA/VOMITING	5%*	30%	55%*

*P<0,05

[Table 3. Complications]

Analgesia duration (p<0,003) and numeric pain rating score at 24 hours (p<0,001) were prolonged by perineural dexamethasone compared with saline an iv dexamethasone.
Conclusions: Perineural administration of dexamethasone with Ropivacaine 0,5% prolongs femoral nerve block effects with no observed adverse events.

9AP2-1

Systemic lidocaine in chronic pain: our experience

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Background: Lidocaine, a local anesthetic and an antiarrythmic drug, has been used to relieve cancer, postoperative and neuropathic pain, when given systemicaly. Its effect, though not fully understood, is thought to result from sodium ion channel blockade, thus inhibiting neuronal ectopic discharges.[1] Its use in chronic pain management is very sparse although it has not been completly banned. We bring a review of our experience in using lidocaine at our Chronic Pain Unit (CPU).
Case report: In a 5 year review of our CPUs' use of systemic lidocaine (SL), we found 4 cases. All were neuropathic pain: 2 Trigeminal Neuralgia, 1 Post-Herpetic Neuralgia and 1 Post-surgical Neuralgia. The number of treatments each patient made ranged from 2 to 15. All patients were previously medicated with anticonvulsivants, opioids and triciclic antidepressants, capsaicin or lidocaine patch, with limited responses. Our CPU has a SL protocol(1st day, 100mg lidocaine; 2nd day, 200mg ; 3rd day, 300mg diluted up to 100 ml of NaCl 0,9% at 200ml/h; after this a subcutaneous DIB is placed with 300mg lidocaine with NaCl 0,9% up to 100ml at 0,5ml/h for 7 days) although it was not used consistently by all doctors. In all cases, there was improvement in pain scores after 1st day of treatment. One patient had side effects in 3 treatments, which were of nausea, vomiting and sedation, but in any of the cases protocol was interrupted.
Discussion: SL, although not contemplated in most recent guidelines for neuropathic pain management, is still used in our CPU for refractory neuropathic pain. There are still reports of its use in other CPUs, mainly for neuropathic pain. Studies show it's use is safe[2] and also that is better than placebo for neuropathic pain. This review is a reminder of another tool that is still in use in chronic pain management, although clearly further studies are needed to determine its precise role in this area.
References:
1. Tremont-Lukats, et al. Systemic Administration of Local Anesthetics to Relieve Neuropathic Pain: A Systematic Review and Meta-Analysis. Anesth Analg 2005.
2. Challapalli, V. et al. Systemic administration of local anesthetic agents to relieve neuropathic pain (Review). Cochrane Collaboration. 2005, Issue 4.
Learning points: The use of SL in chronic pain management, mainly neuropathic pain, though sparse, is still a reality in some CPUs. This is a reminder of another tool we have at our disposal, although precise evidence about its efficacy is needed.

9AP2-2

Is there a placebo effect on topical treatment on myofascial pain syndrome?

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Background and Goal of Study: The effectiveness of placebo treatment on different diseases has been instigating researchers. High concentration capsaicin (HCC) may have some efficacy on myosfacial pain syndrome (MPS). The objective of this study was to evaluate the pain scores of the placebo group in a topical HCC clinical trial in MPS patients.

Materials and Methods: This was a prospective placebo controlled and blinded study carried out in pain management center at a teaching hospital. Two topical formulations were used in this study: BC (base cream - placebo) and CC (base cream + capsaicin 8% - active treatment). After approval by the Ethics Clinical Research Committee, 40 patients freely consented to be enrolled in two groups (31 female, average age 58 years). They have been treated using a standard regimen for MPS (no difference between groups). Before application of study formulations, anesthetic ointment (AO) was used at the most painful trigger point (TG). After complete removal of the AO, the BC or CC (according to study group) were topically administered for 60 min in the area of delimited PG. Pain was assessed by verbal numeric scale (VNS - 0-10) at the time points: before, just after application, as well as seven, 30 and 60 days after application of formulations. Patients were requested to inform the best average pain (BAP) for the period, as well as the pain at the moment (PAM).
Results and Discussion: None of the BC treated patients presented topical hyperemia or skin burning at the application site, while 85% of CC treated presented these complaints. There was no statistic difference on a BAP scores. The average assessed PAM score (VNS) on the BC and CC treated patients were, respectively: before treatment = 6.7 and 6.8; just after treatment = 3.5 and 2.2; 7 days = 5.7 and 0.7; 30 days = 7.8 and 1.1; 60 days = 8.8 and 3.8. The PAM score assessed just after treatment did not presented statistical significant between BC and CC patients treated, but was statistically lower than the previous assessed PAM for those groups, probably due the used AO.
Conclusion(s): The CC formulations caused hyperemia and burning sensation at the application site. PAM score was lower in both groups just after the treatment. Topical HCC was effective in treating pain up to 60 days, but no significant placebo effectiveness was observed.
Acknowledgements: This research was supported by FAPESP grants.

9AP2-3

The evaluation of an oxigen and nitrous oxide mixture in analgesia for balneotherapy of major burn patient

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Background: After the primary care of a major burn, infection is the main threat to the patient's life. In this context, balneotherapy (BNT) takes primordial importance on his recovery, however, it is an extremely painful procedure. Several anaesthetic techniques are suitable for analgesia in this procedure, especially the combination between ketamine and midazolam.
Case report: We have evaluated several parameters like: quality of analgesia, Blood pressure, heart rate and peripheral O2 saturation using, respectively: numerical pain scale, noninvasive blood pressure and oximetry. These evaluations have being done in three different moments, before, during and after the BNT, that was done using an equal parts mixture of nitrous oxide and oxygen (NO2/O2) with a self demand valve.
Ten procedures from 7 patients were realized using this protocol without any complications. There's no significative alteration in any hemodynamic parameters in any moment. Our patient's ages were between 12-42 years, being 3 females and 4 males. All of them were cooperative and had burns in advanced healing process, but could not tolerate the BNT without anaesthesia. During the procedure one case related grade 8, three grade 3 and six grade 0. After the procedure all patients related grade 0.
Discussion: The simple touch of a second degree burn can create as pain as a surgical incision. However, the BNT involves a series of potentially painful procedures like wound cleaning, bandage, bath, small surgical procedures like debridement and scarothomy. Moreover, the main anesthetic technics requires the use of a venous access that can be source of contamination and sometimes it's very difficult to obtain and maintain in a patient with major burns, edema and in children. The use of intramuscular injections are possible, however, beyond the disadvantages mentioned before, it is a new source of pain. Based on that, doctors are looking for alternatives to obtain a short term treatment for the low to moderate intensity pain, with a fast beginning and disappearance, with minimal side effects, great safety and easy administration. Based on analgesia international protocols for short duration procedures, we choose to study the mixture in selected cases from our burn treatment center. The results are promising, showing that this use seems to be a good alternative to these kind of patients.
References: Onody P. et al. 2006;29:633-640
Learning points: Quality and safety analgesia in burn treatment.

9AP2-4

Postoperative analgesia: are we prescribing it correctly?

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Acute pain is a major component in the postoperative evolution period, and its control decisive for a total and proper surgical recovery. Its assessment is essential, as well as in-depth knowledge of all drugs and analgesia techniques available.
The purpose of this observational study is to analyze the prescribing behavior of postoperative analgesia in a central hospital during the reorganization of the Acute Pain Unit prior to the implementation of postoperative analgesia protocols.
We analyzed a total of 195 prescriptions made for the immediate postoperative period of inpatients under elective surgery of Urology and General Surgery, over 90 days.
The study sample included 195 patients who underwent surgery with degrees of expected pain:
mild (Group A, n = 62),
moderate (Group B, n = 82) and
severe (Group C, n = 46).
The impact of the expected degree of pain was analyzed in several therapeutic decision parameters, including a multimodal analgesic strategy, the implementation of rescue analgesia and the use of regional analgesia during the postoperative period.
The most commonly used intravenous drugs were: Paracetamol (Acetaminophen) (95.9 %), Metamizole (85.1 %) Tramadol (31.8%). Multimodal analgesia strategy was always chosen for the intense pain expected group (Group C - 100 %) but not for the other groups (Group A - 71% and Group B - 91.5 %).
The rescue analgesia prescription was not always used and it was similar in the 3 groups (Group A - 69.4 %, Group B - 76.8 % and Group C - 69.6 %).
Regional analgesia was barely used as an additional strategy for postoperative analgesia, though it was more frequent in Group C - 26.1%.
This observational study, conducted during a transition and reorganization phase of the Acute Pain Unit of a central hospital, permitted the monitoring of different prescription habits, allowing the genesis of an improvement strategy towards the reality of the institution.

9AP2-5

The influence of esmolol infusion on postoperative pain and drugs consumption after rhinoplasty

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Background: Aim of the study is demonstrate the rationale use of selective beta1 adrenergic antagonist esmolol to reduce analgesic drugs consumption during controlled hypotension for rhinoplasty.
Material and methods: We randomised 72, ASA 1-2, age 31±12, M:F 2:1 patients undergoing rhinoplasty for aesthetic surgery. Patients with hypersensitivity, cardiovascular diseases and asthma were excluded. The esmolol group (n=36) Group E received 0.5μg/Kg in 20ml of saline solution bolus followed by 50-100 μg/Kg/min intra-operative esmolol continuous infusion, Group S (n=36) received bolus of equivalent volume of normal saline followed by intra-operative continuous infusion of normal saline. General anesthesia was mainteined with desflurane and remifentanil according to maintening and adequate depth anesthetic controlled hypotension (BP< 90mmHg) and bispectral index value between 50-60. Intra-operative dosage of remifentanil and adverse effects such as hypotension
(reduction of MAP< 45mmHg), bradycardia (heart rate less 50 btm), bleeding were reported.
Postoperative analgesia was performed by intra-operative bolus morphine 0.06mg/kg in 10 ml saline solution followed by continuous infusion of morphine 0.3 mg/kg+ Ketoralac 1.5mg/kg+ dexametasone 8mg started 45 minutes before the end of surgery and followed for 24 hours, rescue dose morphine bolus 0.06mg/kg in 10ml of saline solution. Pain, nausea, vomiting and rescue morphine consumption were reported.
Results : From data analysis in the Saline group (S group), median consumption of remifentanil to maintain an adequate deep anesthesia was 0.21 ±0.02 μg/kg/min vs the Esmolol group (E group) 0.11 ±0.02 μg/kg/min p< 0.05 ,

the total morphine consumption in the postoperative period was 307.1 mg (S group), 155.8 mg (E group), the median Mean Blood Pressure (MAP) was respectively at the induction of anesthesia, osteotomy, awakening time: 96± 7 mmHg (S Gropup) vs 88± 5 mmHg (E Group); 84±6 mmHg (S group) vs 60±7mmHg (E group); 96± 14mmHg (S group) vs 85±5 mmHg (E group).
Conclusions: Our study demonstrate the efficacy of intra-operative infusion of esmolol on reducing intra-operative and post-operative pain and drugs consumption after rhinoplasty. Esmolol, because of its ultrashort duration of action, should be safe for the induction of beta blockade in patients who are getting rhinoplasty, and is ideally suited for rapidly changing levels of beta blockade in this clinical situation.

9AP2-6

Long-term drug therapy of chronic pain

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Background and Goal of Study: The long-term treatment with painkillers is routine in the treatment of chronic pain today. But for long term medication with drugs from the group of opiates it is discussed controversial.
Previous studies and records show only a spotlight of the supply situations and treatment effects of chronic pain patients. The findings status is often inconsistent, so that conclusions and directions for practice are difficult to derive. For this reason, no general recommendations can be made for long-term therapy.
Material and methods: Based on the chronic pain patient population of our clinic pain severity, chronicity degrees, side effects and quality of life were recorded retrospectively.
Measuring instruments are:
German Pain Questionnaire, Quality of Life Questionnaire (WHO QOL), Questionnaire for dysfunctional cognition (PCS).
Included were inpatients and outpatients of the clinic for pain management.
Results and Discussion: A total of 310 patients were considered in an interim analysis.
At about the same gender breakdown was found that the degree of chronicity, the number of patients with opioid long-term use of opioids in the stage is 56% higher.
Opioid therapy is comparable in terms of income satisfaction and pain intensity with the Non-opioidtherapie. There are no differences between the opioid dose groups. Constipation and fatigue are primarily observed in opioid patients, nausea more common in Nonopioidanalgetika. Severe impairment of general well-being can be found in opioid patients.
Within the opioid group duration of treatment, opioid dose and pain intensity are associated with psychological variables, namely depression, anxiety, quality of life, environment and catastrophizing. No significant correlations could be revealed with the variable intake satisfaction.
Conclusions: The use of opioids is usually adapted to the severity and chronicity of pain disease. However, there is no clear advantage of an active substance group. Correlations between duration of use and dose of opioids with anxiety and depression highlight the importance of multimodal accompanying therapies.
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9AP2-7

Postoperative pain and side effects after thyroidectomy: randomized double blind study comparing nefopam and ketorolac

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Background and Goal of Study: Most patients who undergo total thyroidectomy may suffer from postoperative pain, nausea, and vomiting (PONV). Nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids are typically administrated to reduce postoperative pain. But they sometimes induce postoperative bleeding and PONV. Nefopam is a centrally acting, non-opioid analgesic drug used to reduce opioid consumption and so reduce the prevalence of PONV. This study compared and assessed the effects of nefopam and ketorolac on postoperative pain and PONV after thyroid surgery.
Materials and Methods: Two hundred patients underwent total thyroidectomy with central compartment neck dissection in our hospital during a 5 month enrollment period.The written informed consent for participation was obtained from all patients. Group N and Group T were administered nefopam 20 mg and ketorolac 30 mg, respectively, during the last 30 minutes of surgery. Pain scores were measured using a 10-point numerical rating scale. Pain scores were assessed 30 min, 1, 6, and 24 h postoperatively. Pain scores were compared using two-way repeated measures ANOVA. The incidence of nausea and the number of vomiting episodes were estimated at 1 h, 6 h, and 24 h after the operation. Side effects including shivering, nausea, vomiting, and postoperative bleeding were compared using Chi-square test. StatView 5.0 program (SAS Institute Inc., Cary, NC, USA) was used.
Results and Discussion: Pain scores and episodes of vomiting, shivering and postoperative bleeding did not differ significantly between the two groups. Group N patients experienced fewer episodes of nausea at 1 h and within 6 h after the operation comparing with K group, especially 1 h ($P < 0.001$ and $P = 0.016$).
Conclusion(s): Nefopam and ketorolac are similarly effective in reducing postoperative pain after thyroid surgery. Postoperative nausea was less in Group N patients within 6 h postoperatively. Nefopam is favored for pain management after thyroidectomy.

9AP2-8

Anxiolytic effects of intravenously administered parecoxib in patients undergoing total knee arthroplasty with a continuous femoral block: a prospective randomised double-blind study

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Background and Goal of Study: Intravenous infusion of parecoxib could provide significant pain relief in surgical situations that require additional forms of analgesia. However, very little is known about its effects on the anxiety levels of patients before a surgical procedure. The aim of this prospective study was to investigate whether intravenous parecoxib, pre-emptively administered, has an effect on anxiety levels experienced prior to continuous femoral nerve block (CFNB) for postoperative analgesia after total knee arthroplasty (TKA) and if it influences the reported pain of the procedure itself.
Methods: A total of ninety (90) patients who underwent TKA under spinal anesthesia were included in the study. Prior to TKA, all patients received CFNB and were randomized in two Groups: Group D consisted of 45 patients who received the drug parecoxib intravenously in addition to CFNB, whereas Group P consisted of 45 patients who received a placebo drug (N/S 0,9%) intravenously instead of parecoxib. All patients were asked to fill in the questionnaires STAI1 and STAI2 in order to evaluate anxiety levels pre- and post-surgically, respectively. The main aim was to distinguish personality-trait anxiety from state anxiety, i.e. anxiety experience due to the actual perioperative events and the actual pain endured.
Results and Discussion: The non-parametric Mann-Whitney test revealed statistically significant differences between the two patient groups pre- and post-operatively. More specifically, the group receiving parecoxib appeared to have lower anxiety levels both pre- and post-surgically, as compared to the placebo group, with statistical significance $p=0.012$ and $p=0.002$, respectively.
Conclusion(s): Our study has shown that, in addition to its primary analgesic action, parecoxib has an anxiolytic effect in patients undergoing TKA with CFNB. This potent analgesic should therefore be investigated further for its potential to be introduced as a new prophylactic regime in the management of pain-related anxiety.

9AP2-9

Postoperative intravenous patient controlled analgesic efficacy of nefopam after laparoscopic gynecologic surgery

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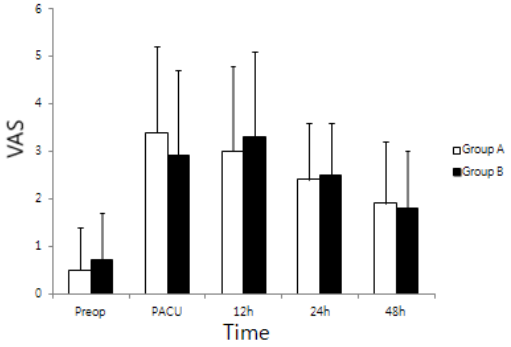
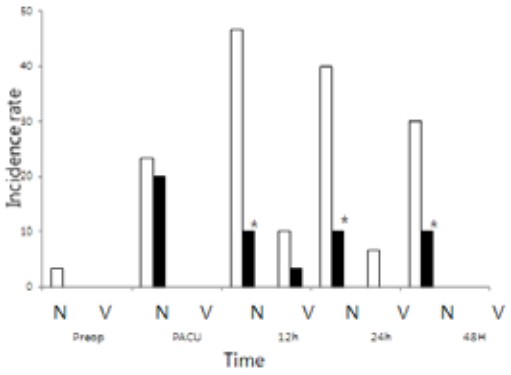
Background and Goal of Study: Intravenous patient-controlled analgesia (IV-PCA) using opioids and nonsteroidal anti-inflammatory drugs (NSAIDs) is the most commonly used method undergoing laparoscopic gynecologic surgery. However, this method has several adverse effects for patients during postoperative pain management. This study was conducted to compare the analgesic efficacy of IV-PCA using nefopam alone and combination with opioids and NSAIDs after laparoscopic gynecologic surgery.
Materials and Methods: In a prospective randomized trial, 60 patients scheduled to undergo laparoscopic gynecologic surgery received IV-PCA for postoperative analgesia. Group A (n =30) and
B (n = 30) received IV-PCA using combination(morphine 60mg and ketorolac 180mg) and using nefopam 200mg at a basal rate of 1 ml/h, a bolus of 1ml, and a lockout time of 15 min, respectively. The primary outcome was analgesic efficacy using visual analogue rating scale (VAS). Other outcomes included incidence rate of postoperative nausea and vomiting (PONV), patient satisfaction for postoperative pain control, a rate of patients taking additional opioids requirements, and incidence rate of side effects, postoperatively.
Results and Discussion: There were no significant differences in VAS between both groups. The incidence rate of PONV was lower in group B than group A at 12h, 24h and 48h after surgery (P<0.05). The patient satisfaction for postoperative pain control was higher in group B than group A (P<0.05). There were no significant differences in rate of patients taking additional opioids requirements and incidence rate of other side effects.
Conclusion(s): IV-PCA using nefopam alone would provide equivalent analgesic efficacy, lower incidence of PONV, and higher patient satisfaction comparable with IV-PCA using combination with morphine and ketorolac after laparoscopic gynecologic surgery.
References: 1. Evans MS, Lysakowski C, Trame`r MR. Nefopam for the prevention of postoperative pain: quantitative systematic review. Br J Anaesth 2008; 101: 610-17.



[Fig. 1. Postoperative visual analogue scale (VAS)]



[Fig. 2. Incidence rate of PONV]

9AP2-11

Chronic pain after orthopedic surgery: causes and treatments

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Background and Goal of Study: After orthopedic surgery16%-35% of patients suffered from chronic pain. Different approaches to the treatment of chronic pain after orthopedic surgery has been the subject of very few studies[1]. The aim was to study the causes of chronic pain after surgery and develop an effective therapy.
Materials and Methods: 26 patients (age 45±14.3) were examine. All suffered from pain after orthopedic surgery more than 6 month. 5 patients after meniscectomy, 5 after total hip replacement, 3 after knee replacement, 2 after two knee replacement,7 after laminectomy,4 after posterior spinal fusion. Pain intensity (5.7 ± 0.5) visual analogue scale (VAS-1/10). All patients after surgery had had multimodal analgesia, than were treated with standard therapy including NSAIDs and muscle relaxants 14 days, adjuvant analgetics and antidepressants for all 6 month with low effect. We carefully examined the patients and revealed concomitant orthopedic pathology that has not been taken into account before surgery.
For example, 15 patients had a problem with spine, 11 had a problem with joints. In patients with spine problems in addition to standard medical therapy in the 1and 3 days got central segmental blockade. There were different approaches depending on the prevalence of the clinical picture. The dose of steroid was reduced gradually from the second procedure. In patients with joints problems we used para - and intraarticulation injection with local anesthetics and a small dose of steroids. All the patients received dosed motor mode. The results of treatment were assessed on 3, 14 and 30 days. Statistical analysis was made by SPSS(p<0.05).
Results and Discussion: During the treatment we noticed a significantly decrease of pain-3.4±0.2 (p<0.007) to the 3th day. To the14th day of treatment -1.5±0.5(p<0.009) and 0.7±0.3 (p<0.003) to the 30th day. We had no complication. Improved the possibility of movement of patients, patients refused so additional support, 11 patients were able to work.
Conclusion(s): These preliminary results showed that all patients before surgery need to be completely examine. Using in the treatment various kinds of blockades statistically significant reduce pain from first procedure in patients without any local or systemic side effect.
References:
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9AP3-1

Twelve years of impairing neuropathic sensitization following vaginal delivery with episiotomy

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Background: Neuropathic sensitization and pain has an estimated prevalence of 3 to 10%[1, 2]. We describe our approach and treatment of a clinical case of long lasting vaginal neuropathic sensitization with severe bio-psychosocial impact.
Case report: A 51 year old, married, healthy woman, was admitted to our chronic pain unit with a complaint for needle-like pain 2cm inside the left-posterior vaginal wall, triggered by touch, beginning 12 years ago after a vaginal delivery with episiotomy. She had no more vaginal, urinary or gastro-intestinal symptoms or signs. Since then it impaired severely her intimate hygiene and sexual life. She was referred to our unit after she consulted her general practitioner and several gynaecologists with no physical or imagiologic abnormalities and no success with topic and local creams and ovules, with a final diagnosis of psychogenic pain.
After our first consultation and recollection of a detailed clinical history we suspected of neuropathic sensitization in the region of the episiotomy. She was prescribed with 10 mg of amitriptyline and magnesium, and scheduled for an ambulatory procedure with deep sedation for proper identification of the exact trigger point and injection of a mixture of saline and ropivacaine 0.2% for local neural desensitization.
On the follow up consultation, one month later, she was completely asymptomatic, even with manual stimulation.

Discussion: Neuropathic sensitization is a complex disorder and it can have severe bio-psycho-social impact if untreated. It's diagnose and treatment should be suspected and correctly orientated to a chronic pain unit.
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Learning Points: Undiagnosed long-lasting pain shall be orientated to a chronic pain unit.

9AP3-2

Postoperative pain management in chronic kidney disease: French national survey

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Objectives: Chronic kidney disease (CKD) is a growing public health problem. Frequently, CKD patients have to undergo surgical procedures and require effective postoperative pain management (POPM).
Study Design: A prospective, self-administered questionnaire survey was emailed to physicians SFAR members (French Society of Anesthesiology and Intensive Care).
Methods: The questionnaire had closed-ended questions to evaluate each SFAR member's POPM in CKD patients. Questions concerned equation used to measure renal function, analgesics used and dose adjustment based on the CKD stage, the existence of protocol in their own department of anesthesiology and their awareness of the existence of "Postoperative analgesia in "particular situations" including CKD. Practical recommendations. SFAR guidelines 2008"(1).
Results: 307 respondents returned the questionnaires. One quarter of the respondents (27%) worked in a university hospital. 85% practiced exclusively in anesthesia department. MDRD and Cockroft equations were used by 39% and 40% of SFAR members. The most commonly used drugs were paracetamol (≥ 80% in all cases) and morphine (stage 2:78%; stage 3: 61%; stage 4:48%); a reduced morphine dose was prescribed by more than 80% of the anaesthesiologists regardless of CKD stage . In ESRD, the opioid used in PCA were morphine, oxycodone, and sufentanil (66%, 26%, and 20% respectively). 6% of the physicians declared to have protocol for CKD POPM available in their own department and 16% were well-informed about the SFAR's Postoperative analgesia in "particular situations" including CKD.
Discussion and Conclusions: according to 2008 SFAR recommendations, used of sufentanil has been suggested to treat POP in ESRD. Nevertheless most surveyed practitioners used morphine preferentially even in ESRD. Heterogeneity and ambiguity of international recommendations about the use of morphine in ESRD and the absence of specific protocols concerning the use of PCA sufentanil for POPM may explain in part the used of morphine in case of ESRD and the rarity of protocols for CKD POPM in the practitioners departments.
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9AP3-3

Prevalence of persistent pain 6 months after major surgery: a prospective observational study

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Background and Goal of Study: Prolonged postoperative pain is a major issue for patient discomfort after surgery and often associated with delayed recovery and persistent disability. The aim of this study was to evaluate the prevalence of persistent pain and need for analgesics up to 6 months after major surgery.
Materials and Methods: A prospective observational monocenter cohort study was conducted between January 2012 and August 2013. Eligible patients were aged ≥18 years and scheduled to undergo elective surgical interventions including joint surgery (hip, knee arthroplasty) back surgery (nucleotomy, spondylodesis), and urological surgery (cystectomy, prostatectomy, nephrectomy). Pre- and postoperative pain was assessed on a numerical rating scale (NRS 0-100) on day 2 and 7 and six weeks and six months after surgery. Clinical information was collected with structured questionnaires during hospitalization and by telephone interview after discharge.
Results and Discussion: 644 patients gave informed consent, thereof 54.4% men (mean age 62.2, SD 14.3). The majority of patients were classified as ASA 2 (53.4%). Higher preoperative pain scores were found in patients undergoing joint (mean 76; 95% confidence interval [CI]: 72-80) and back surgery (mean 71, CI: 67.5-74.5) than in patients prior to urological surgery (mean 23; CI: 18-28). Pain levels did not differ between the surgical groups in the early postoperative period and after six weeks. After six months, pain levels in urological patients decreased ($p < .001$), but increased in patients, who underwent back surgery ($p = .026$). Six weeks postoperatively, 56.5% of patients after joint surgery reported the intake of analgesics on a regular basis (vs. 45.0% after back surgery and 13.5% after urological interventions, respectively). Six months after surgery, need for analgesics was reported by 41.3% of patients after back surgery, compared to 35.5% after joint surgery and 7.3% after urological surgery. Our results reveal significant variations regarding pain and analgesic use during long-term follow-up depending on surgical procedure.
Conclusion: Persistent pain is a dissatisfying result after surgical interventions predominantly performed to relieve pain symptoms and reduce functional impairment. Indications for back surgery, namely nucleotomy, and joint prosthesis, should be critically considered. Adequate pain management strategies are needed, even after discharge from hospital, to improve long-term results.

9AP3-5

Increased incidence of herpes zoster and postherpetic neuralgia in adults with insomnia: a population-based study

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Background and Goal of Study: Insomnia affects approximately 6-10% of the general population on a situational, recurrent or persistent basis. There is a close correlation between the duration and quality of sleep and immune responses and individuals with insomnia (insomniacs) are more susceptible to infections. Herpes zoster (HZ) results from reactivation of latent varicella-zoster virus in sensory ganglia after a primary infection, which is a result of diminished cell-mediated immunity. We hypothesize that insomnia associated with dysregulated immunity may be a risk factor for developing HZ and its complications.
Materials and Methods: We used data from the longitudinal National Health Insurance Research Database (NHIRD) 2000 in Taiwan. It contains data of outpatient and inpatient claims of 1 million beneficiaries which were randomly sampled from 25.68 million enrollees in Taiwan NHI from 1996 to 2010. Adult (aged 20 years and older) insomniacs who met the following criteria between 2002 and 2006 were identified: (1) ≥1 single hospitalization for insomnia or (2) ≥3 outpatient visits for insomnia within a time period of one year.
Results and Discussion: In total, 31,726 adults diagnosed with insomnia and 63,452 matched controls were identified. Insomnia affected most commonly in adults aged 60 and older with female preference. Prevalence of comorbidities including malignancy, diabetes mellitus, hypertension and depression/anxiety was significantly higher in insomniacs than that in noninsomniacs. Insomniacs had a higher Charlson comorbidity index scores than noninsomniacs. The overall incidences of HZ in insomniacs and noninsomniacs were 8.42 and 5.25 per 1,000 person-years, respectively. The adjusted hazard ratio of HZ was 1.46 times greater for insomniacs (95% confidence interval: 1.32-1.61) after adjusting for potential confounders. In Kaplan-Meier survival curves, the 3-year cumulative incidence of HZ in insomniacs was significantly higher than that in noninsomniacs. Postherpetic neuralgia, nonpain neurological complications and respiratory complications in insomniacs were significantly greater than those in noninsomniacs in term of zoster-related complications (18.2% vs 13.7% , 10.1% vs 6.6% and 1.8% vs 0.7% respectively).
Conclusion(s): This large population-based retrospective cohort study showed that insomnia was independently associated with increased risk of HZ and its neurological complications.

9AP3-6

A retrospective study of persistent postsurgical pain following thoracic surgery

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Background and Goal of Study: Thoracic operations are among the highest risk procedures, often leading to chronic post-surgical pain. Unrelieved acute pain after thoracic surgery may contribute to the development of post-thoracotomy pain syndrome (PTPS). In recent years, the development of video-assisted thoracic surgery (VATS) has reduced surgical stress.
However, the PTPS incidence has reportedly remained unchanged. We retrospectively studied the incidence of persistent postsurgical pain following VATS in our institute to identify associated risk factors.
Materials and Methods: We studied 170 patients, with ASA physical status below 2, who underwent VATS between 01/2014 and 09/2014. We checked anesthesia records, postoperative pain management, and determined whether or not these patients took painkillers at 1 month and/or 2 months after the operation.
Results and Discussion: Of the 170 patients, there were 111 males and 59 females, with a mean age of 63.3 years. General anesthesia had been used in all cases, combined with epidural anesthesia in 12 cases. Mean operative time was 167.6 minutes. Postoperatively, 140 cases were given intravenous patient-controlled analgesia with fentanyl and 12 received epidural analgesia. Additional analgesics were administered, if necessary. Fifty-three patients (34.1%) were using analgesics 1 month after surgery (group 1M). Twenty-one patients (12.3%) were still on analgesics 2 months after surgery (group 2M). The group 1M and 2M patients had significantly longer operative times than the patients not given analgesics 1 or 2 months after surgery (group C) (191±86min vs 156±87min, p=0.018). Furthermore, the patients in group 1M and 2M also tended to more frequently need additional analgesics during 3 days after surgery than the patients in group C (P=0.085). We found that 91% of group 2M patients were transitioning from group 1M. Patients in group 1M had a significant risk of transitioning to group 2M (Odds ratio: 19.5, p<0.0001).
PTPS is defined as pain along a thoracotomy scar at least 2 months after the surgical procedure. Therefore, the patients with pain 1 month after surgery were suggested to be at significant risk of suffering prolonged pain, i.e. for more than 2 months, raising the possibility of PTPS development.
Conclusion(s): Patients with pain 1 month after surgery is considered to be high risk of progression to PTPS, requires adequate pain management.

9AP3-7

The incidence of complex regional pain syndrome after wrist fracture: a retrospective survey of 153 patients

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Background and Goal of Study: Complex regional pain syndrome-type I (CRPS-I) is a chronic pain condition that usually follows deep-tissue injury such as fracture. Specifically after Colles' fractures the incidence ranges from 1% to 37% (1).
The aim of this study was to analyse the incidence of CRPS-I after surgical repair of wrist fracture and to identify some risk factors.
Materials and Methods: One hundred and fifty three patients admitted to Charleroi University Hospital Centre suffering wrist fracture scheduled for surgical treatment between 2006 and 2012 were identified. A review of the medical records was performed to determine demography, type of fracture and surgical procedure and mode of anaesthesia. All patients were contacted by telephone and asked if they had experienced any signs and symptoms of CRPS-I in the postsurgical period using the Budapest Research Criteria (BDC) (2). Student's t and Chi^2 tests with p<0.05 significant.
Results and Discussion: Forty four patients (28%) met the BDC criteria for CRPS-I in the postoperative period. Risk factors of the patients without and with CRPS-I are summarised in Table 1. The incidence of CRPS-I after surgical repair of wrist fracture found in this survey is high (28%) and agrees with previous studies (3,4).
We identified some risk factors for CRPS-I, i.e. female gender, age and displacement of the bones (dislocation), in accordance with literature. Regarding the anaesthetic techniques, we observed a reduced incidence of CRPS-I with general anaesthesia in contrast with plexus block. External fixation of the wrist seems to induce more CRPS-I when compared to open surgery, related to more important injury.

	Non CRPS-I group (n = 109)	CRPS-I group (n = 44)	p-Value
Gender (M/F)(n)	42 (39%)/67(61%)	7 (16%)/37(84%)	0.007
Age (yr)	50.5 ± 25.2	62.2 ± 16.0	0.005
Dislocation (n)	11 (14%)	11 (33%)	0.020
Anaesthesia (AG/plexus)(n)	70 (65%)/38 (35%)	16 (38%)/26 (62%)	0.003
External fixator (n)	24 (23%)	17 (43%)	0.034

[Table 1. Risk factors for CRPS-I]

Conclusion(s): Around 30% of our patients suffered CRPS-I after surgery for wrist fracture.
References:
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2. Harden et al. Pain 2010;150:268-74;
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4. Field and Atkins. J Hand Surg Br 1997;22:178-82

9AP3-8

PAin MAnagement, costs and risk of local infection after major open abdominal surgery: epidural vs continuous wound infusion (PAMA trial - pilot study)

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Background and Goal of Study: Pain control on major abdominal surgery is a challenge. Epidural analgesia (EDA) is a common technique for pain relief in this procedure. The aim of the study is to evaluate the effectiveness of this established technique with one not yet consensual: Continuous Wound Infusion (CWI).
Materials and Methods: 28 patients submitted to major abdominal surgery (median laparotomy) under general anesthesia were randomized to either EDA or CWI . The CWI group received analgesia through a multiorifice wound catheter placed above the peritoneum and connected to a 10 mL/h ropivacaine 0,2% infusion. The EDA group received ropivacaine 0,2% infusion bolus of morphine every 12 hours according to a protocol based on age and catheter level. Both analgesic regimens were continued for 48 hours. Efficacy criteria were based on pain at rest (Verbal Response Scale ≤3/10) at 24 hours. Pain intensity, rescue analgesia consumption, and side effects were assessed at 6, 24, and 48 hours after surgery.
Results and Discussion: The proportion of patients successfully controlled for their postoperative pain management were 79% for CWI and 57% for epidural. On the CWI uncontrolled pain group, all patients classified their pain at 24 hours below 6/10. The incidence of nausea, vomiting, pruritus, and urinary retention was significantly lower in the wound infusion group and time to recovery of bowel function was shorter.
Conclusion(s): The effectiveness analysis suggests that CWI is the dominant strategy for managing postoperative pain in comparison with EDA after major abdominal surgery. This technique is associated with better analgesia and a lower incidence of side effects, contributing for a quicker recovery and discharge.
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Wu CL, Cohen SR, Richman JM, Rowlingson AJ, Courpas GE, Cheung K, Lin EE, Liu SS: "Efficacy of postoperative patient-controlled and continuous infusion epidural analgesia versus intravenous patient-controlled analgesia with opioids: a meta-analysis".Anesthesiology. 2005 Nov;103(5):1079-88;
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Acknowledgements: PAMA group

9AP3-9

Diabetic peripheral neuropathic pain in primary care: prevalence and treatment

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Background and Goal of Study: Neuropathies are the most common long-term microvascular complications of diabetes, with up to 50% of older type-2 diabetic patients having evidence of a distal peripheral neuropathy (DPN). Diabetic peripheral neuropathic pain (DPNP) is a consequence of DPN that affects up to 26% of diabetic patients(1) and is usually gradual or insidious. Several treatment options are available and should be used to reduce symptoms and improve quality of life(2). Our goal was to determine the prevalence and treatment of DPNP among Portuguese adults with type 2 diabetes.
Materials and Methods: We conducted a cross-sectional study that included a sample of 60 patients with type2 diabetes, representative of the diabetics of a Portuguese Primary Healthcare Unit (n=364). DPNP was diagnosed using the Portuguese version of Douleur Neuropathique 4 (DN4) questionnaire (score ≥4). All data regarding age, gender and treatment (drugs or other) were recorded. Statistical analysis was performed using SPSSv20.0.
Results and Discussion: Patients' mean age was 69.15 years [95% CI: 66.27-72.03]; 52% were male and only 16% were under insulin therapy. Mean Hemoglobin A1c (HbA1c) was 6.67% [95% CI: 6.42-6.92], with 43.33% under 6.5% and 85% under 8%. DPNP was diagnosed in 13 patients (21.7%) and only 3 (23%) of them were under treatment for DPNP (one with pregabalin and two with tricycle antidepressants). Regarding patients with DPNP, mean age was 77.62 years [95% CI: 72.75-82.49], 69% were female and mean HbA1c was 6.67% [95% CI: 6.13-7.11]. HbA1c was <6.5% in 50% and <8% in 83%. However, 31% of these patients were already under insulin therapy.
Conclusion(s): The prevalence of DPNP in the study population was in accordance with the literature(1). In our study, most patients with DPNP were females, older than the average diabetic patient but with controlled HbA1c. We also found a higher prevalence in insulin usage in these patients. The most surprising finding was the poor therapeutic approach of these patients, with less than a quarter of those reporting significant pain being under treatment. The results of our study should encourage Family Doctors and other physicians engaged in the approach and treatment of DPNP to actively assess, diagnose and start early treatment with first-line drugs, since DPNP is a very prevalent and disturbing problem for diabetic patients.
References:
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9AP3-10

The efficiency of local invasive therapy in myofascial facial pain syndrome patients

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Background and Goal of Study: The efficiency of 2% lidocaine injections was evaluated in myofascial facial pain syndrome (MFPS) patients.
Materials and methods: 96 MFPS patients, who attended the clinic in 2012-14, were randomized into two comparable groups (48 patients each) by the sealed envelope method. The control group received fluoxetine 20mg/day and tizanidine 8mg/day during three months and a month, respectively. The study group received additional 2% lidocaine injections in masticatory muscles trigger points (10 injections with 2 day intervals). The 3-month observation period included neurodental examination, the Visual Analog Scale (VAS) and the McGill Pain analysis Questionnaire (MGPQ). The examination took place prior to and three months after the treatment. The data was analyzed with IBM SPSS Statistics and MS Excel software. The study was approved by the Institutional Review Board.
Results and Discussion: The control group consisted of 68.8% females and 31.2% males (mean age 61.8±10.1 and mean disease history 4.7±0.4 years). The study group included 75% women and 25% males (mean age 58.3±12.7 and the mean disease history 5.1±0.6 years). The neurodental examination revealed masticatory and pericranial myofacial disorders in 95.5% and 93.8% in the control and study groups respectively. The VAS score was 4.7±1.6 and 5.1±1.8 points in the study and control groups, respectively. MGPQ score in the both groups suggested that patients developed sensory and affective disorders (sensory rank pain index (RPI) 10.98±2.37; affective 10.17±2.19; total 22.48±4.65 in the control group; and 12.15±2.56; 11.02±1.92 and 23.17±4.66 points in the study group). After the 3-months treatment, pain resolved in 75% patients and was significantly lower in the study group than in control group (0.9±0.3 and 2.3±0.7, respectively; p=0.03). MGPQ scores also demonstrated more apparent changes in the study group (0.65±0.08 and 1.75±0.19 (p=0.02); 0.54±0.09 and 1.13±0.16 (p=0.04); 1.19±0.16 and 2.60±0.38 (p=0.02) sensory, affective and total RPI in control and study groups, respectively).
Conclusions: 2% lidocaine injections in masticatory muscles trigger points help to relieve MFPS in a short time.
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9AP3-11

Anxiety in the prediction of postoperative pain in major orthopedic surgery

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Background and Goal of Study: Preoperative anxiety is common. Increased levels of anxiety may alter a patient's surgical course and are associated with higher postoperative pain[1], reducing patient satisfaction, delaying discharge and recovery and increasing costs.[2]
The aim of this study was to assess the effect of preoperative "anxiety" and "need for information", in preoperative and postoperative pain in major orthopedic surgery and to evaluate the effect of age, gender, Boby Mass Index (IMC), and anaesthesia in its levels.
Materials and Methods: After approval by the institutional ethics committee, a prospective study was conducted in patients submitted to elective total knee arthroplasty (TKA) or total hip arthroplasty (THA) since June-2014. Before hospital admission (15 days) patients were informed about anaesthesia and postoperative analgesia, and immediately submitted to the "Amsterdam Preoperative Anxiety and Information Scale" (APAIS) evaluation. "Anxiety" (with-W vs without-Wo, cut off>13) and "need for information" (uninterested attitude-UA vs positive attitude-PA, cut off≥5) were registered and correlated. These four groups were correlated with preoperative and postoperative (48h after surgery) pain (assessed by Brief Pain Inventiry-BPI), gender, age, IMC or anesthesia (general anaesthesia-GA vs regional anaesthesia-RA). Non-parametric tests were performed for comparisons between numerical variables and Chi-square test for categorical variables. Statistical significance at p< 0.05.
Results and Discussion: Sixty patients were included: W-19%, Wo-81%; UA-44.4%, PA-55.6%.
The W and PA groups were correlated (p=0,005). Postoperatively, W group scored higher "minimum postoperative pain level" (p=0,033).
No differences were found between groups concerning preoperative pain, anaesthesia, surgery, gender, age and BMI.
Conclusion: Preoperative anxiety was correlated with the need for information and with higher levels of "minimum postoperative pain".
These are preliminary data from an ongoing study. Further results may bring important insights to postoperative pain study.
References:
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9AP4-1

Preemptive gabapentin and residual pain after thyroid surgery: a randomized, double-blind, placebo-controlled trial

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Background and Goal of Study: The preoperative administration of gabapentin proved its efficacy in the management of acute postoperative pain. Its anti-hyperalgesic action could prevent delayed postoperative pain. The objective was to evaluate the interest of preoperative gabapentin on the occurrence of residual pain after thyroid surgery.
Materials and Methods: After ethical committee approval, 90 consecutive patients undergoing total thyroidectomy were included between April 2012 and January 2013. Patients received 2 hours before induction of anesthesia oral 1200-mg of gabapentin (G) or placebo (P). General anesthesia was standardized. The day before surgery and at 3 and 6 months after surgery, eligible patients completed the numeric scale (NRS) ranged from 0 (no pain) to 10 (unbearable pain), the neuropathic pain diagnostic questionnaire (DN2), the neuropathic pain symptom inventory (NPSI) and the Saint Antoine pain questionnaire (SAPQ) which analyses the sensory and affective dimensions of pain. Data are expressed as n (%) or means ± SD. Differences between G or P were by Chi-square or Fisher tests or Wilcoxon test as required. Significance at $P < 0.05$.
Results and Discussion: Among the 90 patients included, 5 patients were excluded due to postoperative protocol violation. The population was comparable for age, weight, ASA score and preoperative pain. At 3 months, 83 patients completed the questionnaires including 41 in G and 42 in P. A total of 14 (17%) patients experienced a DN2 ≥ 3. There were 6 (14.6%) patients in G and 8 patients (19%) in P (p=NS). NRS was respectively 0.4±0.93 and 0.74±1.38 (p=NS). The SAPQ was 2.85±5.02 in G and 3.29±6.21 in P (p=NS). Values for NPSI were significantly lower for patients treated with G (1.87±3.09) than for those with P (3.33±3.96, p=0.04). At 6 months, 80 patients completed the questionnaires including 40 patients in G and 40 patients in P. A DN2 ≥ 3 was reported in 11 (13.6%) patients including 4 patients (9.8%) in G and 7(17.5%) patients in P (p=NS). Overall NRS, SAPQ and NPSI were low without any significant difference between groups.
Conclusion(s): This work confirms the presence of low intensity residual neuropathic pain at 3 and 6 months after thyroidectomy. Despite the fact that gabapentine induced a decrease of the pain neuropathic component at 3 months, the incidence of neuropathic pain 6 months after thyroidectomy was not modified by this treatment.

9AP4-2

Interaction between pregabalin and fentanyl - a clinical study using pain threshold

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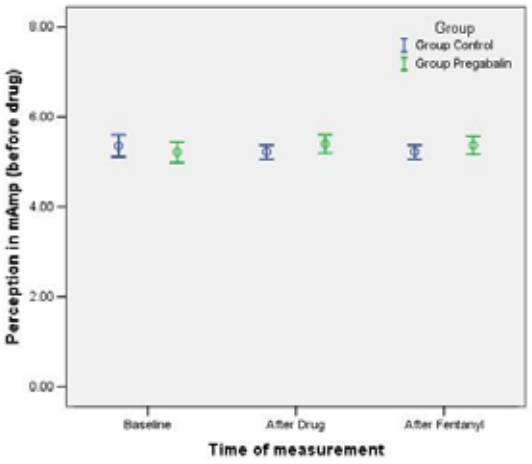
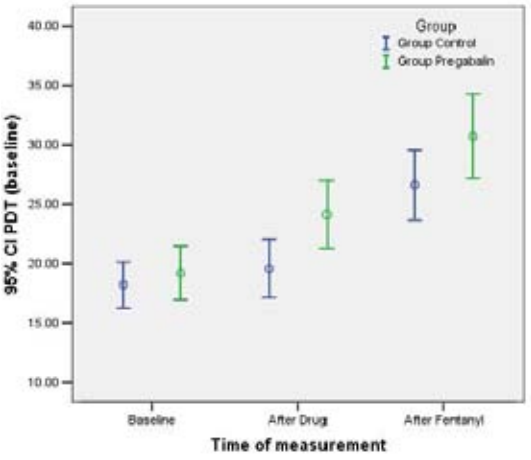
Background and Goal of Study: GABA receptor analogues have been found to have opioid sparing effect and also reduce the incidence of their adverse effects. The mechanism of interaction between Pregabalin and opioids on pain threshold has not been completely elucidated. The objective of the present study was to assess the effect of pre-treatment of oral Pregabalin on Fentanyl analgesia using pain detection thresholds (PDT) by cutaneous electrical stimulation. The use of electric stimulations by neuromuscular junction monitor to determine the pain threshold to supplement the algesiometer was recently validated.
Materials and Methods: Eighty patients of ASA grade I-II, aged 18-58 years, weighing 40-80 kgs, undergoing elective general surgeries were randomized into two groups- Group C- Placebo control and Group P -Pregabalin. Pain detection threshold(PDT) were measured at baseline, 2 hrs after administration of oral pregabalin 75mg, and 15min after administration of intravenous Fentanyl 1mcg /kg. Comparision of data between groups was performed using t-test for independent variables.
Results and Discussion: Baseline PDT was comparable between the groups. Pregabalin produces a significant elevation of pain detection threshold (PDT) from 19.59 (95% C.I -17.11 to 22.06) to 24.16 (95% C.I 21.3 to 27.01).There was no statistically significant difference between the two groups in the PDT after administration of intravenous Fentanyl(26.6 in group C vs 30.7 in group P) though the mean PDT was higher(11.5 in P vs 8.4 in C) in patients who received pre-treatment with Pregabalin.



[Comparision of Perception Threshold (PT) between the groups]



[Comparision of Pain Detection Threshold (PDT) between the groups]

Conclusion(s): Pregabalin increases the pain threshold. Pre-treatment with 75mg of Pregabalin 2 hrs before surgery does not have significant additive or synergistic effect on the increase of pain threshold produced by Fentanyl.

9AP4-3

Long-term risk of neuropathic pain in patients undergoing transabdominal hysterectomy treated with preemptive dose of pregabalin and gabapentin - randomized, double-blind, placebo-controlled trial

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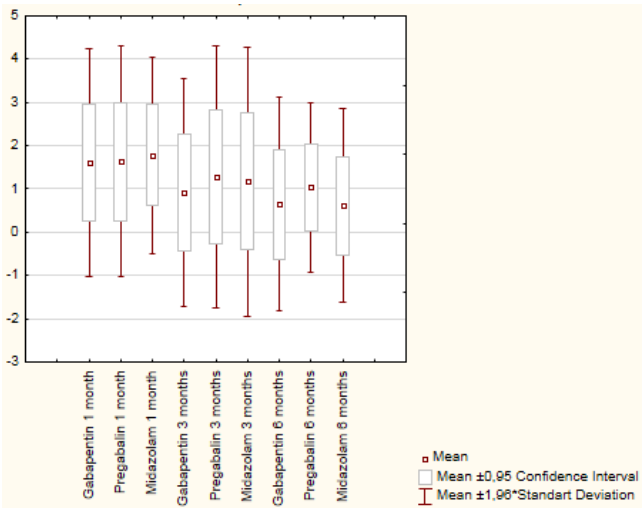
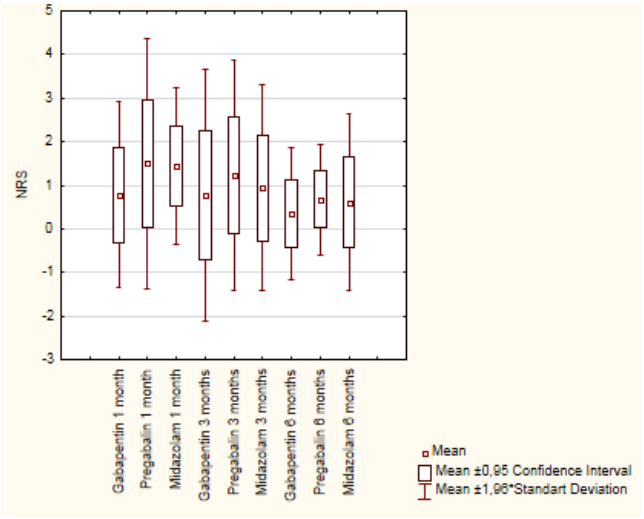
Background and Goal of Study: Preemptive analgesia is used to prevent altered conduction of nociceptive impulses. Increasing number of studies has demonstrated the role of preemptive dose of gabapentin and pregabalin in attenuating acute postoperative pain. However, the impact of preventive dose of pregabalin and gabapentin on persistent postsurgical pain has not been evaluated yet. Relatively high occurrence of neuropathic pain is associated with hysterectomy. The aim of present study was to compare long-term risk of neuropathic pain after transabdominal hysterectomy in patients treated with preemptive pregabalin and gabapentin with the control group.
Materials and Methods: The experimental protocol was approved by the Local Ethical Committee. Inclusion criteria of the study were: patients scheduled for planned hysterectomies and aged between 18 and 70. Informed written consent was taken. Between 2011 and 2013 a total of 63 ASA I and II patients were randomized into three groups (Group A - Gabapentin 600

mg, Group B - Pregabalin 150 mg and Group C - Midazolam 7,5 mg as active placebo). At 1, 3, 6 months postoperatively patients were interviewed for presence of neuropathic pain as well as for its intensity according to numeric rating scale (NRS). Neuropathic pain score included seeking for seven symptoms in the postoperative area: burning pain, stabbing pain, tingling, itching, numbness, sensation of cold or current transmission. According to the protocol three positive answers indicated the presence of neuropathic pain.
Results and Discussion: Mean NRS measured at 1 month postoperatively did not differ between groups (group A - 0,78, group B - 1,5, group C - 1,44; F= 2.466; p=0,09;) at 3 months (group A - 0,78, group B - 1,22, group C - 0,94; F= 0.75; p=0,47) and at 6 months (group A - 0,35, group B - 0,68, group C - 0,61 ; F= 1.01; p=0,37 ; Anova. Mean neuropathic pain score at 1 month postoperatively did not differ between groups (group A - 1,6; group B - 1,63, group C - 1,77, F= 0.098; p=0,9) at 3 months (group A - 0,91, group B - 1,27, group C - 1,17; F= 0,35; p=0,7) at 6 months (group A - 0,65, group B - 1,04, group C - 0,61; F= 0,92; p=0,4; Anova).
Conclusion(s): Pregabalin given at 150 mg and Gabapentin given at 600 mg as preemptive analgesia are not effective in reduction of risk of long-term neuropathic pain after transabdominal hysterectomy.
References: Tiippana EM et al. Anesth Analg. 2007;104(6):1545-56.



[Neuropathic characteristic score]



[Long term pain score]

9AP4-4

Perioperative pregabalin for postoperative pain relief after thoracotomy

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Background and Goal of Study: Thoracotomy is associated with severe acute postoperative pain and a high incidence of persistent post-surgical pain. Pregabalin is effective both at controlling postoperative pain and preventing chronic neuropathic pain.
In this study we aimed to determine the efficacy of perioperative pregabalin, with or without the addition of a local anaesthetic continuous wound infiltration, in the control of postoperative pain and the prevention of chronic post-thoracotomy pain in patients undergoing thoracotomy.
Materials and Methods: After Ethical approval was obtained, 45 patients undergoing thoracotomy under general anaesthesia alone were allocated to receive in addition to their standard postoperative analgesia which consisted of PCA-morphine and systematic administration of paracetamol either placebo (PLCB group, n=15), pregabalin alone (PRG group, n=15) or pregabalin combined with continuous wound infusion of local anaesthetics (PRG+CWI group, n=15). Patients in PRG and PRG+CWI groups were advised to assume pregabalin 75 mg every 12 hours starting the afternoon before surgery and continuing for the first 5 postoperative days. Postoperative data collection included opioid consumption, VAS scores at rest and during cough and incidence of side effects. At 1 and 3 months from surgery patients were assessed with the DN4 questionnaire for neuropathic pain.
Results and Discussion: There were no significant differences in patient demographic and intraoperative data among the three groups. VAS scores were significantly lower in the PRG+CWI group ($p<0.05$) at rest, while during cough the placebo group had higher scores than both treatment groups ($p<0.001$ or $p<0.05$). Morphine consumption measured at 48 postoperative hours revealed a significant difference in total morphine; PLCB group: 49±11mg, PRG group: 33±10mg and PRG+CWI group: 28±11mg ($p<0.001$ between placebo and the other two groups). The incidence of neuropathic pain was more frequent in the placebo group (1-month: PLCB group: 10 pts, PRG group: 0 pt and PRG+ CWI group: 0 pt [$p<0.001$], 3 months: PLCB group: 10 pts, PRG group: 0 pt and PRG+ CWI group: 0 pt [$p<0.001$]).
Conclusions: Perioperative administration of pregabalin significantly reduced pain scores and opioid consumption in post-thoracotomy patients and restricted the incidence of neuropathic pain whereas the addition of continuous wound infiltration with local anaesthetics did not enhance its preventive effect.

9AP4-5

Effects of preemptive gabapentin in knee surgery under general anesthesia: a meta analysis

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Background: Preemptive gabapentin has been evaluated as an adjunct in the management of postoperative analgesia. Knee surgery is associated with significant postoperative pain especially after general anesthesia. This systematic review was conducted to evaluate postoperative analgesic effects of preemptive oral gabapentin after knee surgery under general anesthesia.
Materials and Methods: We performed systematic research of randomized controlled trials using oral preemptive gabapentin in knee surgery under general anesthesia. We searched MEDLINE, EMBASE, the Cochrane Library and KoreaMed. Studies were included all randomized double blinded clinical trials of preoperative oral gabapentin treatment. The surgery was limited to knee arthroscopy and total knee arthroplasty.
Results and Discussion: We identified 237 trials. Four RCTs were met the criteria. Postoperative 2 hours and 4 hours VAS (Visual Analogue Scale) score [weighted mean difference (WMD), -13.96 and -8.55] were reduced in the gabapentin groups. 12 hr, 24 hr, and 48hr postoperative VAS score were not decreased. However, morphine consumption during postoperative 24 hours were not different between gabapentin and placebo groups. The incidence of nausea and vomiting were not different.

Conclusions: Preoperative oral gabapentin can reduce early period postoperative pain in knee surgery under general anesthesia. However, gabapentin did not decreased pain intensity and additional opioid consumption of postoperative 24 hours.

9AP4-6

A prospective, randomized, placebo-controlled trial of memantine (Namenda®) for postoperative analgesia following radical retropubic prostatectomy

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Background and Goal of Study: This is the first double-blind, randomized controlled trial to test the hypothesis that perioperative memantine provides better acute postoperative pain relief and prevents chronic pain after surgery (Radical Retropubic Prostatectomy, or RRP) compared to placebo, when used as an opioid adjunct.
Materials & Methods: 62 patients undergoing RRP under general anesthesia were randomized into two groups of comparable demographics. The memantine group (n=32) received oral memantine 20 mg 30-60 minutes preoperatively, and 10 mg each on the morning and evening of postoperative day 1. The control group (n=30) received identical placebo pills. Data were collected on pain (Verbal Rating Scale, VRS on coughing) (Table 1), cumulative opioid consumption (Table 2) and opioid-related side effects (ORS) from 0-24 hours postoperatively. At 1 week and 1 and 3 months, patients were surveyed on postoperative pain.

Pain on Coughing (Verbal Rating Scale, VRS)	Control group (n = 30)	Memantine group (n = 32)	Significance (3 d.p.)
0 minutes	4.5 ±2.9	4.8 ±2.3	0.729 (n.s.)
30 minutes	5.3 ±2.9	5.8 ±2.3	0.525 (n.s.)
60 minutes	5.2 ± 2.5	5.5 ± 2.2	0.619 (n.s.)
120 minutes	5.2 ±2.0	4.8 ±2.3	0.578 (n.s.)
24 hours	5.9 ±2.9	5.7 ±2.0	0.730 (n.s.)
1 week	0.6 ±0.9	1.9 ±2.2	0.005 (sig.)

[Table 1. Postoperative Pain (mean ± SD)]

IV Morphine equivalents (mg)	Control group (n = 30)	Memantine group (n = 32)	Significance (3 d.p.)
Intraoperative	36.2 ±14.9	35.8 ±16.6	0.910 (n.s.)
PACU	8.9 ±8.1	8.4 ±6.7	0.781 (n.s.)
12 hours	19.2 ±13.0	20.9 ±16.3	0.650 (n.s.)
24 hours	37.0 ±24.6	43.9 ±46.6	0.476 (n.s.)

[Table 2. Cumulative Opioid Consumption (mean ± SD)]

Results & Discussion: There was no significant difference in VRS, opioid consumption, and ORS (itch, nausea, vomiting and retching) at the surveyed timepoints, except VRS at 1 week was higher in the memantine group (1.9 ±2 vs. 0.6 ±1, p=0.005). There was no significant difference in the incidence of chronic postoperative pain at 1 and 3 months.
Some NMDA antagonists (e.g. ketamine) reduce acute postoperative pain and analgesic demand as opioid adjuncts [1]. Memantine may not bind to receptors involved in acute pain, or may need to be started days preoperatively to be effective. It may cause drug-receptor perturbations, leading to higher VRS at 1 week.
Conclusion: Perioperative memantine does not significantly reduce acute or chronic postoperative pain after RRP.
References:
1. McCartney et al. A qualitative systematic review of the role of N-methyl-D-aspartate receptor antagonists in preventive analgesia. Anesth. Analg. 2004;98(5):1385-400.

9AP4-8

Opiod-sparing effects of perioperative very low doses of ketamine added in general anesthesia for colorectal surgery- an interesting option

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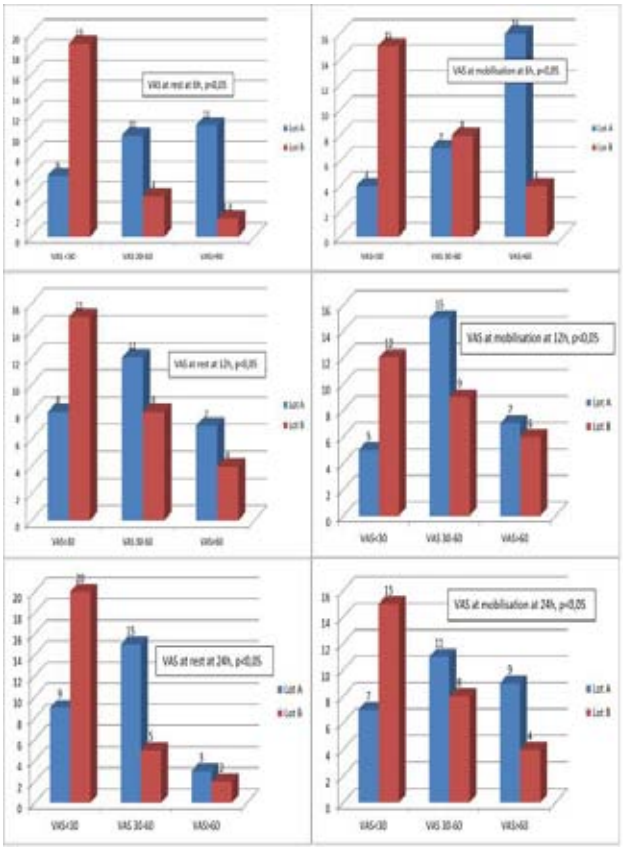
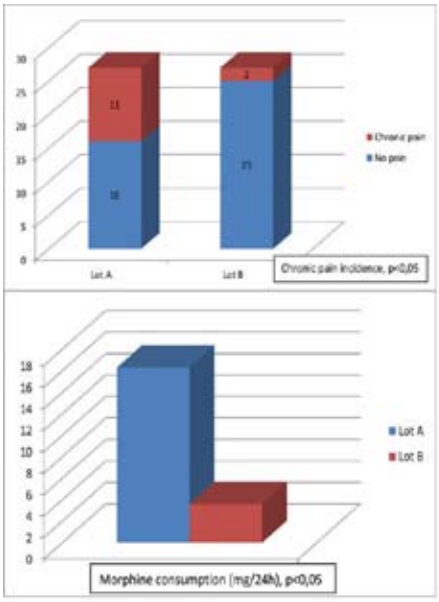
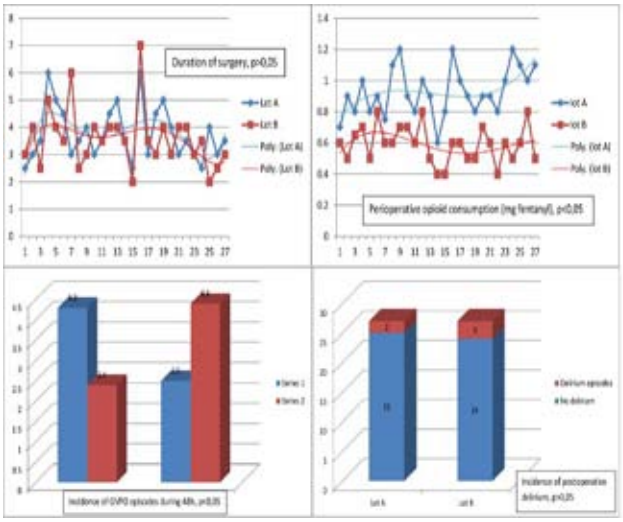
Background and Goal of Study: The aim of the study was to evaluate if very low doses of i.v. perioperative ketamine added to a standard, balanced anesthesia could have opioid-sparing effects for the patients with colorectal cancer surgery.
Materials and Methods: A prospective, randomized study of 54 patients with surgery for colorectal cancer were allocated in 2 groups. Group A 27 patients received standard, balanced general anesthesia fentanyl 2g/kg iv at induction and 2-5g/kg/h perioperative and sevoflurane 2-3%.Group B 27 patients with the same anesthetic regimen plus ketamine 0,2mg/kg at induction and midazolam 2mg iv, followed by repeated doses of 0,1 mg/kg ketamine and 2 mg iv midazolam at 1 h interval. Postoperative analgesia for both groups according to VAS: mild pain 1g paracetamol iv, moderate pain 10 mg ketorolac iv, severe pain 10 mg morphine s.c.
We evaluated the incidence of postoperative pain for 24h, the incidence of chronic pain, the peri and postoperative opioid consumption, the duration of surgery, the GVPO and delirium incidence during 48h, p value <0,05 statistically significant.
Results and Discussion: There is a significant lower VAS score in group B, no difference in duration of surgery, also, there is a significant higher peri-and postoperative opioid consumption in group A, no difference in postoperative delirium



[Fig1]



[Fig2]



[Fig3]

Conclusion(s): By blocking central pain sensitisation pathways ketamine could have an important sparing effect on opioid consumption in neoplasic surgery.

9AP4-9

Anticonvulsants improve post-operative analgesia quality in women undergoing Cesarean section: a meta-analysis

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Introduction: Anticonvulsants, including gabapentin and magnesium sulfate ($MgSO_4$), can improve post-operative (post-OP) analgesia quality. However, the question of whether anticonvulsants exert similar effects in women undergoing Cesarean section (CS) remains to be elucidated.
Materials and Methods: We performed a standard meta-analysis. We collected studies from Medline/Pubmed, Embase, BioMed Central and Cochrane register of clinical trial (from inception until October, 2014). Only randomized controlled trials comparing additional anticonvulsants with standard post-OP analgesic protocols in CS women were included. The collected outcomes included pain scores, post-OP analgesics consumptions, complications and patients' satisfaction.
Results: A total of 538 titles were obtained from our search. After deleting the duplicated and invalid titles, 11 studies were included. Because 4 studies used two relevant intervention conditions, 15 effect sizes were included for analysis. Among the 15 effect sizes, gabapentin has been used in 4 trials, and $MgSO_4$ has been used in 11 trials. Gabapentin was administered via a systemic (i.e., oral) route and $MgSO_4$ was administered via a neuraxial (i.e., epidural or intrathecal) or systemic (i.e., intravenous) route. In comparison with standard post-OP analgesic protocols, CS women receiving additional anticonvulsants had significantly lower pain scores [Overall effect size (95% confidence interval) -0.68 (-0.96~-0.20), Gabapentin group -0.40 (-0.60~-0.20), Magnesium group -0.84 (-1.00~-0.68)]. Interestingly, when subgrouping the result according to the administration route, the heterogeneity was greatly reduced. Both routes were effective, but the neuraxial route was more significant [neuraxial -1.22 (-1.42~-1.01), systemic -0.34 (-0.50~-0.18)]. Moreover, CS women receiving additional anticonvulsants also consumed less post-OP analgesics [Overall -1.06 (-1.38~-0.74), Gabapentin group -1.14 (-1.39~-0.89), Magnesium group -1.00 (-1.64~-0.37)] and had better satisfaction [Overall 1.08 (0.75~1.41), Gabapentin group 1.35 (0.85~1.86), Magnesium group 0.77 (0.50~1.04)]. However, the between-group differences in the incidences of complications, including hypotension, sedation, nausea and vomiting, shivering and pruritus, were not statistically significant.
Conclusion: Anticonvulsants, including gabapentin and $MgSO_4$, improve the post-OP analgesia quality in women undergoing cesarean section.

9AP4-10

The serratus anterior block: an alternative regional technique in the pain management of rib fractures

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Background and Goal of Study: Multiple rib fractures are common and are associated with a significant morbidity and mortality. Early analgesia is important to reduce morbidity and mortality. Thoracic epidural analgesia and paravertebral blocks as part of multimodal analgesia are considered the gold standard (1). However, thoracic epidurals and paravertebral blocks are frequently contra-indicated in trauma patients due to other associated injuries. We audited the effectiveness of the serratus anterior block(2) in patients with multiple rib fractures.
Materials and Methods: In our institution we introduced a rib fracture analgesia protocol which included an ultrasound guided serratus anterior block (cont-SAB), as an alternative regional technique. No ethics committee approval was required as it was deemed a quality improvement initiative. Following informed consent, we followed up patients and prospectively collected data including dynamic pain scores and incentive spirometry.
Results and Discussion: We present a series of 12 consecutive cases in whom conventional regional techniques were contraindicated and we used a cont-SAB to provide analgesia as part of multimodal analgesia approach. The cont-SAB was successfully performed in all patients without any complications or side effects. The average dynamic pain score (0-3 scale, 0=no pain and 3=severe pain) prior to insertion of the cont-SAB was 2.9 (2-3). None of the patients could comply with physiotherapy. Dynamic pain score in all patients was reduced post block to an average of 1.3 (0-2). The average length of the cont-SAB was 5 days (2-7). The average incentive spirometry pre-block was 750ml which improved to 1810ml post block.
Conclusion(s): We have shown that cont-SAB provided effective analgesia and facilitated compliance with physiotherapy in all patients and demonstrated a significant reduction in reported dynamic pain scores. The use of this block can be recommended in patients with multiple rib fractures where thoracic epidurals and paravertebral blocks are contra-indicated.
References:
1. Easter. Am J Crit Care 2001; 10(5):320-329
2. Blanco. Anaesthesia 2013; 68(11): 1107-1113

9AP4-11

Pain impact during the first 24 hours after major bariatric surgery

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Background and Goal of Study: Obesity is one of the largest problems in XXI century and is associated with perioperative morbidity. The aim of this study was to evaluate the impact of pain after major obesity surgery, in the postoperative period.
Materials and Methods: After study approval by the institutional ethics committee, a prospective study was conducted in patients scheduled for major bariatric surgery admitted at the Post Operative Care Unit (PACU) (from May to September 2014). Pain was assessed according to VAS scale.
Patients with VAS >3 were considered patients with significant pain (SP). Demographic and perioperative data was collected including respiratory and cardiovascular events. Quality of the recovery was evaluated with the 15-item Quality of Score (QoR-15) 24 hours after surgery. Exclusion criteria: unable to give informed consent and documented chronic pain disease.Ordinal and continuous data were tested for normal distribution.
Descriptive analysis was performed and the Mann-Whitney U test, Fischer's exact test or Chi-square test was applied.
Results and Discussion: Fifty-two patients were evaluated and 33 (64%) had SP. These patients had a lower median age (40 versus 48, p=0.009), had less frequently hypoventilation-obesity syndrome (6 % vs. 36%, p=0,013) and took more frequently >than 10 mg of morphine during their PACU stay (24% vs 0%, p=0,021).There were no differences regardless the occurrence of respiratory or cardiovascular events and in the PACU length of stay. These patients reported a lower global QoR-15 score (96 vs. 111, p=0.011) and differences in five items of the questionnaire.
Conclusion(s): Patients with SP were younger and had less frequently hypoventilation-obesity syndrome. They had a considerably worst recovery after anesthesia and surgery.

9AP5-1

Interventional pain management in trigeminal neuralgia (TN) and painful trigeminal neuropathy (PTN): conventional and pulsed radiofrequency

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Background and Goal of Study: TN is one of the most common causes of facial pain with an annual incidence of 4 to 13 per 100.000 people. PTN is caused by other disorders and is indicative of neural damage. Both have an important impact on the quality of life and have high costs.
Percutaneous interventional management shows that conventional radiofrequency (CRF) offers the highest rates of complete pain relief but pulsed RF (PRF) is less neurodestructive and thus less likely to cause complications. Painful anaesthesia after percutaneous thermocoagulation could appear in up to 3% of all procedures.
Due to the current controversy in the role of PRF, the aim of this study is to review our clinical experience with PRF and CRF in TN and PTN in terms of pain relief and complications.
Materials and Methods: We retrospectively studied 60 patients (29 men / 31 women) who had TN or PTN, and were treated with percutaneous RF (129 procedures: 32CRF, 99PRF) between January 2000 and December 2014. The average age was 60,5ys (SD=15,2).
We reviewed aetiology, side and trigeminal branches affected, visual analogic scale (VAS) before and after each procedures, medical treatment, procedures, % of improvement, complications and image tests.
Results and Discussion: Right-sided maxillary and mandibular branches were the most frequently affected ones. Aetiologies in order of frequency were: essential, atypical facial pain, cluster headache, multiple sclerosis, postherpetic neuralgia and tumours. Initial pain was qualified as 8 or more in VAS and was refractory to conventional treatment.
In the PRF group, performed in all the aetiologies, improvement in basal pain was between 50-75% in 21.98 % of the techniques during an average of 7.4 months; above 75% in 54.9% of the techniques during an average of 10.4 months (in that group, 34% had a 100% of pain relief). No complications were reported with PRF.
In the CRF group, performed in TN, all the patients improved above 70% during an average of 7.5 months but it led to complications in 9.3% of the techniques (dysesthesias 6.25 %, painful hypoesthesia 3.1% and temporary masseter impotence 3.1%).
Conclusions: PRF is an effective technique for pain relief in TN and PTN in a considerable percentage of the patients with no associated complications. It is a less invasive option which should be consider before performing CRF in TN. CRF in TN provided satisfactory pain relief in all the patients but relevant complications could potentially appear.

9AP5-2

Cluneal nerve syndrome: diagnosis and treatment with pulsed radiofrequency

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Background and Goal of Study: Cluneal Nerve Syndrome (CNS) represents 10% of low back pain and it is characterized by unilateral low back pain with radiation to the ipsilateral buttock.1 Pulsed Radiofrequency (PRF) is a minimally invasive and highly effective technique in the treatment of low back pain. There are no reports in the literature about PRF of the Superior Cluneal Nerve (SCN) for the treatment of CNS. This technique has recently been used in a Portuguese Pain Medicine Unit (PMU). Our aim is to understand the criteria used in referencing and diagnosis of CNS, and assess the effectiveness of PRF in its treatment.
Materials and Methods: This report consists of a retrospective study of all patients submitted to PRF for treatment of CNS during 2013. Demographic data, referencing criteria (pain characteristics and medical specialty which referenced the patient), diagnostic criteria (pain characteristics and test block) and effectiveness of the PRF treatment (discharge from PMU after the procedure) were collected. We defined quantitative variables in terms of mean and standard deviation and qualitative variables in percentage.
Results and Discussion: The sample consist of 40 patients, 54 ± 8.2 years old, 75% women, 55% ASA II and 45% ASA III. Most patients were sent to PMU by Orthopedics (55%) and General Medicine (17.5%). Their main referencing criteria were low back pain with unilateral (35%) and bilateral (15%) multisegmental irradiation, with pain duration prior to referencing being greater than 1 year in 77.5% of the cases. The test block of SCN was made in 17.5% of the patients with successful pain relief in all cases. PRF and infiltration of SCN was performed with local anesthetic (97.5%) or local anesthetic and corticosteroid (2.5%). After PRF and infiltration of SCN, 22.5% of the patients were discharged from PMU, 2.5% presented transitory CNS improvement, 47.5% had pain relief but remain in PMU for other reasons, and 27.5% did not obtain amelioration of the pain.
Conclusions: CNS is an overlooked etiology which must be considered in patients with complains of low back pain. Most patients have a prolonged duration of pain. PRF of SCN showed therapeutic advantages as 70% of the patients presented an effective symptomatic improvement. As this is a retrospective study, it was not possible to provide a quantitative assessment of pain to accurately measure the effectiveness of the treatment.
Reference: 1. J Neurosurg Spine. 2013; 19 (1): 76-80.

9AP5-3

Ganglion impar and botulinum toxin: a therapeutic option for pelvic-perineal chronic pain

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Background: Chronic pelvic pain is a very disabling condition with significant impact on the quality of life of those who suffer it. Its pathogenesis is not well known and in spite of introducing various therapeutic techniques, the response is often unsatisfactory and it is limited to relieving the symptoms. We present the case of a patient who underwent an alternative treatment.
Case report: 64 years old female with bipolar affective disorder presented intense perineal pain after a casual fall being diagnosed of pudendal nerve

neuralgia. Magnetic resonance showed no organs affection. Local anesthetic block, surgical decompression and pudendal nerve radiofrequency was performed without clinical improvement. Pudendal nerve block with local anesthetic and bilateral surgical decompression were conducted again in a second centre, obtaining improvements of 60%
Four years later she was attended in our centre with painful paresthesias initiated in clitoris with bilateral irradiation from labia majora and minora to anus. She was on treatment with Gabapentin 150mg/12 h and Oxycodone 10mg/12 h. Using a visual analogue scale, she had a pain level of 6, exacerbated by sitting and supine with a relief in lateral decubitus.
Due to absence of response to the previous treatments the decision was taken to make a ganglion impar block with 100 units of botulinum toxin under fluoroscopy and iodinated contrast, presenting clinical improvement of 70%. After 6 months the symptoms reappeared so the block was repeated. 80% improvement and a good quality of life were confirmed 2 months later. Our centre scheduled follow-up controls.
Discussion: The blockage with local anesthetics, corticoids, alcohol/phenol or radiofrequency neurolysis in both pudendal nerve and the ganglion impar are possible options in treating chronic pelvic pain. Recent publications suggest that botulinum toxin could modify the secretion of neurotransmitters involved in the recognition of pain by analgesic mechanism secondary to muscle relaxation. Before a visceral chronic pelvic pain refractory to conventional treatments a possible alternative might be the blockage of Walter's ganglion with botulinum toxin.
References: Lim SJ, Park HJ, Lee SH, Moon DE. Ganglion impar block with botulinum toxin type A for chronic perineal pain. Korean J Pain, 23(1), 67-69, 2010
Learning points: Ganglion impar block with botulinum toxin could be an alternative in cases where chronic pelvic pain does not respond to other treatments.

9AP5-5

Treatment of meralgia paresthetica: ultrasound-guided pulsed radiofrequency therapy of the lateral femoral cutaneous nerve

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Objectives: Meralgia paresthetica (MP) is a sensory mononeuropathy characterized by paresthesia, pain or sensory impairment along the distribution of the lateral femoral cutaneous nerve (LFCN) caused by entrapment or compression of the nerve. MP poses a diagnostic challenge because the symptoms can mimic other common diagnoses such as lumbar spine pathology. Various etiological factors are described such as obesity due to increased nerve friction, diabetes due to neuropathy and as a complication of thoracolumbar spine surgery. The therapeutic challenge lies in the complex innervation and extensive anatomic variability. Ultrasound-guided LFCN targeting might improve patient selection and responsiveness. Pulsed radiofrequency of LFCN may offer a low risk treatment for long lasting pain relief.
Methodology: We analysed 24 cases of MP at our pain clinic in a retrospective study. All cases were evaluated for risk factors i.e. diabetes, high body mass index (BMI) and history of lumbar spinal surgery. In 21 cases, only patients with positive ultrasound-guided diagnostic blockade of the LFCN (>50% pain relief with 2mL lidocaine 2%) received ultrasound-guided PRF. Ultrasound-guided LFCN was visualised as described by Hurdle. Paresthesia in the dermatome at < 0.50V sensory stimulation ensured correct positioning. PRF was performed during 240s, at 45V and 20ms pulse width, not exceeding 42°C at needle tip. Global perceived effect (GPE) was assessed eight weeks after the PRF-treatment. GPE of ≥ 50% was considered as significant pain relief.
Results: Out of 24 cases with MP the mean BMI was 27 kg/m^2, 50%(12/24) had a BMI > 25 kg/m^2; 42% (5/12) of this group was overweight (BMI 25-30 kg/m^2) and 58% (7/12) obese (BMI ≥ 30 kg/m^2). 33%(8/24) of the cases had a history of lumbar spinal surgery and 1(4,1%) case was a diabetic.
Eight weeks after PRF 71,4%(15/21) reported a significant pain relief, moreover a third of the cases (7/21) reported a GPE of 70% or more. 19%(4/21) reported a GPE between 30-50% and 9,5%(2/21) reported no pain reduction. No complications were noted.
Conclusion: Ultrasound-guided blockade of LFCN with local anesthetics serves a diagnostic role for meralgia paresthetica. Ultrasound-guided PRF of LFCN, after a positive diagnostic block, can be an accurate treatment for MP with a significant pain relief in more than 70% of cases as confirmed by these data. Future studies should validate these observations and determine long-term effects.

9AP5-6

Epiduroscopy and lumbossacral radicular pain

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Background and Goal of Study: Lumbossacral radicular pain is defined as a pain in the distribution area of one of the nerves of the lumbossacral plexus, which may be accompained by sensory or motor impairment.[1] Epiduroscopy can be performed as a part of a multimodal approach when conservative or interventional treatments fails.[1] The aim of this study was to evaluate the success and complications rates after treatment with epiduroscopy.
Materials and Methods: Descriptive analysis of our experience between 2012 and 2013. Selection criteria: refractory lumbar/multisegmental pain, history of spinal surgery and MRI or epidurogram adhesions/fibrosis.
Results and Discussion: About 15 patients underwent epiduroscopy at the Ambulatory Unit under counscious sedation, between January of 2012 and December of 2013. The majority of the patients were women (66.7%), ASA II (46.7%), with age between 40-60 years. All were referred for chronic pain associated with failed back surgery. A mixture of ropivacaíne 2 mg/ml, sodium chloride 0,9% and metilprednisolone was injected at different column levels. Pain relief was reported in 66.6% of the patients, 13.3% had no clinical improvement and 20% noted a transitory worsening of the symptoms. Only one patient repeated the procedure. No significant complications were found during the follow-up and 10 patients had Chronic Pain Unit discharge after 2 years. Clinical improvement is due to epidural adhesions release and targeted administration of epidural medications arround inflamed nerve roots. Our success rate is in agreement with clinical trials witch report favourable treatment outcomes in 30-50% of patients.[1] Direct nerve injury is possible but minimised by having the patient awake and able to communicate with the operator. Dural tears can occur caused by the epiduroscope making a small hole in the dural membrane. Macular haemorrhages or bleeding in the internal layers of the eye may happen due to excessive saline flush volume used during the procedure.
Conclusion(s): Epiduroscopy aids in identifying structures in the epidural space, establishing diagnosis and administering therapy. In selected patients it could be an a valuable therapeutic option. Complications are rare and generally related to the rate of epidural fluid or inadvertent dural puncture.[1,2]
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9AP5-7

Efficacy of the ultrasound-guided pulsed-radiofrequency of suprascapular nerve for intractable shoulder pain - case series

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Background and Goal of Study: Suprascapular nerve has a lot of sensory branches with motor branches, and is involved in the pain of the shoulder joints. Thus, by combining the exercise therapy and suprascapular nerve block for painful disorders of the shoulder joint, it is possible to have high therapeutic effect. Suprascapular nerve block is an effective treatment for patient with shoulder pain as to reduce pain immediately and facilitate exercise therapy, but the therapeutic efficacy of local anesthetics are restrictive. Pulsed radiofrequency treatment (P-RF treatment) is believed to be no neurodestruction by thermocoagulation. Therefore, it provides pain relief without paralysis of motor nerve performed in mixed nerves such as suprascapular nerve. In addition, by using ultrasound guidance, we can carry out this treatment more safely, avoiding complications such as pneumothorax or blood vessel puncture. In the present study, we aimed to assess the efficacy of ultrasound-guided P-RF of suprascapular nerve for patients with shoulder pain resistant to conservative medical management.
Materials and Methods: This study involved 10 patients (18 procedure) with chronic intractable shoulder pain who did not respond to physical or drug therapy. Under ultrasound guidance, supraspinous fossa was identified, A needle was inserted and we searched for the point raising referred pain on the supraspinous fossa. P-RF was performed for 360 seconds. Pain assessment was performed using the Numeric Rating Scale (NRS) and all outcome

assessments were performed at baseline and 1, 3 months after treatment.
About the patient who received repetitive treatment, effective period was evaluated. Changes in oral medication, such as opioids and NSAIDs, during the follow-up period were investigated. The t-test and Mann-Whitney test were used for statistical analyses, and the significance level was set at $p<0.05$ in both tests.
Results and Discussion: There were 5 women and 5 men. Mean age was 69 years (range, 55-85). Significant improvement in NRS was observed at 1 (7.8 to 3.2) and 3 months (to 4.2), as compared to baseline measurements. Duration of average pain relief was 20 ± 6 weeks after procedure. No serious complication was found in any patient received this treatment.
Conclusion: Ultrasound-guided P-RF of suprascapular nerve could be a safe and useful treatment for the patients with intractable shoulder pain.

9AP5-8

Neurolytic celiac plexus block provides pain relief for patients with upper abdominal visceral cancer pain while not reducing morphine consumption

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Background and Goal of Study: Neurolytic celiac plexus block (NCPB) has been used to provide analgesia for upper abdominal visceral pain caused by cancers in the upper abdomen, especially pancreatic cancer (PC). In our hospital, we provide NCPB in patients with PC primarily, but also in patients with upper abdominal visceral pain not related to PC. It is unclear, however, if pain relief can be achieved with NCPB in patients with non-pancreatic cancers (NPC).
The purpose of this study was to determine the effect of NCPB for pain caused by both pancreatic and non-pancreatic cancers.
Materials and Methods: This was a retrospective medical record review of 22 patients who underwent NCPB 27 times (five patients received repeat NCPB) for upper abdominal visceral pain between April 2007 and May 2014. All patients received 15 ml of anhydrous ethanol using a posterior percutaneous celiac plexus block technique under fluoroscopic guidance. We assessed pain intensity (0-10 numerical rating scale) and 24-hour opioid use (morphine-equivalent dose) before and after NCPB in each group. Pain scores and the morphine-equivalent opioid dose were reported as median and interquartile range (IQR: 25th-75th quartile). Wilcoxon signed-rank test was used for all analyses; $p< 0.05$ determined significance.
Results and Discussion: We identified 12 patients who received NCPB to treat PC pain (Group P) and 10 patients who received NCPB to treat NPC pain (Group N). Group N included patients with gastric cancer (4), lung cancer (2), esophageal cancer (2), colon cancer (1) and ureteral cancer (1). The morphine-equivalent opioid dose in each group, before and after NCPB, were 180 mg (IQR: 85-252) and 120 mg (IQR: 60-330), respectively, ($p=0.37$) in Group P, and 78 mg (IQR: 38-120) and 105 mg (IQR: 9-132), respectively, ($p=0.61$) in Group N. The morphine-equivalent opioid dose in each group, before and after NCPB, was not statistically significantly different. Pain scores in each group, before and after NCPB, were 5.0 (IQR: 3.5-7.0) and 1.0 (IQR: 0.0-3.0), respectively, $p=0.0014$ in Group P and 5.5 (IQR: 4.0-7.0) and 4.0 (IQR: 2.0-5.3), respectively, $p=0.015$ in Group N.
Conclusion(s): Our results suggest that although NCPB improved pain relief in patients with both pancreatic (P group) and non-pancreatic cancers (N group), it did not affect the morphine-equivalent dose. Pharmacologic treatment may be necessary in patients with upper abdominal visceral pain even after NCPB.

9AP5-9

A new approach: spinal cord stimulation for treatment of critical hand ischaemia in antiphospholipid antibody syndrome

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Background: Antiphospholipid antibody syndrome (APS) is a recently identified autoimmune disease present mostly in young women. Those with APS make abnormal proteins called antiphospholipid autoantibodies in the blood (aPL).
Once the disease is diagnosed, adequate therapy in most cases can prevent the recurrence of symptoms. Spinal Cord Stimulation (SCS) improved considerably severe digital ischaemic injury and clinical pain in a patient with APS. SCS therapy for ischaemic pain and upper extremity digital ischaemia in APS is unusual.
Case report: A 58-year-old female with clinical history of APS, DM type II, hypercholesterolemia and clinical criteria for COPD, suffered from ischaemic dilated cardiomyopathy with biventricular systolic dysfunction; a heart transplant was performed after 36 days from diagnosis.
In the first postoperative month, the patient developed severe digital ischaemia (1st and 2nd finger distal phalanx of right hand) associated with distal upper extremity pain. SCS treatment was decided after failed therapies with the prostacyclin analogues; two 8-electrode percutaneous leads were placed in cervical and thoracic epidural region, correct coverage and absence of complications were checked.
During following monthly checkups, improvement was observed progressively, both in the ischaemia and pain, from 40% to its entirety.
Discussion: The goal is to report the successful treatment of severe hand-digital ischaemia in a patient with APS during the immediate postoperative period of cardiac transplantation, avoiding amputation.
Evidences from small trials failed to demonstrate that pain relief in critical limb ischaemia was better for SCS than for conventional medical management[1]; trials of other subgroups of ischaemic pain may be useful.[2]
References:
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Learning Points: Selected patients with severe digital ischaemia and distal upper extremity pain may benefit from SCS therapy after failed pharmacological therapy and sympathetic blocks.
More trials should be done in order to demonstrate these subgroups of ischaemic pain could benefit from SCS.

9AP5-10

Knee pain management using ultrasound-guided Webermedical endo-Laser in comparison to fluoroscopy-guided thermal radio-frequency

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Background: Osteoarthritis (OA) is one of the most common joint disorders in the elderly [1].
Webermedical intra-articular laser (WEL) therapy makes it possible to irradiate directly in the tissue.Infrared laser(IR) has dose-dependent anti-inflammatory effect on OA [2]. Thermal radiofrequency (TRF) of the knee joint articular nerve branches were targeted to address the entire nociception and stiffness in OA[3].
This study aimed to investigate the effects of WEL and TRF on nonspecific knee joint pain.
Case report: 50 patients suffering from non-specific knee pain for more than 3 months with no response to conservative treatments ,were enrolled in the study with Knee pain rated 44 mm or greater on the pain visual analogue scale (VAS) and 4 or greater on the Numeric rating scale (NRS). Procedures performed from Feb. to Oct. 2014 by Spine Care Center Cairo, Egypt. Assessment of pain was done at baseline then weekly post procedure for 1 month then at 1-month follow-up visits for 6 months.
Patients of the 1st group received WEL Blue and IR, using Ultrasound guided imaging, 2 WEL needles were advanced successively in the retro-patellar recess. The procedure includes 3 sessions with 1 week interval. Patients of the 2nd group received TRF with temperature 80°C for 90 sec., 2 cycles, using fluoroscopy guided imaging, 3 of the 5 genicular nerves were targeted.
Discussion: The pain relief started from the 2nd week post procedure and increased gradually, which enabled the patients to optimize physiotherapy after 1 month. 36,41,& 9% of the Middle-age population treated with WEL achieved 71-80%, 81-90% and 90-100% knee pain relief, respectively. Middle age population showed overall higher improvement when treated with WEL. In old age population both treatments showed nearly the same result. Female and overweight population showed higher improvement to WEL over TRF, male and obese patients showed nearly equal response to both treatments. 50% of employed patients showed 81-90% improvement with WEL, while TRF treatment showed higher results in non-employed patients.These results need further trials.

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Learning Points: TRF of genicular nerves leads to significant pain reduction in elderly. WEL, is effective to decrease pain in middle-aged and overweight patients.

9AP5-11

Management of neurostimulation device during pregnancy

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Background: The use of neurostimulation devices (NSD) is not recommended in pregnancy because of its unknown effects on developing fetus(1). However, it is common that NSD recipients are women in their childbearing age. The purpose of this descriptive study is to present our experience.
Case report: Four pregnant patients with NSD are reported; one suffered from fail back surgery syndrome, two from ilioinguinal pain, and one from atipical facial pain. Three patients were treated with spinal cord stimulation; two of them had a subcutaneous lead as well. An auricular nerve lead was implanted in the other patient.
NSD were switched off during pregnancy. The analgesia during the labour was managed by epidural infusion (2). Inadequate pain relief was found in three of the four women; one had no relief at all.
NSDs were switched on after the lactation in three patients. Reset was always necessary, and even in two cases a new surgery for lead repositioning and pulse generator placing was necessary. One patient remained asymptomatic after labour; the device is still turned off.
Discussion: Main goal about NSDs' management during pregnancy is if it's advisable to continue with the treatment. There is no evidence about the effects of the regarding technology in developing fetus. NSD can suffer disturbances (3), because of rapid physiological changes in pregnancy. Finally, neuroaxial anaesthesia is not contraindicated, but infection and wire breakage may occur (1).
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Learning points: Patients should be informed about the risk and benefits of NSD in pregnancy, and the management should be individualized (2). Complications with device may occur in neuroaxial anaesthesia or even with pregnancy changes. Rx radiography could be indicated in case of changes in paresthesia to check lead position(3).

9AP5-12

DREZ as severe neuropathic pain treatment: a case report

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A 26-year-old female patient referred from Vascular Surgery for consultation about a CPRS on her left leg after her left foot fracture. A initially conservative management keeping just gabapentine 1200 mg/8h and Amitriptyline 75 mg, leaving opioids because side effects.
After two failed attempts of Spinal Neurostimulation (failed by ineffective and painful estimulation as well as infection) the patient was referred to our unit for review. Her leg looked elephantiasic, wounded and painful with intense pretibial allodynia. Having attempted Lumbar Sympathetic RF, Femoral Blocks, Femoral Pulsed RF, even surgical electrode for Spinal Neurostimulation, the distressing patient requested for amputation. After supracondylar amputation pain got better, even letting rehab. Unfortunately four months later the patient referred neuropathic pain on stump and allodynia. Anew some technichs as Femoral RF, Capsaicin Patch (painful) and Femoral Neurostimulation (ineffective) were failed.
Medication did not control neuropathic discharges nor allodynia. Next attempt was intrathecal Zyconotide, (ineffective and meningitis symptoms) reaching 7 mcg, and intrathecal morphine pump (cutaneous infection), which were removed. Against consecutive failures we proposed DREZ (Dorsal Row Entry Zone). Carried it out on March 2012 (laminectomy D11-L1), patient referred complete fading of symptoms (however sizable weakening left leg). Eight days later, due to a paraspinal collection (E coli isolated), neuropathic pain, fever and meningeal symptoms started sharply.
Patient was reoperated successfully. Currently asymptomatic, patient is reviewed in Rehabilitation.

9AP6-1

Comparison of different methods of detecting surgical stress response for noxious stimuli during general anesthesia

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Background and Goal of Study: Analgesia is one of key factors in general anesthesia yet measuring the intensity of patient reaction to surgical noxious stimuli remains a challenge. Tradicionally surgical stress response is assessed based on hemodynamic parameters like systolic and diastolic blood pressure (SBP, DBP) and heart rate (HR). Nowadays there are new, objective methods that are supposed to help in appropiate assesment of surgical stress response. Two of those methods are Surgical Pleth Index (SPI) and Skin Conductance Algesimeter (SCA) [1]. The goal of this study was to compare three methods of assessing surgical stress response for noxious stimuli during general anesthesia: SPI, SCA and basic hemodynamic parameters (SBP,DBP,HR).
Materials and Methods: 9 patients anesthetised with sevoflurane, fentanyl and cis-atracurium were monitored with SPI, SCA and hemodynamic parameters assesment (SBP,DBP, HR) at the same time. The measurement were recorded at 5 minute intervals. To establish a proper depth of anesthesia and right level of neuro-muscular blockade we used Bispectral index (BIS) and Train of four (TOF). Statistical analysis was performer by Q-Cochrane test in analyzing dicotomous qualitative variables. $P<0,05$ was marked as statistically significant.
Results and Discussion: There were 528 measurements in total. Statistical analysis revealed a significant difference between indications of respective methods ($p<0,01$). SPI indicated that stress response to surgical noxious stimuli was present in 139 (26.32%) measurements, SCA in 70 (13.25%), and reaction reflected in hemodynamic parameters was observed in 84 (15.90%) measurements. In 16 measurements (3.03%) SPI and SCA methods indicated there was a stress response which was reflected by hemodynamic parameters with a significant delay in time.
Conclusion(s): Our results suggest that there is a difference in studied methods of detecting surgical stress response for noxious stimuli during general anesthesia. SPI was the most sensitive compared to SCA and hemodynamic parameters. It is possible that SPI and SCA can reflect surgical stress response earlier than paying close attention to hemodynamic parameters but it is necessary to confirm the results on a larger study population.
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9AP6-2

Assessing the neuropathic component and the main descriptors in persistent postoperative pain after cardiac surgery

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Background and Goal of Study: Persistent postoperative pain (PPP) is defined as persistent pain after surgery of greater than 3 months' duration [1]. After Cardiac Surgery (CS), the reported incidence of PPP pain varies from 11 to 56% [2]. Previous research described PPP as a potential Neuropathic Pain (NP). The goals of our study were: to identify the incidence of PPP after CS in a tertiary university hospital and to assess its neuropathic component and main descriptors.
Materials and Methods: We conducted an observational prospective study which included adults proposed to CS from July to December 2013, after approval by the local Ethics Committee. We applied the validated Portuguese version of Brief Pain Inventory Short Form preoperatively (T0) and 3 months later (T3). If the patient had pain at T3 and other causes of pain excluded (such as recurrent angina), they were considered as having PPP. We applied the Portuguese version of Douleur Neuropathique 4 Questionnaire to assess NP and the Portuguese version of McGill Pain Questionnaire Short Form to identify its main descriptors. Sample size calculation was performed priory. Non-parametric tests were performed for comparisons between numerical variables and Chi-Square Test used for categorical variables (statistical significance was assumed at $p<0.05$).
Results and Discussion: A total of 288 patients completed the study. The incidence of PPP was 43% and moderate to severe PPP was 17%. Fifty per cent of the patients with PPP had NP and patients with moderate to severe PPP presented more often NP (68.8% vs 38.2%, p=0.001). Previous stable angina was associated with higher presence of NP (100.0% vs 43.6%, p< 0.001), but not with higher incidence of PPP (56% vs 41.8%, p=0.171). Valvular surgery presented lower incidence of PPP (28.7% vs 50.0%, p=0.001) but they didn't differ according NP (p=0.828). There were no differences in the incidence of NP related with remifentanil dose (p=0.258) and skeletonized internal thoracic artery harvesting (p=0.054). "Sharp", "Gnawing", "Aching" and "Tender" were the main descriptors of PPP after CS.
Conclusion: This study contributes to a better knowledge of PPP after CS and it is the first time that PPP after CS is described to be NP in half of the cases.
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9AP6-3

Prospective clinical trial evaluating gender-associated differences in pain perception before surgery

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Background and Goal of Study: Experimental trials evaluating differences in perception of pain between male and female participants showed heterogeneous results. There is evidence for lower thresholds for pressure pain, lower tolerance for thermal and pressure pain in women. Clinical trials described inconsistent results. For example, higher levels of pain where reported by male patients following major surgery, however, opposing results by females following minor procedures. Preoperative gender related differences may translate also into postoperative differences. Nevertheless, preoperative assessment of pain intensity has rarely been reported in the literature.
Materials and Methods: This prospective clinical trial screened 5102 surgical patients at Charité University Hospital in Berlin, 2011 and 2012. Patients reported of pain intensity during their preoperative anaesthesiological examination in a computer-assisted questionnaire. For this analysis, 3042 adult patients with any pre- operative pain were included. As primary end point, adjusted differences in pain intensity (visual analogue scale, VAS, 0-100) were evaluated.
Results and Discussion: Altogether 1487 female patients reported higher pain intensity compared to 1555 male patients; median VAS 30 (25-75% quartile: 10-52) in females versus 21 (25-75% quartile 10 - 46) in males, p< 0.001. After adjustment for observed differences in baseline characteristics using robust regression analyses this difference remained statistically significant (p< 0.0001). These gender differences were consistent across several subgroup analyses. In contrast, large variability was observed in relation to surgical discipline and in patients with less co-morbidity. Men seemed to present with higher pain intensity in younger age groups and also before major surgical procedures.
Conclusion: This study demonstrates that preoperative gender differences in pain perception were observed including significant variability in specific subgroups. Preoperative pain may also translate into differences in the postoperative setting. Currently there remains uncertainty especially regarding modifiable factors to optimize perioperative pain treatment.
Acknowledgements: We would like to thank Alexander Krannich and Anna-Lena Salz for the assistance in data management and analyses.
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9AP6-5

Nociception anti-nociception balance measurement through normalized pulse volume

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Background and Goal of Study: There is no established numerical quantification for pain
(or nociception anti-nociception balance:NANB when sedated) until now. Hence, perioperative opioid analgesics is titrated mainly by estimated effect site concentration (Ce).Although numbers of numerical quantification for pain or NANB have been suggested, they are still not widely used due to poor prediction.
Normalized pulse volume (NPV) is a ratio of DC component to AC component in pulse oximetry. NPV is utilized as Keeler polygraph,or a lie detector. Furthermore,recent study demonstrated that NPV well reflect mental stress through vascular tone[1]. This study attempts to validate appropriateness of NPV for numerical quantification for pain or NANB,moreover inferior-to-superior relationship between NPV and Ce.
Materials and Methods: 30 cases under total intravenous anaesthesia were recruited to this observational study which was approved by local ethics committee, and written consent was obtained.
After putting on routine monitor, adhesive fingertip pulse oximetry sensor for NPV(Rainbow SET technology: Masimo Corporation, America) was applied. Fentanyl Ce was titrated to 1-1.5ng/ml when operation is over.Remifentanil was used accordingly to cope with nociception during anesthesia. Eight breaths per minute was set to the point of recovery of respiration (RoR).
On RoR, NPV and Ce for Fentanyl and Remifentanil were recorded, and total Ce was calculated as Remifentanil to be twice potent to Fentanyl regarding ventilatory depression to fit recent study[2].
Results and Discussion: NPV on RoR 2.61±0.97(dimensionless number) Coefficient of variation(CoV) 37.1%
Total Ce on RoR 1.66±1.13(ng/ml) CoV 68.4%
Z test,test for CoV showed that NPV on RoR was statistically narrower than total Ce on RoR with significant level of 0.05.
Conclusion(s):
NPV better predicts RoR than Ce.
NPV is more valid for pain or NANB than Ce.
NPV is a promising candidate for numerical quantification of pain or NANB.
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Acknowledgements: There is no conflicts of interest.

9AP6-6

Investigating the role of psychosocial factors in persistent postoperative pain after cardiac surgery

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Background and Goal of Study: Persistent postoperative pain (PPP) is defined as persistent pain after surgery of greater than 3 months' duration [1]. After cardiac surgery, the reported incidence of chronic poststernotomy pain varies from 11 to 56% [2]. Depression, psychological vulnerability, stress, and late return to work showed likely correlation with PPP [3]. The goals of our study were: to identify the role of anxiety, depression, self-esteem and catastrophizing in PPP after cardiac surgery.
Materials and Methods: We conducted an observational prospective study which included
adults proposed to cardiac surgery between July and December 2013, after ethics committee approval. We applied the validated Portuguese version of Brief Pain Inventory Short Form preoperatively (T0) and 3 months later (T3). If the patient had pain at T3 and other causes of pain excluded, he was considered as having PPP. Anxiety, depression and self-esteem were measured with the Portuguese version of Duke Health Profile questionnaire (DUKE) at T0. Catastrophizing was assessed with the Portuguese version Pain Catastrophizing Scale (PCS) at T0. Demographic data was registered.
Sample size calculation was performed priory. Non-parametric tests were performed for comparisons between numerical variables and Chi-Square Test used for categorical variables. Statistical significance was assumed at $p<0.05$.
Results and Discussion: A total of 288 patients completed the study and the incidence of PPP after cardiac surgery was 43%. Lower self-esteem and catastrophizing were associated with the development of PPP after cardiac surgery. We were unable to detect differences in anxiety and depression.
Conclusion(s): Catastrophizing and self-esteem should be considered to identify patients at high risk for PPP after cardiac surgery, in order to optimize clinical pain management.
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9AP6-7

Pain catastrophizing in major orthopedic surgery

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Background and Goal of Study: Pain catastrophizing is a negative cognitive-affective response to pain and has been associated with adverse pain outcomes.[1,2] The Pain Catastrophizing Scale (PCS) is a 13 item questionnaire with 3 domains (helplessness, rumination and magnification) widely used for its evaluation.[3]
The aim of this study was to compare pain catastrophizing with preoperative and postoperative pain after major orthopedic surgery.
Materials and Methods: After approval by the institutional ethics committee, we conducted a prospective study, starting in June 2014, in patients scheduled for elective total knee arthroplasty or total hip arthroplasty. Exclusion criteria: age less than 18 years old, ASA physical status IV, analgesic allergy, peptic ulcer, gastrointestinal bleeding, inability to give consent, previous surgery in the same surgical site. Pain catastrophizing was evaluated with PCS preoperatively. Pain was assessed with Brief Pain Inventory (BPI) preoperatively and postoperatively (48h after surgery). Descriptive analysis of variables was used to summarize data. Non-parametric tests were performed for comparisons between numerical variables and Chi-square test for categorical variables. Statistical significance assumed at $p< 0.05$.
Results and Discussion: Sixty patients enrolled, 31.7% presented with a clinically relevant pain catastrophizing level (PCS>30). Preoperatively, these patients scored higher for the BPI question "pain at this moment" (median 5 vs. 3, p=0.026) and for pain influence on their interpersonal relationships (median 5 vs. 2, p=0.049). Postoperatively, they reported higher maximum pain after surgery (median 8 vs. 6, p=0.017). Female patients presented higher PCS scores (median 26 vs. 18, p=0.032) and more clinically relevant levels (41.9% vs. 5.9%, p=0.007). There were no differences regarding age or body mass index.
Conclusions: Pain catastrophizing was more relevant in women and had a negative impact on pain outcomes, which is consistent with previous studies.[1,2] This is an ongoing study and these are preliminary data. Further results may bring important insights to the study of postoperative pain.
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9AP6-8

Area of cutaneous cold hypoesthesia as an predictor of the quality of pain control under continuous epidural postoperative analgesia with local anesthetics

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Background and Goal of Study: Postoperative analgesia perdural continuous infusion of local anesthetics is widely used for the control of postoperative pain. In the context of a multimodal analgesia with the use of systemic analgesics and neuraxial opioids, it is difficult to establish the real benefits of continuous infusion of local anesthetics in the control of postoperative pain. This study sought to establish a correlation between the percentage of wound covered by skin cold hypoesthesia area induced by local anesthetics in continuous infusion and control of postoperative pain at rest and movement, as well as overall satisfaction.
Materials and Methods: We studied 85 adult patients undergone to laparotomy in the postoperative ward period undergoing systemic multimodal analgesia and continuous infusion of bupivacaine 0.125%. All had their analgesic care in accordance with the protocol of acute pain group of the institution. Pain at rest, pain on movement and overall satisfaction were recorded, it was used the Visual Analog Scale. Then the cutaneous sensitivity to cold was tested, the skin surface with cold hypoesthesia induced by the local anesthetics was recorded. Each subject was allocated into one of three groups according to the percentage of surgical wound coverage by the cold hypoesthesia surface, the complete covered wound group (CC), partial covered wound group (PC), and the uncovered wound group (UC).
Results: 20 patients were allocated in the UC group, 31 patients in the CP group and 34 patients in the DC group. Pain at rest was lower in the CC group (7.56 mm ± 9.4) than in PC group (21.94 ± 17.4 mm) and gupo UC (20.45 mm ± 21.8) ($p<0.0001$). The pain on movement was also lower in the CC group (29.18 ± 24.6 mm) than in PC group (50.77 ± 28.4 mm) and the UC group (57.55 ± 26.4 mm) ($p<0.0001$). The overall satisfaction of the UC group (69 ± 25 mm) was lower than the PC group (83 ± 13 mm) and the CC group (86 ± 14 mm) ($p=0.004$).
Conclusion(s): The presence of a cutaneous cold hypoesthesia area covering completely the surgical wound seems to be correlated with the quality of epidural analgesia with local anesthetics in continuous infusion in the context of multimodal treatment of pain in the postoperative period of laparotomy. Its evaluation can be an objective way to evaluate the effectiveness of infusion of local anesthetics in this context.

9AP6-9

Prediction of postoperative pain and morphine consumption in patients by preoperative pressure pain assessment before elective surgery

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Background and Goal of Study: The goal of this study was to evaluate if preoperative pressure pain sensitivity testing is predictive of postoperative surgical pain and morphine consumption.
Materials and Methods: 321 patients scheduled for elective surgery (lumbar discectomy, lumbar spinal fusion, hysterectomy, thoracotomy and total hip replacement) in 2009-2013 were enrolled in study. A pressure algometer was used preoperatively to determine the pressure pain threshold and tolerance. A visual analog scale (VAS) was used to assess postoperative pain. In addition to nonopioid analgesia subjects received intravenous patient-controlled analgesia (PCA) for postoperative pain control. The preoperative pain threshold and tolerance were compared with the postoperative VAS pain scores and morphine PCA consumption and logistic regression was performed for the risk of moderate or severe postoperative pain (i.e. VAS >30 mm at rest and >40 mm during movement).
Results and Discussion: The patients enrolled preoperative pain threshold and tolerance were 34 (24; 45,6) N and 74 (54; 95) N, respectively. The median VAS pain scores during postoperative 24h were 20 (10; 37,5) mm at rest and 40 (25; 62,5) mm during movement. Pre-operative pain tolerance correlated significantly with pain score during movement in patients at 24h postoperatively (R=-0,124, p=0,026). Moderate or severe postoperative pain was in 98 (31%) and 157 (49%) patients at rest and during movement, respectively. The patients with moderate or severe postoperative pain had significantly less pain tolerance than patients without it (69 (52; 89) N and 78 (60; 101) N, respectively; p=0,006). The moderate or severe postoperative pain during movement 24h postoperatively was significantly predicted by pressure pain tolerance (OR=1,01; 95% CI=1,004-1,018; p=0,004). The median morphine PCA consumption was 21,25 (7,5; 38) mg. Pressure pain threshold did not correlate significantly with morphine consumption (R=-0,137, p=0,133), but pain tolerance was (R=-0,306, p=0,0006).
Conclusion(s): The risk of moderate or severe postoperative pain during movement within postoperative 24h may be predicted using preoperative pressure pain tolerance. There is a correlation between pressure pain tolerance and morphine PCA consumption during 24h after operation. The aim of future studies is establishing the mode and predicting value of algometry in different type of pain and surgery.

9AP6-10

Pain management with dexmedetomidine during major abdominal surgery; an alternative to epidural anesthesia?

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Background and Goal of Study: A common concern in anesthesia is to limit the perioperative opioid consumption, since treatment with mu-opioid agonist might result in hyperalgesia. Adjuvant helps to improve the quality of analgesia and decrease opioid consumption, consequently decreasing opioid-related effects, such as nausea and vomiting, sedation, ileus, and respiratory depression. In this prospective controlled study we investigate the effect of Dexmedetomidine-dex, a highly selective a_2 adrenoreceptor agonist on opioid consumption in patients undergoing major abdominal surgery under general anesthesia without epidural anesthesia.
Materials and Methods: Forty patients 18-75 years old, ASA I-III, were randomized to either the control-C or to Dexmedetomidine-D group. Anesthesia was induced with propofol 1.5mg/Kg, fentanyl 0.15mcg/Kg, rocuronium 0.6mcg/Kg and it was maintained with sevoflurane and bolus fentanyl. The response entropy target range during maintenance of anesthesia was 40 to 50. Control group received postoperative 6ml/h ropivacaine 2% through epidural catheter, where Group D received bolus dex 0.1γ/kg over 10 minutes after induction in anesthesia following by continuous infusion of 0.7γ/ Kg/h until the end of the operation. Moreover, group C received ondasentrone 50 mg before induction, where Group D did not receive any antiemetic therapy. It was recorded the intraoperative heart rate-HR, mean arterial pressure-MAP, the perioperative fentanyl and the analgesic result of both techniques.
Results and Discussion: Fentanyl consumption was significant less in Group D than in the group C (0.37±0.11mg vs 0.807±0.179 p=0.000). Group D received 50-100mcg pethidine during the first postoperative day, starting 3 hours after extubation. Group D did not experience any episode of nausia or vomity. In contrast, there were noticed 4 episodes of vomity after extubation in the group C (p=0.02, x^2test). HR and MAP was higher in the control group intraoperative and in the early postoperative period than in the group D (p< 0.05).
Conclusion(s): Dexmedetomidine produced anesthetic-sparing efect and reduction in the need for opioid and antiemetic drugs, without compromised the intraoperative and postoperative analgesia of patients.

9AP7-1

The safety profile of parecoxib for the treatment of post-operative pain: a pooled analysis of 28 randomized, double-blind, placebo-controlled clinical trials

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Objective/Methods: Parecoxib, a prodrug of valdecoxib, is an injectable cyclooxygenase-2 (COX-2)-selective inhibitor that is approved in over 80 countries for short-term use as either pre-operative analgesia to prevent or reduce post-operative pain, as a concomitant treatment to reduce opioid analgesic requirements, or for the treatment of acute pain. Parecoxib is commonly administered as a 20 mg or 40mg intravenous or intramuscular dose followed every 6-12 hours by 20 mg or 40 mg doses as required, not to exceed 80 mg/day. The use of COX-2 inhibitors and other non-selective anti-inflammatory drugs have been associated with specific adverse events, including cardiovascular and gastrointestinal events. In order to examine the frequency of such adverse events among patients treated with parecoxib, data were pooled from 28 randomized, double-blind, placebo-controlled trials in which 5,402 patients received parecoxib for post-operative pain. Trials were up to 7 days in duration.
Results: Across all trials, there were no reported cases of severe cutaneous adverse reactions among parecoxib- or placebo-treated patients. The occurrence of arterial (parecoxib = 0.3%; placebo = 0.2%) and venous (parecoxib = 0.2%; placebo = 0.1%) cardiovascular embolic and thrombotic events was similar between treatment groups. Renal failure and impairment was also similar between parecoxib (1.1%) and placebo (1.0%) groups. Gastrointestinal ulceration-related events occurred in 0.3% and approximately 0.2% of patients in the parecoxib and placebo groups, respectively. Hypersensitivity reactions occurred in approximately 12.3% of patients in the parecoxib group compared with 12.6% for placebo. Severe hypotension occurred in approximately 2.7% and 2.3% of patients in the parecoxib and placebo groups, respectively. Masking signs of inflammation occurred in < 0.1% of patients in both the parecoxib and placebo groups.
Conclusions: Generally, the occurrence of adverse events associated with the use of the selective COX-2 inhibitor parecoxib was low in a pooled analysis of 28 double-blind, placebo-controlled clinical trials of post-operative pain and the frequencies of such events were not significantly different between parecoxib and placebo groups. Overall, parecoxib was well-tolerated in clinical trials with durations up to 7 days. Sponsored by Pfizer Inc.

9AP7-2

Topical application of eutectic mixture of local anesthetics (EMLA®) cream can suppress referred pain caused by intravenous rocuronium injection

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Background and Goal of Study: Although rocuronium injection-induced (RII) pain is well known, the mechanism is still unclear. Since patients experience pain in the forearm during intravenous injection of rocuronium, viscerosomatic convergence of the sensory pathways from the skin and vein might exist and noxious stimulation of the vein might cause referred pain to the forearm. Thus, we hypothesized that topical application of local anesthetics on the referred pain area can reduce pain originating from the vein. We studied the effect of topical application of eutectic mixture of local anesthetics (EMLA®) cream on RII pain.
Materials and Methods: Following approval of the Ethics Committee of our institution, written informed consent was obtained from each patient enrolled in this prospective, randomized, double-blinded, placebo-controlled study. Forty-four patients undergoing elective surgery were randomized to EMLA® (E) group or a control (C) group. A 22-gauge cannula was inserted in the dorsum of the hand of each patient in both groups at a hospital ward. Then, the dorsum of the forearm was covered with a thick paste of EMLA® 60 min before arrival in the operating room in the E group, while the same procedure was performed with the control paste without the drug in the C group.
Anesthesia was induced with 1.5 mg/kg propofol. After consciousness was lost, which was assessed by loss of response to verbal commands and loss of eyelash reflex, 0.9 mg/kg rocuronium was injected over a period of 5 seconds. According to a previously described method (Kwak et al., 2013), pain-related response of each patient to rocuronium injection was assessed with a four-point scale (FPS): 0 for no response, 1 for movement at the wrist only, 2 for movement involving the arm only, and 3 for generalized response or movement in more than one extremity and reactions. The incidence of withdrawal response was analyzed by the χ^2-test. The FPS was analyzed by the Mann-Whitney U test. Statistical significance was defined as $P<0.05$.
Results and Discussion: There was a significant difference between the overall incidences of withdrawal movement in the C group (70%) and E group (33%, $P=0.015$). FPSs of the E group were significantly lower than those of the C group ($P<0.01$).
Conclusion(s): The results of this study have suggested that topical application of EMLA® could reduce RII pain by suppressing the referred pain originating from the skin of the forearm.

9AP7-3

Postoperative pain in cholecystectomy: preliminary data

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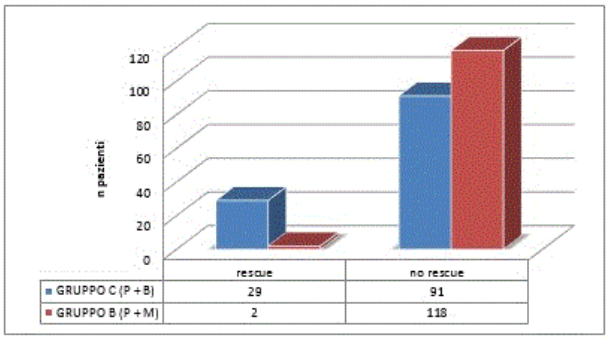
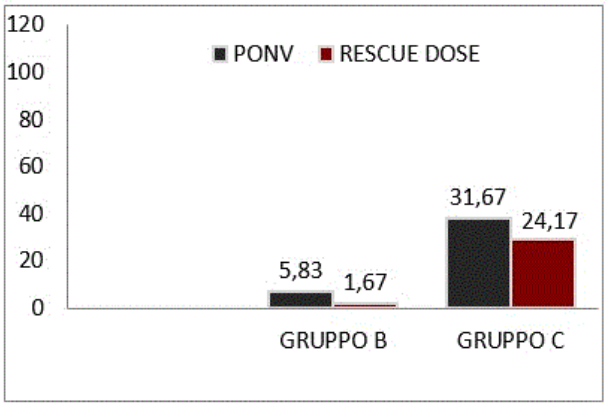
Background and Goal of Study: The aim of the study is to better evaluate analgesia in patients being subjected laparoscopic cholecystectomy surgery.
Materials and Methods: From 1 January 2013 to 31 December 2013 we examined 240 patients undergoing cholecystectomy, ASA I-II, aged between 20 and 50 years. They were divided into two groups. 120 patients were included in Group B and received as post-operative analgesia morphine 10 mg sc and acetaminophen 1 g iv. 120 patients were included in Group C, for they were given buprenorphine 0.3 mg im and acetaminophen 1 g iv as post-operative analgesia. A NRS scale (0-10) was administered soon after the awakening and then 1, 3, 6, 12 and 18 hours after the end of the surgical procedure.
General anaesthesia was: induction with propofol 2.5 mg/kg and remifentanil 0.10 mg/kg/min; muscle relaxation with rocuronium bromide 0.5 mg/kg; maintenance of with continuous infusion of remifentanil 0.1-0.2 mg/kg/min and desflurane 4-5 vol%.
Results and Discussion: They are reported in the tables below. For the inferential analysis we used the U Mann-Whitney test. From the data shown in group B, we observed a postoperative course with less complications. The values of NRS between the group B and group C are overlapped, but in the group B we observed a greater number of rescue doses. Statistical analysis showed that between the two groups there are statistically significant differences (p.value <0.05).





[Results]

Conclusion(s): The use of morphine and paracetamol as analgesic interventions of laparoscopic cholecystectomy surgery is the protocol that provides the best post-operative management, achieving good control of postoperative pain with few side effects.
References: Amini S, Sabzi Sarvestani -Comparing the impact of intraperitoneal hydrocortisone with bupivacaine on postoperative pain after laparoscopic cholecystectomy. Anesth Pain Med. 2014 Sep 8;4(4):e17206

9AP7-4

Gabapentin in perioperative pain management of surgical patients - a systematic review with meta-analysis and trial sequential analysis

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Background and Goal of Study: Gabapentin has become a substantial element in postoperative multimodal analgesic regimen. The aim of this PRISMA compliant and PROSPERO registered systematic review of randomised clinical trials (RCT) was to document beneficial and harmful effects of perioperative gabapentin treatment.
Materials and Methods: The Cochrane Library's CENTRAL, PubMed, EMBASE, Science Citation Index Expanded, Google scholar and FDA database were searched for relevant trials. Unpublished trials were searched in relevant databases. Randomised clinical trials comparing gabapentin versus placebo or active placebo irrespective of publication type, status, publication year and language were included. Quasi-randomised and observational studies were included for assessment of harms. Two authors independently screened titles, abstracts, performed data extraction and bias evaluation. We performed GRADE-rating of the quality of evidence. Primary outcomes were 24-hour morphine consumption and incidence of serious adverse events (SAE).
Results and Discussion: Ninety-four trials with 6724 patients fulfilled the inclusion criterias. Twenty-four hour morphine consumption was reported in 58

trials of which nine trials were classified as low risk of bias. A morphine sparing effect of 3.67 (95% CI 0.26, 7.07) mg were found in the low risk of bias trials. The trial sequential analyses (TSA) of this outcome confirmed that more trials are needed before the conclusion is reliable. The number of accrued patients in the TSA of low risk of bias trials is 718 which is 39% of the required information size. The 24 hour morphine sparing effect estimated in all trials was 7.70 (95%CI 6.14, 9.26) mg.The GRADE rating is low in the low risk of bias trials. The areas of concern are inconsistency, indirectness and imprecision. In the overall assessment of 24-hour morphine consumption the GRADE rating is very low. All areas, except imprecision, are of concern. SAE were reported in 22 trials with 1633 patients. Thirty-three events were found in the gabapentin group and 29 in the controls. The risk ratio of SAEs was 1.08 [0.67, 1.75].
Conclusion(s): Perioperative gabapentin treatment may reduce 24-hour morphine consumption, but the actual information size is insufficient for trials with low risk of bias. SAEs were poorly reported limiting confidence in analyses.

9AP7-5

Low-dose ketamine infusion reduces postoperative hydromorphone requirements and pain scores in opioid-tolerant patients after spinal fusion

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Background: Spine surgery patients are often tolerant to opioids, which makes postoperative pain control challenging. This has led to a search for adjuvant medications to reverse opioid tolerance, and reduce postoperative opioid use and opioid-mediated side effects [1,2,3]. Mu opioid receptor activation by morphine has been implicated in the development of opioid tolerance via an increase in glutamate synaptic effect at NMDA receptors [4]. These receptors are also involved in central pain sensitization via a wind-up phenomenon and altered pain memory. This process can be blocked by ketamine, a noncompetitive antagonist [5]. We believe ketamine would be of particular benefit in opioid tolerant patients because of NMDA antagonism, reducing opioid use without compromising pain control.
Materials and Methods: This is a prospective, randomized, double-blinded, four-arm parallel, single-center study. In this report, we included 82 lumbar spinal fusion patients divided into opioid tolerant (daily opioids during two weeks before surgery) or opioid naïve. Patients in each group were randomized to either ketamine or placebo infusion, started on arrival in PACU, in addition to hydromorphone IV PCA. Ketamine dose was 0.2 mg/kg bolus, followed by an infusion of 0.12 mg/kg/h for 24h. Pain scores and hydromorphone use were recorded until 24h postoperatively.
Results: Hydromorphone requirements in the placebo/tolerant group were significantly higher than in the ketamine/tolerant group and in the placebo/naïve group ($p < 0.0001$). There was no significant difference in the administered amount of hydromorphone between the 2 opioid-naïve groups and the ketamine/tolerant group. Acetaminophen rescue doses during 24h postoperative were significantly more frequent ($p < 0.0016$) for patients in both placebo groups than in the ketamine groups. Diazepam for muscle spasm was used more frequently for patients in the tolerant placebo group ($p < 0.0003$) compared to the patients in the opioid naïve groups and the tolerant ketamine group. Pain scores were significantly lower ($p < 0.0001$) in the ketamine/tolerant group than in the ketamine/placebo group.
Conclusion: Low-dose ketamine infusion is a useful adjunct to improve pain control and reduce opioid requirements in opioid-tolerant patients undergoing major spine surgery.
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9AP7-6

Management of rib fractures following successful CPR and percutaneous coronary revascularisation

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Background: Pain from multiple rib fractures is notoriously difficult to treat. Aggressive early pain management prevents the development of respiratory complications. Multi modal analgesia with a epidural or paravertebral block are seen as gold standard (1), however there are few options if the epidural or paravertebral are contra indicated.
We describe a case with a continuous serratus anterior block (cont-SAB) as an alternative.
Case: A 58 year men had an out of hospital cardiac arrest with a of return to spontaneous circulation after 20minuntes, he had a percutaneous coronary revascularisation with antiplatelet therapy. He reported severe pain and unable to deep breathe and cough due to multiple bilateral rib fractures (right 2 ribs and left 8 ribs fractured) from CPR. Multimodal oral and intravenous analgesia had failed. Due to the antiplatelet therapy both epidural and paravertebral were contraindicated.
An ultrasound guided cont-SAB (2) with catheter placement was performed on the left and the block established with 0.25% L-bupivacaine 40ml and a continuous infusion of 0.1% L-bupivacaine at 5ml/hr started. The dynamic pain scores (DPS) pre-block was 3 (Scale: 0=no pain and 3=severe Pain) and DPS post block were 0-1.
Incentive spirometry pre block: 1200mls and post block :2300mls
The patient complied with the physiotherapy and made a successful recovery. The cont-SAB was maintained for 3 days and the patient was discharged the following day with oral analgesia.
Discussion: This is a case were the severe pain from rib fractures, in whom the gold standard regional anaesthesia was contra-indicated, was successfully treated with a cont-SAB. In patients with multiple rib fractures epidurals and paravertebral blocks are often contraindicated due to associated injuries such as head injuries, spinal fractures and coagulopathies. Usually there is a reliance of intravenous opioids to achieve analgesia.
However, complications associated with opioids such as reduced cough reflex and respiratory depression can increase morbidity. The serratus anterior block has very few contra-indications and can be used to enhance analgesia and reduce morbidity.
References:
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Learning points:
1. Analgesia for multiple rib fractures is difficult
2. Cont-SAB can be utilised as alternative to epidural or paravertebral

9AP7-7

Multimodal therapy on neuropathic pain: effect of pregabalin, tramadol and ketorolac

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Background and Goal of Study: Neuropathic pain is caused by either central or peripheral nervous system dysfunction. With its complicated pathogenesis involved, conventional pharmacological treatment focusing on selective receptor mechanism is either limited or ineffective. As a result, multimodal therapy is currently accepted as the best approach.
Our studies want to compare the effectiveness of four drug treatments on a rat neuropathic pain model. Also, evaluate the therapeutic effect of pregabalin on different neuropathic pain model.
Materials and Methods: We used spared nerve injury (SNI) model in which two major divisions, the tibia and common peroneal branches, of the sciatic nerve were cut. Tramadol (2.5, 5, 10 mg/kg i.p.), Ketorolac (2.5, 5, 10 mg/kg i.p.), their combination (Tramadol 5 mg/kg + Ketorolac 5 mg/kg i.p.) and Pregabalin (3, 10, 30 mg/kg i.p.) were tested on their efficacy on spontaneous and evoked pain behaviors of SNI neuropathic rats. And, Pregabalin (3, 10, 30, 100 mg/kg i.p.) were treated on spontaneous and evoked pain behaviors

in SNI and chronic constriction injury of infraorbital nerve (IONCCI) neuropathic rats.
Results and Discussion: Spontaneous pain significantly decreased in combination group, Pregabalin had analgesic effect at 10 mg/kg. Mechanical allodynia was reversed under both high dose Tramadol and T+K combination treatments. Pregabalin demonstrated better analgesic effect at high dosage in both neuropathic pain models.
Conclusion(s): We demonstrate that low dose and ineffective NSAID can augment the analgesic efficacy of weak opioid on a rat model of peripheral neuropathic pain. Our data confirm the effectiveness of pregabalin in treating peripheral neuropathic pain.

9AP7-8

Analgosedation for PTCD and stenting in biliary constriction: comparision of two different concepts

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Background and Goal of Study: Percutaneous transhepatic biliary drainage (PTBD) and stenting are well-established methods for treatment of cholestasis in biliary constriction. These procedures are inconvenient and painful for the patient. Therefore analgosedation is needed. In this study we compared 2 different types of analgosedation with regard to patient's comfort and satisfaction of the interventional radiologist.
Materials and Methods: Randomized, controlled study (Eudora CT Nr.: 2006-003285) was approved by the local Ethic commitee. 50 patients (29 male, 21 female) who underwent PTBD or stenting were included. For each procedure analgosedation was made with remifentanil alone or with midazolam, piritramid and S-ketamine. Ninty percent of the patients got a non-opiod analgetic like metamizol, diclofenac or paracetamol at the end of the intervention. Antiemetic medication was given as needed. Pain intensity was measured during intervention using the VAS score (0 no pain, 10 highest pain) and the appearance of PONV were determined. Statistical analysis was calculated by using the Man-Whitney-U-test.
Results and Discussion: There was no significant difference in pain intensity by using remifentanil alone or midazolam, piritramid and S-ketamine during the intervention. However, more patients in the remifentanil group needed an additional opiod in the postoperative phase. PONV was seen in 33% of the patients in the remifentanil group and in 4% in the other group.
Conclusion(s): Analgosedation in PTBD and stenting is standard at our institution. Although remifentanil has good analgetic effect during intervention, PONV seems to be more frequently with remifentanil and patients need a more long acting analgesics for postoperative phase. Therefore the combination of midazolam, piritramide and S-ketamine is favourable. For avoiding PONV anti-emetic prophylaxis should be given preoperatively.
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9AP7-9

Can the use of dexmedetomidine for procedural sedation in total knee arthroplasty reduce postoperative pain? A randomized control study

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Background and Goal of Study: Patients undergoing spinal anesthesia often request sedation to alleviate the anxiety of being awake during surgery. Dexmedetomidine may be ideally suited for these patients as it offers anxiolysis, sedation, and analgesia. These analgesic properties may be of particular benefit in patients undergoing operations associated with significant postoperative pain. However, no randomized controlled trials have yet studied the postoperative opioid requirements in patients receiving spinal anesthesia and an IV infusion of dexmedetomidine. We hypothesized that the administration of dexmedetomidine for sedation during total knee arthroplasty under spinal anesthesia would decrease postoperative morphine consumption in the first 24 hours following surgery.
Materials and Methods: In this prospective, double blinded randomized control trial, we enrolled 40 ASA 1-3 patients undergoing total knee arthroplasty with spinal anesthesia. Patients were randomized to receive either a Dexmedetomidine loading dose of 0.5ug/kg over 10 minutes followed by an infusion of 0.5ug/kg/hr for the duration of the surgery, or a normal saline loading dose and infusion of equivalent volume. All patients received 12.5mg of hyperbaric bupivacaine and 10 ug of Fentanyl intrathecally. The primary outcome was morphine consumption as measured by PCA for the first 24 hours. Secondary outcomes included time to first PCA request, VAS scores and opioid side effects.
Results: There was a significant decrease in mean cumulative morphine consumption at 24 hours in the dexmedetomidine group (mean [95% CI] 29.2 mg[24.3-34.1](Dex) vs. 61.2mg [53.6-68.7](placebo); $P<0.0001$).
Time to first analgesic request was delayed in the dexmedetomidine group: (239.5 mins [205.6-273.4] (Dex) vs. 165.5 mins [134.9-196.1] (placebo); $P=0.002$). There were no significant VAS score differences at 6, 12, or 24 hours. There was more vomiting in the placebo group (7 patients (placebo) vs. 1(Dex), $p=0.005$) as well as more pruritus in the placebo group (6(placebo) vs. 1(Dex), $p=0.01$).
Conclusions: Dexmedetomidine was associated with a reduction of greater than 50% morphine use in the first 24 hours following total knee arthroplasty. Our study demonstrates that an intraoperative infusion of dexmedetomidine for sedation in patients receiving spinal anesthesia can produce postoperative analgesic effects, offering another potential adjunct in the multimodal pain management of these patients.

9AP7-11

To add or not to add?

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Background and Goal of Study: Patient-controlled analgesia (PCA) proved to be more effective than conventional analgesia[1]. However, it is controversial if the adding of antiemetics to the opioids administered brings benefit in the reduction of post-operative nausea and vomiting (PONV). The objective of this study consisted in the analysis of the existence of PONV in patients who used PCA as analgesic method.
Materials and Methods: We analyzed all patients submited to a major surgery, in a four month period, which used PCA with morphine, with or without an antiemetic, as postoperative analgesic method. The data collected were: gender, age, Apfel score, use of antiemetic, opioid quantity administered by bolus, existence of opioid continuous infusion, opioid total dose, duration of analgesia and occurrence of PONV. The data obtained were analyzed using Pearson χ^2 test and Kruskal-Wallis test of SPSS 20.0®.
Results and Discussion: Of the 115 patients analyzed, 40% were female and 60% were male, with an average age of 60 years. 44% used this analgesic method for 24 hours and 56% for more than 24 hours. 47,8% used an morphine PCA and 52,2% an morphine and antiemetic PCA. There were no differences in the composition of the groups in age, gender, Apfel score, bolus average dose, existence of continuous infusion and opioid total dose. In the morphine PCA group, the Apfel score average value was 1,9, and the bolus average dose was 1,5mg. Five patients had continuous opioide infusion. The total dose administered was 38,2mg, during an average period of 39 hours. The incidence of PONV was of 10,9%. In the second group, the Apfel score average value was 2,0, and the bolus dose was 1,7mg. The total dose administered was 34,5 mg, during an average period of 40 hours. The incidence of PONV was 13,3%. The female gender and higher Apfel score are associated with a higher incidence of PONV ($p< 0,05$). The adding of antiemetic to morphine had no statistical significance with the occurrence of PONV ($p>0,05$).
Conclusion(s): We were able to conclude that the adding of an antiemetic to morphine PCA has no association with the decrease of the PONV and that the incidence of this secondary effect is low. Thus it is intended to highlight the need for further studies to confirm if the adding of antiemetics is or is not necessary and to evidence the lower incidence of PONV in patients submitted to these major surgeries using this analgesic technique.
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9AP8-1

A prolonged infectious gluteal cellulitis secondary to caudal epidural catheter puncture

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Background: Caudal epidural injections of local anesthetics with or without steroids is one of the most commonly used procedures in low back pain management. It has been used in chronic low back pain and radicular pain secondary to lumbar disc herniation, discogenic pain, post-laminectomy syndrome or spinal stenosis.
Case report: A 64 year old woman was admitted to the emergency service with a complaint of pain on her left gluteus. Her medical history included spondyloarthrosis, foraminal stenosis, chronic lumbosciatica and anxious depressive disorder.
Three days before, she received a caudal epidural injection to treat her chronic low back and radicular pain, secondary to spinal stenosis. The procedure was executed under surgical asepsia conditions. Sacral cornua and hiatus was manually localized for caudal access. A 19-gauge epidural catheter was inserted using a 17-gauge, 9.84 cm Tuohy epidural needle, and loss of resistance technique. 80 mg triamcinolone in total volume of 10cc, diluted in saline physiological serum 0.9% was administrated through a 0.2 micron flat catheter filter. This catheter was removed 10 minutes afterwards.
At admission, a swelling and erythematoedematous plate of about 15 cm x 6 cm on her left gluteus was found, with low suppuration through epidural catheter insertion orifice at sacral level. This abscess was drained surgically and she received medical treatment. She was discharged from hospital a week later.
Discussion: Complications in regional anesthesia are infrequent. Epidural abscess and meningitis are the most common. Localized infection, bacteraemia, inflammation and erythema have been reported in sporadic cases associated with peripheral nerve block catheters.
The correct placement of a needle is the key to a successful caudal puncture. We conducted a blind technique, so we cannot rule out the wrong position of the needle in the subcutaneous plane out of the epidural space. Different confirmation techniques have been used to identify the epidural space at this level. One of the most relevant nowadays is ultrasonography.
Learning Points: Infectious complications associated with regional anesthesia are very uncommon. We suggest some recommendations derived from this case:
1. The importance of using aseptic techniques; and
2. a reliable epidural needle placement to perform a safe and effective epidural analgesia like ultrasonography can be useful.

9AP8-2

Differential effectiveness of communications on patient satisfaction, patient global impression of improvement in pain and pain severity in postoperative patients receiving intravenous patient-controlled analgesia

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Background and Goal of Study: Effective communications are essential to successful patient-physician relationships which are the cornerstone of quality medical care. “CICARE”, initially proposed by the UCLA Medical Center, is a quality improvement project targeting effective communications between patients and physicians. Thus, “CICARE” training for the acute pain service (APS) team was expected to improve the quality of pain management and patient satisfaction in postoperative patients receiving intravenous patient-controlled analgesia (IV-PCA).
Materials and Methods: Questionnaire survey research was conducted. An anonymous ten-question questionnaire was designed and completed by patients voluntarily after IV-PCA was discontinued. Each questionnaire item was assessed using a 5-point Likert scale (1: extremely poor; 5: excellent). Patients were separated into two groups - “before” and “after” CICARE. Primary outcomes were patient global impression of improvement (PGI-Improvement) in pain and patient satisfaction with APS. Secondary outcomes included accessibility of PCA information, quality of communication skills and instrument/workflow proficiency. In this study, APS team members visited IV-PCA patients twice daily. The severity of pain measured with an 11-point numeric rating scale (0-10) and the rates of side effects of IV-PCA were assessed and recorded on questionnaires.
Results and Discussion: In total, 762 questionnaires were returned with an effective response rate of 54.12%. Significant increases in PGI-Improvement in pain and patient satisfaction with APS were identified in group “after” CICARE compared with group “before” CICARE. CICARE training effectively improved accessibility of PCA information, communication skills in comprehensibility, ask and response as well as the pain management process (the workflow proficiency). But, there were no differences in instrument proficiency, the severity of pain and the rates of side effects of IV-PCA between groups. Interestingly, differential effectiveness of communications was noted between PGI-Improvement in pain and pain severity.
Conclusion(s): This survey research reveals that a quality improvement project for APS team targeting effective communications can successfully improve the quality of pain management and patient satisfaction with APS.

9AP8-3

Episiotomy: its understated long-range consequences

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Background: Episiotomy enjoys wide acceptance when trying to avoid maternal lacerations or to facilitate difficult births(1).
Long-range consequences have not been studied sufficiently. Medio-lateral episiotomy was found to be a risk factor for III and IV degree perineal tears(2) and can cause chronic pelvic pain. Nowadays, treatment options might not achieve total pain relief.
Case report: Three months after vaginal delivery and medio-lateral episiotomy, associated with III degree perineal tear, a 31-year-old woman (diagnosed with systemic mastocytosis), suffered from intense pain in the episiotomy scare, dyspareunia and stool incontinence.
During the following trhee months, perineal massage and rehabilitation were ineffective. Oral-opioids treatment was not considered because of the mastocytosis. Trigger point injection with L-bupivacaine and corticoids showed little effect. A second infiltration one month later achieved almost one year of pain relief, but more infiltrations were needed.
Two years after the episiotomy, she suffered intense perineal neuropatic pain symptoms (allodynia and hyperalgesia). Pregabalin treatment was inefficient. Impar ganglion was blocked, with no effect. Finally she received bilateral pulsed radiofrequency on the third and fourth sacral roots obtaining total pain relief.
Discussion: Incidence of chronic pelvic pain after episiotomy appears to be low, but it is still unknown. Medical and social impact are high. Its treatment is very difficult. Mastocytosis limits therapeutic options, increasing the challenge (3).
Bilateral pulsed radiofrequency of the third and fourth sacral roots was useful. It could be an option for patients with chronic pain after episiotomy.
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3. Knut B., Patrizia B., et al. Drug allergy in mast cell disease. Curr Opin Allergy Clin Immunol 2012;12:354-360
Learning points: Further trials are needed to assess the real incidence of chronic pain after episiotomy and to research for an effective therapy.
Pulsed radiofrequency of sacral roots could be an useful therapeutic option when first line treatments have no effect.

9AP8-4

Pain assessment in ICU - 2 months observational study

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Background and Goal of Study: The assessment of pain and sedation in the ICU is particularly complex. Inadequate analgesia leads to several adverse events. The aim of this study was to characterize the pain scores of patients admitted in a Intensive Care Unit in order to develop and implement an analgesia protocol.
Materials and Methods: Descriptive observational study, with patients admitted to a polivalent intensive care unit, from January to February 2014. The data was collected by assessment of the clinical records. The pain scores were evaluated by the Numerical Scale (NS) and Behavioral Pain Scale (BPS), and uncontrolled pain was defined as NS>3 or BPS>4.
Results and Discussion: 52 patients were included, and 607 pain assessments were collected. 35 patients (67%) had uncontrolled pain at some time of the first 4 days. 5 patients (14,3%) had severe pain scorres during the first 4 days. In 32% NS scores was found uncontrolled pain, and 13% BPS scores revealed uncontrolled pain. On the other hand, to the total number of assessments of pain, only 18% experienced uncontrolled pain. The maximum NS score observed was 7 and maximum PBS score was 8. From the medical patients with uncontrolled pain (16%) under analgesic technique, 54% were with infusion analgesia and 35% with bolus intravenous analgesia. 22.8% of ratings to surgical patients (37, n=162) revealed uncontrolled pain.
Conclusion: This study confirmed the presence of high prevalence of uncontrolled pain in patients admitted in this UCI. The absence of pre and post treatment records does not allow to conclude on the effectiveness of pain control. Analgesia of critically ill patients can be optimized by implementing a therapeutic protocol, with focus on evaluation on static, dynamic and intra-procedures pain. A prospective study evaluating the protocol implemented would be essential to understand if it would be an effective strategy to ensure the patient comfort.
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9AP8-5

Pain on the first day after surgery: prospective and cross-sectional study

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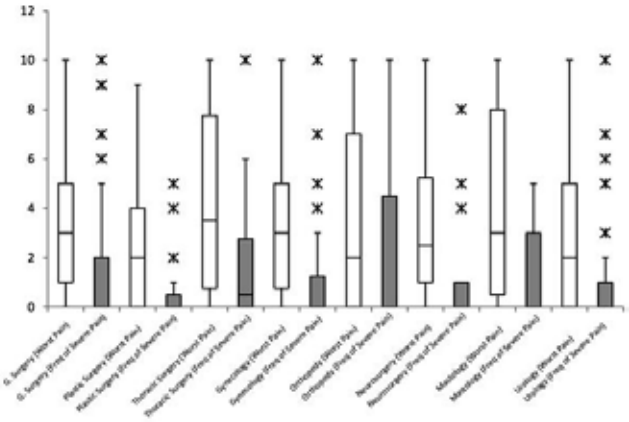
Background: More than 80% of patients undergoing surgery reported pain in the postoperative period. The hypothesis of this study is that the postoperative pain is undertreated. The aim of this study was to identify the frequency and intensity of pain 24 hours after surgery in different surgical specialties treated in a tertiary university hospital.
Materials and Methods: After the approval of Research Ethics Committe were assessed 300 successive patients. Elements noted: patient characteristics; surgical specialties; 3- drugs and techniques. In 2 moments (delivery of post-anesthesia care unit and 24 hours after the end of surgery), patients were evaluated by Visual Analogic Scale (VAS): pain intensity; adverse events, interference of pain in activities and sleep and the patient's degree of satisfaction with the treatment.
Results and Discussion: 289 patients were included, 51.2% male, 48.8% female, with a mean age of 51.3 years. Surgery specialties: General Surgery (21, 8%), Urology (19.7%), Orthopedics (17%), Gynecology (12.1%), Plastic Surgery (7.3%), Neurosurgery (6.2%), Mastology (6.2%) and Thoracic Surgery (4.2%). Anesthetic techniques: general (41.5%), regional (37.7%), combined (20.1%) and no information (0.7%). Analgesics: dipyrone (95.8%) Tramadol (50.2%), ketoprofen (46%) Ropivacaine (2.4%) Morphine (1%), local ice (0.7%), paracetamol (0.3%), fentanyl (0.3%), parecoxib (0.3%) and clonidine (0.3%). Multimodal analgesia was performed in 165 cases. At PACU the mean pain by VAS was 1.6 and adverse events scores were: nausea (0.6), somnolence (1.9), pruritus (0.3), dizziness (0.3). The mean VAS pain scores for the 24 hours after surgery was 2.1 and the average intensity (VAS) of adverse events scores were nausea (0.8), drowsiness (0.7), pruritus (0.2), dizziness (0.3). In the first 24 hours the average intensity (VAS) were: most severe pain (3.3), minor pain (0.6), difficulty moving in bed (2.2), difficulty taking a deep breath (1.3), difficulty sleeping (0.7), difficulty of performing out of bed activities (1.4) and the strong pain frequency (13.4%). The average of patient satisfaction (VAS) with the treatment was 9.6.
The frequency and intensity of the most intense pain occurred in thoracic and breast surgery.
References:
Gerbershagen HJ, Aduckathil S, van Wijck AJ, Peelen LM, Kalkman CJ, Meissner W. Pain Intensity on the First Day after Surgery A Prospective Cohort Study Comparing 179 Surgical Procedures. Anesthesiology 2013;118(4):934-944.



[Figure 1]

9AP8-6

Sensory deficits and mirror image sensory dysfunction after sternotomy

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Background and Goal of Study: In order to overcome some of the problems having lead to the large variation in the prevalence of persistent post-sternotomy pain (PPSP) (different definitions of persistent postoperative pain, non-uniform study protocols, individual aspects, and variety of surgical methods) we decided to clinically examine (author MLK) sensory modalities of coronary artery bypass graft (CABG) patients 6 months after sternotomy. This is part of a bigger entity aiming to examine the area of acute postoperative hyperalgesia in predicting the risk for PPSP.
Materials and Methods: This is a prospective, observatory, power-calculated study involving 100 consecutive elective CABG patients. Written consent was obtained from patients: age >18years, first time CABG, co-operative. The study was approved by our hospital ethics committee. Sternum was palpated. Sensory testing started from the periphery, progressing towards the midline scar on the sternum. Aβ fiber-function was tested with a cotton stick. C-fiber testing was assessed by pin prick (wooden stick) and mechanical thresholds were determined with an Aesthesiometer (Canella medical, Somedic, Hörnby, Sweden). Aδ-fiber functions were tested with thermal rollers at 25°C and 40°C (Somedic, Hörnby, Sweden). The area of sensory dysfunction was measured and the changes in the sensory modalities were marked by using the numerical rating scale, as stated by the patient.
Data were analysed by using SPSS; Fisher's exact test or Pearson's chi2 -test was used when appropriate. Nonparametric test was applied for all non-equally distributed data.
Results and Discussion: When examined and discussed, 14 out of 91 patients were suffering from persistent post-sternotomy pain, in contrast to 26

patients according to the questionnaire filled in by the patients at the same appointment. Painful patients more often had mirror-image sensory dysfunction and larger affected areas than painfree patients. Details in table:

	All	Painfree at 6 months	Pain at 6 months	p
Mean age (years)	68.9	69.6	65.3	0.069
Gender M/F (N)	72/19	64/13	8/6	0.039
Sensory Dysfunction (SD) (N)	62	49	13	0.088
Contralateral SD (N)	25	17	8	0.002
Allodynia (N)	27	21	6	0.343
Median size of the area of SD (cm^2)	38.7 (sd 63.8)	22.5 (sd52.2)	84.2 (sd86.6)	0.000

[Table 1]

Conclusion(s): Clinically relevant neurologic deficit, in CABG patients, may be diagnosed reliably by using simple bed-side tools.

9AP8-7

Stop at mild pain: audit of perioperative pain management in an acute pain service

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Background and Goal of Study: *No worse than mild pain* was considered the only outcome acceptable in clinical practice [1]. The aim of this audit was to evaluate the current practices and quality of pain management in our Acute Pain Service.
Materials and Methods: A retrospective analysis of medical records from patients referred to the acute pain service during June of 2014. Demographic variables, surgical specialty, analgesic technique, time to first evaluation and pain level at rest and movement were registered. A qualitative categorical scale was used (absent, mild, moderate, intense, unbearable pain). A descriptive statistics was performed.
Results and Discussion: Data from 119 consecutive patients were analysed. The average age was 59.8 years and 50.4% were women. The majority of patients (56.3%) were from Orthopedics surgery having as analgesic technique: peripheral nerve blocks (35.8%), epidural technique (31.3%), patient controlled analgesia (PCA) (23.9%) and in 9% other techniques. Patients from General Surgery (17.7%) and Urology (12.6%) were with epidural or PCA techniques. In Vascular Surgery (11.8%) patients were managed with epidural, single bolus intrathecal morphine and PCA. Patients in Orthognatic surgery and Neurosurgery (1.6%) were managed with PCA. Acute pain evaluation in the first 24 hours was performed in 49.6% of patients: 98.3% with absent or mild pain at rest and 84.7% with absent or mild dynamic pain; for patients having the first evaluation after 24 hours (50.3%) 95% had absent or mild pain at rest but 28.3% had moderate to intense dynamic pain. Analysing all analgesic techniques >96% of patients had absent or mild pain at rest, except for sequential epidural bolus technique (75%). Dynamic pain was evaluated as absent or mild in ≥ 80% of patients except for sequential and epidural bolus technique. 95.2% of patients with continuous epidural analgesia had no more than mild dynamic pain; in those with epidural bolus more than one third had a level superior to mild dynamic pain.
Conclusion(s): The objective of *stopping at mild pain* was achieved in almost patients at rest and with the majority of analgesic techniques. Considering dynamic pain, evaluation in the first 24h for therapy adjustments and preference for continuous techniques rather than bolus may be important aspects to improve.
Reference: Moore R A et al, Anesthesia 2013; 68:400-12.

9AP8-8

Perioperative analgesic strategy and fast-tracking in scapulo-thoracic arthrodesis: a case report

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Background: The scapula alata condition results from a deficient serratus anterior muscle, which can be caused by fascio-scapulo-humeral muscular dystrophy (FSH). Clinical symptoms (shoulder instability, pain and loss of elevation of the arm) cause fonctional impotence. A scapulo-thoracic arthrodesis (STA) can lead to improved condition (1), but constitutes a painful major surgery, with hospital stay duration that often exceeds one week, and potential severe, debilitating, deafferentation chronic pain.
Case report: We report the case of an 29 years old patient with FSH treated by STA. Anesthesic strategy combined general anesthesia and locoregional analgesia: a preoperative ultrasound-guided parasagittal paravertebral catheter was used before incision (mepivacaine 1% 30ml). During surgery, sufentanil was given according to Analgesia Nociception Index monitoring (ANI, MDMS, Lille, France), leading to an average ANI value > 80 during the scapulothoracic operative time. A postoperative *quadratus lomborum* analgesic bloc was performed in order to control pain of the bone graft sample zone on posterior iliac crest. Once in post anesthesia care unit, the patient reported no pain. The total (including induction) dose of sufentanil was 0.4 µg/kg. A continuous perfusion of ropivacaïne (0.2%, 5ml/h) was administered via the paravertebral catheter during 48 hours. Visual Analog Scale pain scores were < 40/100 throughout the postoperative period. The patient reported very good satisfaction, and was discharged home four days after surgery, with paracetamol and tramadol only. No deafferentation pain was observed at discharge and 4 weeks later (DN4 score = 0, and 1, respectively). Further assessment of the patient's condition is planned at 3 and 6 month later.
Discussion: The literature is very poor about data on pain management in STA. The surgical technique represents a deafferentation model. Several cases of severe, debilitating chronic pain have been described (2). This case illustrates how preemptive analgesia with a paravertebral catheter may contribute to perioperative pain management and rapid recovery.
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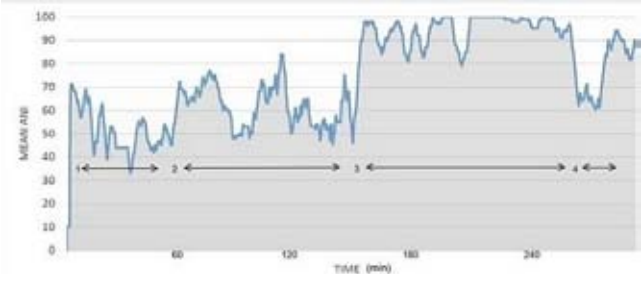
Learning points: This optimized approach with an opioid-sparing strategy may permit rapid recovery, no early deafferentation pain, and fast-tracking for this major surgery. ANI monitoring may have contributed to reducing intra-operative opioid use.



[Figure 1. Evolution of ANI during surgery, 1: Induction, 2: Bone graft prelevement, 3: Scapulo-thoracic time, 4: Awakening]

9AP8-9

Phantom limb pain prevention by infraclavicular block combined with ketamine perfusion in a patient who is amputated arm by necrotic spider venom

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Background: Pain management due to amputated member is complex. It appears in most patients submitted to this procedure; prevalence oscilates from 0.5 to 100%. Although it could persist through years, it usually weakens and eventually disappears.

Case report: A 71-years old man bitten by a loxosceles spider in his arm, comes to our hospital. His medical history includes diabetes mellitus tipe 2 and colon cancer treated. Initially the patient had sever inflamation and a necrotic eschar, so empirical antibiotic therapy was initiated. Increased dosis was needed because of phologosis an necrotizing fascitis. Poorly pain control and development of renal failure, urge us to place a catheter infraclavicular with an ultrasonic-guided tecnique.
To intensify and prolong treatmen duration, we administered an elastomeric infusion of Levobupivacaine 0.125%. After fasciotomy, it begans muscule necrosis, myositis and necrotic paniculitis with fungical infection. Becoming necesary amputation of the member. Fungal cell structures at the surgical margins were identified, so glenohumeral dislocation occurs. To develop the surgery we administered 100 mg Levobupivacaine bolus via infraclavicular catéter, and a continuous infusion of 0.5 mg/kg/h Ketamine via intravenous. Below amitriptyline and pregabali terapy was started, with a satisfactory pain control.
Results and Discussion: An electric discharge occurs from lesional peripheral neurons to the spinal cord during amputation, being highest during surgery, but continues until the cicatricación is completed. Intraoperative nociception and painful aftermaths because of changes in CNS, are prevented with profilactic analgesia. Besides ketamine has proved useful in reducing spontaneous pain on the stump, the wind up phenomenon and PLP because of blocking N-methyl-D-aspartate (NMDA) receptors.
Conclusion(s): Phantom limb pain (PLP) could be prevented with a multidisciplinary approach. Combination of periferical block with continuous infusion of Levobupivacaine and Ketamine intraoperatively can be considered an effective multidiscipinar treatment.
References:
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2. Jensen T.S. et al. Phantom limb, phantom pain and stump pain in amputees during the first 6 month following limb amputation. Pain 1983; 17:243-56.

9AP8-10

Intravenous lidocaine for postoperative pain: a single centre quality assurance study

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Background: Intravenous lidocaine can provide significant pain relief through its analgesic, anti-hyperalgesic and anti-inflammatory properties [1]. While short term infusions have been reported in different surgical models, systematic reviews have confirmed benefits from it in many aspects of enhanced recovery programs [2, 3]. In 2009, our Acute Pain Service implemented an IV lidocaine protocol.
The aim of this study was to review this protocol and explore the safety of IV Lidocaine in acute pain management.
Methods: After obtaining REB approval, a retrospective study was first completed for patients receiving intravenous lidocaine between 2009 to 2012 and included only patients who received intravenous lidocaine for pain. The data from anesthesia charts, acute pain service assessments and records were reviewed. Indications, demographics, impact and side- effects for the patients receiving lidocaine were collected. Subsequently, a three compartment pharmacokinetic model was also used to simulate the plasma concentrations of lidocaine achieved during a continuous three day infusion.
Results: In the study period, 169 patients were identified as having received lidocaine. After exclusions, data for 102 patients were analyzed. The indications for intravenous lidocaine were laparotomy (49%), spine surgery (16.7%), polytrauma (12.7%) and amputations (6.9%) etc. Lidocaine infusion was started intraoperatively in 61 patients. In 41 patients, it was started as a postoperative ‚rescue' adjuvant.
For the 'rescue' group, average reduction in activity and rest pain scores was approximately 40% and 25% respectively with a mean reduction of 33% in opioid consumption. Mild side effects and/or early signs of toxicity were reported in 10 patients and resolved. The safety of long term infusions was supported by our pharmacokinetic model. Therapeutic concentrations were achieved (without bolus administration) after 4-6 hours, remained stable and well below the toxic range for the simulated 3- 4 day infusion. On discontinuation of infusion, these levels dropped by approximately 25% every 10minutes till they were undetectable.
Conclusions: This single center quality assurance study confirms the safety and efficacy of intravenous lidocaine continued into the postoperative period by the Acute Pain Service.
References:
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9AP8-11

Postoperative acute pain in patients undergoing transabdominal hysterectomy treated with preemptive dose of pregabalin and gabapentin - randomized, double-blind, placebo-controlled trial

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Background and Goal of Study: Preemptive analgesia is used to prevent altered conduction of nociceptive impulses in the postoperative period. Gabapentin and pregabalin both inhibit alfa-2-delta subunit of voltage gated Ca (2+) channels, thus reducing postsynaptic excitability. Role of gabapentin and pregabalin is well established in the treatment of some types of epilepsy but their use is mainly associated with the pharmacological treatment of neuropathic pain. Many previous studies compared preemptive use of gabapentin with midazolam or pregabalin with midazolam. The aim of the present study was to assess analgesic requirements of patients in the postoperative period treated with either preemptive pregabalin or gabapentin compared to controls receiving standard premedication with oral midazolam.
Materials and Methods: The experimental protocol was approved by Local Ethical Committee.There were following inclusion criteria: patients aged 18-70 years old, ASA I-II, scheduled for transabdominal hysterectomy under general anestehsia. Informed written consent was taken. Between 2011 and 2013 a total of 63 patients were randomized into three groups receiving: Gabapentin 600 mg (Group A), Pregabalin 150 mg (Group B) and Midazolam 7,5 mg as active placebo (Group C). Postoperative pain was assessed with the use of Numeric Rating Scale (NRS), which was was measured at 2, 4, 8 and 20-24 hour after surgery. Morphine was administered by patient controlled analgesia (PCA) automatic syringe pump and its consumption was recorded.
Results and Discussion: 24-hour mean PCA morphine consumption did not differ significantly between groups (group A - 29,6 mg, group B - 23,6 mg, and group C - 27,2 mg; one way Anova; p =0,8399, F=0,175. Moreover NRS score assessed at rest was also comparable between the groups in each time of measurement (at 2 hour group A -2,27, group B - 1,27, group C - 1,55; F=1,79 ; p=0.17 ; one way Anova; at 4hour group A - 1,65, group B- 1,45, group C - 2 ; F= 0,48 ;p = 0,61; one way Anova; at 8 hour group A - 1,43, group B - 0,86, group C - 1 ; F = 1,23; p = 0,29 ; one way Anova at 20-24 hour groupA - 1,82, group B - 1,68, group C - 1,22 ; F=1,14 ;p= 0,32.
Conclusion(s): Pregabalin given at 150 mg and Gabapentin given at 600 mg as preemptive analgesia are not effective in reducing morphine consumption in the first 24 hours after transabdominal hysterectomy.
Reference: Fassoulaki A, et al. Eur J Anaesthesiol. 2012;29(11):531-6.

9AP9-1

Comparison of morphine and oxycodone IV PCA in postoperative pain management after antero-lateral thoracotomy

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Background and Goal of Study: Postoperative pain is most severe in the first 24 hours after surgery. It is particularly intense in thoracic surgical procedures. In those procedures, mainly because of their extent, range and characteristics, the level of postoperative pain is classified as one of the highest. The goal of our study was to compare the efficacy and safety of IV PCA (intravenous patient controlled analgesia) with oxycodone (OXY) compared to IV PCA morphine (MF) in alleviating acute postoperative pain after antero-lateral thoracotomy.
Materials and Methods: 28 patients scheduled for elective antero-lateral thoracotomy were randomly assigned into 2 groups. 14 patients in MF group in which patients received IV PCA with morphine and 14 patients in OXY group where patients received IV PCA with oxycodone postoperatively. Patients in both groups also received sentinel analgesia: 1 g paracetamol in six hour

intervals and 100 mg of ketoprofen as a rescue drug in case of breakthrough pain. We recorded basic hemodynamic parameters (Systolic blood pressure SBP, Diastolic blood pressure DBP, Heart rate HR), pain level in NRS (Numeric Rating Scale) and PHHPS (Prince Henry Hospital Pain Score) scales and sedation level in Ramsay scale 48 h after the surgery. Preoperative demographic data was analyzed with one way ANOVA with post-hoc Tukey test. To determine differences between the groups and establish a correlation between the repetitive measurements we used multivariate repeated measures ANOVA with Bonferroni correction where necessary. Results are presented as mean and standard deviation for demographic data and 95% confidence intervals for repetitive measurements data.
Results and Discussion: Patients demographic data were similar between the groups. There was no statistically significant difference in basic hemodynamic parameters (SBP, DBP and HR). Analysis of the level of experienced pain in NRS and PHHPS scale showed no statistically significant differences between the groups ($p = 0.19$). However, analysis of the level of pain showed significant differences in the NRS and PHHPS level in the course of time ($p<0.01$). There was statistically significant difference in sedation level in favor of OXY group.
Conclusion(s): IV PCA with oxycodone and morphine are effective and safe in alleviating postoperative pain after antero-lateral thoracotomy but oxycodone seems to be more useful because of lower level of sedation.

9AP9-2

Meta-analysis of the effect on pain intensity and safety of the fentanyl iontophoretic transdermal system (ITS) versus intravenous patient-controlled analgesia (IV PCA) in postoperative pain management

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Background and Goal of Study: Fentanyl iontophoretic transdermal system (ITS) is a novel adhesive, self-contained, needle-free patient controlled analgesia (PCA) system that delivers fentanyl transdermally. This meta-analysis compared the effect on pain intensity and safety of the fentanyl iontophoretic transdermal system (ITS) versus morphine intravenous PCA (IV PCA) using data from four randomized, active-controlled trials.
Materials and Methods: Data from four randomized, active-controlled trials (N= 1,271 fentanyl ITS and 1,298 morphine IV PCA patients were included in the analysis of evaluable patient populations) were analyzed. Patients reported pain intensity on a verbal numerical rating scale (0-10) or a visual analog scale (VAS, 0-100) at 24, 48, and 72-hour time points. The scales were anchored at “no pain” and “worst possible pain”. For the purpose of this meta-analysis, pain scales were transformed to a 100-mm VAS. The weighted mean difference (WMD) was calculated as the weighted means of differences between treatments in individual studies with weighting determined by a study’s relative sample size and the variability (e.g., standard deviation). Safety was assessed via spontaneously reported treatment-emergent adverse events (TEAEs). TEAEs were analyzed using odds ratio (OR) from a random effect model.
Results and Discussion: The WMDs in patient-reported pain intensity were comparable at 24 hours (WMD=-1.35, p=0.30), 48 hours (WMD=-1.61, p=0.45) and 72 hours (WMD=-1.31, p=0.41) between fentanyl ITS and morphine IV PCA. Although not significant, the WMD of -1.35 at 24 hours indicated that fentanyl ITS patients had on average a 1.35 point lower pain score (on a 100-point scale) than morphine IV PCA patients. There were similar numbers of patients in both groups who reported at least one TEAE (76.6% in the fentanyl ITS group and 73.4% in the morphine IV PCA group. However, there were significantly more opioid-related TEAEs in the morphine IV PCA group versus the fentanyl ITS group (p=0.03). Specifically there was more hypotension (p=0.03), hypoventilation (p=0.03), pruritus (p=0.0002), and tachycardia (p=0.02) in the morphine IV PCA group versus the fentanyl ITS group. There were no opioid-related AEs that occurred more frequently in the fentanyl ITS group.
Conclusion(s): Compared to morphine IV PCA, fentanyl ITS had statistically significantly fewer opioid-related adverse events and trended toward better pain intensity measurements.

9AP9-3

Oral transmucosal fentanyl citrate use for procedural pain in a burns unit: auditing our experience

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Background and Goal of Study: Procedural pain relief of hospitalized burns patients presents particular challenges and is still inadequate and understudied. Given this lack of data, we audited and present our current practice with the use of oral transmucosal fentanyl citrate (OTFC) for the relief of burn dressing change.
Materials and Methods: We conducted a retrospective descriptive study regarding 4 years of our experience with the use of OTFC. Data collected included patient and lesions characteristics, dosing, pain scores and side effects occurrence.
Results and Discussion: OTFC was used in a total of 83 patients. Lesions were mainly a combination of 2nd and 3rd degree residual burns, with an average of 14 days of evolution since admission. Doses of 400 to 1000 mcg were given with 71% of patients being prescribed with the 400 mcg dose. The pain levels prior and throughout the proceeding were recorded with less than 4% of patients having reported verbal pain scores of >3 and 98% of patients having <5 during the total duration of the procedure. Four patients were prescribed with supplemental analgesia, namely NSAIDs and paracetamol. With regard to side effects, there were no episodes of nausea, vomiting, pruritus or respiratory depression experienced. Comparison with data of other reports of OTFC use within this context is also presented.
Conclusion(s): OTFC is a useful therapeutic option for pain relief during burn dressing changes. Future studies should be conducted to define precise guidelines regarding its optimal dosage.

9AP9-4

Patient reported pain intensity and safety of the fentanyl iontophoretic transdermal system (ITS) versus intravenous patient-controlled analgesia (IV PCA) in postoperative pain management: results from a pooled analysis of four randomised, active-comparator trials

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Background and Goal of Study: This pooled analysis compared the effect on pain intensity and safety of the fentanyl iontophoretic transdermal system (ITS), a novel self-contained, needle-free patient controlled analgesia (PCA) system, versus morphine intravenous PCA (IV PCA) using data from four Phase 3 clinical trials.
Materials and Methods: Data from four randomised, active-controlled postoperative trials comprising 1,271 fentanyl ITS and 1,298 morphine IV PCA evaluable patients, was included in the analysis and evaluated. Patients reported pain intensity on a numerical rating scale (0-10) or a visual analogue scale (VAS, 0-100) at 24, 48, and 72-hour time points. The scales were anchored at “no pain” and “worst possible pain”. Pain scales were transformed to a 100-mm VAS. Safety was assessed via spontaneously reported treatment-emergent adverse events (TEAEs).
Results and Discussion: There was a statistically significant difference in patient-reported pain intensity that favoured patients treated with fentanyl ITS versus those treated with morphine IV PCA at 24 hours (Least Square Mean Difference (95% CI): -1.97 (-3.59, -0.34; p=0.02)). However, the difference was not statistically significant at 48 (p=0.19) or 72 (p=0.33) hours. There were similar numbers of patients in both groups who reported at least one TEAE (76.6% in the fentanyl ITS group and 73.4% in the morphine IV PCA group).
However, there were significantly more opioid-related TEAEs (opioid-related AEs were defined as: apnoea, confusional state, constipation dyspnoea, hypotension, hypoventilation, hypoxia, ileus, nausea pruritus, somnolence, tachycardia, urinary retention and vomiting) in the morphine IV PCA group versus the fentanyl ITS group (p=0.001).
Specifically, there was more hypotension (p=0.03), hypoventilation (p=0.03), pruritus (p=0.0002), and tachycardia (p=0.02) in the morphine IV PCA group

versus the fentanyl ITS group. There were no opioid-related AEs that occurred more frequently in the fentanyl ITS group.
Conclusions: Compared to morphine IV PCA, fentanyl ITS had statistically significantly fewer opioid-related adverse events and better pain intensity measurements at 24 hours.
Acknowledgement: This pooled analysis was supported financially by The Medicines Company.

9AP9-5

Intrathecal morphine use in laparotomy VS laparoscopic abdominopelvic surgery - a prospective analysis of post-operative analgesia and side effect profile

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Background and Goal of Study: Intrathecal morphine (ITM) provides analgesia for up to 24 hours post-operatively, however its safety is still debated[1]. Post-operative nausea and vomiting (PONV), pruritus, hypotension, and respiratory depression have all been reported, however it is hard to quantify the risks of these side effects due to the significant variations in dosing practices[2]. There is no information which patients' benefit from ITM use for post-operative analgesia.
This study compared the quality of analgesia provided by ITM and its side effect profile in laparotomy ("open") VS laparoscopic abdominopelvic surgery.
Materials and Methods: The study was conducted at Salford Royal NHS Hospital (Manchester, United Kingdom). We recorded patients' age, indication and type of surgery and ITM dose received (low [100-150μg] or high [200-400μg]). We recorded opioid requirement at 4, 12 and 24 hours post-operatively, the incidence of side effects and patient's subjective reports of the effectiveness of ITM.
Results and Discussion: 101 patients were included (laparoscopic = 71 [age = 66.6], laparotomy = 30 [age = 56.8]). ITM was morphine sparing at 24 hours in laparoscopic surgery patients compared to laparotomy (27.4mg VS 48.4mg, p=0.021). More laparoscopic surgery patients reported ITM to be good/excellent compared to laparotomy patients (92.8% VS 88.3%). Patients undergoing laparoscopic procedures for inflammatory bowel disease (IBD) required more post-operative opioids to maintain analgesia compared to other patients (p=0.023). The presence of PONV was lower in the laparoscopy group compared to laparotomy (62.0% VS 83.3%, p=0.045). Patients >70 years old who received higher ITM doses had a higher incidence of PONV (73.7% VS 46.5%, p=0.002), with similar opioid use at 24 hours (51.5mg VS 59.0mg, p=0.063). The incidence of other side effects was not different between groups, and there were no cases of respiratory depression identified.
Conclusion(s): ITM provides better post-operative analgesia and causes less PONV in laparoscopic surgical patients compared to those undergoing laparotomy. Patients undergoing procedures for IBD-related indications respond poorly to ITM. ITM should be therefore be restricted to use in laparoscopic surgery for non-IBD indications. Lower doses of ITM can provide adequate analgesia in the elderly while preventing PONV.
References:
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2. Hassett et al. BMC Anaesth 2009. 8:5

9AP9-6

Predictive performance of a new pharmacokinetic model of hydromorphone during postoperative pain therapy in cardiac patients

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Background and Goal of Study: Hydromorphone (HM) is an opioid analgesic used to relieve moderate-to-severe pain. In a previous study with HM in cardiac patients, we found a distinct overshoot with a median prediction error of 58% when using a pharmacokinetic model from the literature which had been developed in young volunteers. We therefore developed a new pharmacokinetic model for HM in patients including age and bodyweight as covariates[1]. In the present study we tested prospectively the predictive performance of this new model during postoperative pain therapy in cardiac patients.
Materials and Methods: After IRB approval and written informed consent we included patients scheduled for elective cardiac surgery. HM was administered postoperatively on the ICU as target controlled infusion (TCI) with the new pharmacokinetic model, targeting plasma concentrations between 0.8 and 10 ng/ml, and as patient controlled analgesia (PCA) with bolus doses of 0.2 mg. Arterial blood samples were drawn regularly during and after HM administration. The plasma concentrations of HM were measured by HPLC and tandem mass spectrometry (2). The prediction error was calculated from the measured concentration Cm and the predicted concentration Cp as PE(%)=100*(Cm-Cp)/Cp. The predictive performance of the model was assessed by MDPE=median(PE), MDAPE=median(|PE|), wobble=median(|PE-MDPE|) and divergence=slope of the linear regression of |PE| vs. time.
Results and Discussion: 573 plasma concentrations of 27 patients (age: 51 - 80 yrs, weight: 65 - 107 kg) were analyzed. The blood sampling period lasted 15.8 ± 4.4 h. The median values and interquartile ranges of the performance indices in the population were MDPE=11.5 (-4.6, 33.3) %, MDAPE=25.8 (17.5, 41.9) %, wobble=18.6 (13.2, 29.4) %, and divergence=-0.9 (-2.2, 0.1) %/h.
Conclusion(s): The new pharmacokinetic model of HM showed an acceptable precision in patients. It is therefore suitable for TCI with HM.
References:
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9AP9-7

Cytotoxicity of oxycodone and morphine in human neuroblastoma cells: comparative approach

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Background and Goal of Study: Oxycodone, a semi-synthetic μ-opioid receptor agonist, is the most commonly used opioid for the treatment of moderate to severe pain. The peak cerebrospinal fluid peak concentration after epidural oxycodone was reported 300-times greater than that when given intravenously after gynaecologic surgery (1). Additionally, those patients given epidural oxycodone needed less rescue pain medication and had fewer adverse effects compared to intravenous dosing. Oxycodone neurotoxicity requires evaluation before intrathecal implementation.
Materials and Methods: We used an *in vitro* cell culture model to compare the cytotoxicity of oxycodone with that of morphine and to study the mechanism underlying oxycodone toxicity. Human neuroblastoma cells (SH-SY5Y) were treated with increasing concentrations (2.5 - 2000 mM) of oxycodone or morphine and harvested at 24 or 48 h. Cell cultures were evaluated with an MTT-reduction assay; this is commonly used to determine cell viability (2).
Results and Discussion: Morphine decreased cell viability at a lower concentration than oxycodone. Morphine also increased the number of apoptotic cells compared to oxycodone when assessed by flow cytometry. Further, transmission electron microscopy images revealed that exposure to both opioids evoked the appearance of numerous electron dense, probable autophagy vacuoles in the cytoplasm of the cells.
Conclusions: Based on these in vitro results, it seems that oxycodone is less toxic than morphine in neuroblastoma cells.
References:
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9AP9-8

The effect of oxytocin infusion on neural blockade by bupivacaine in castrated male rats

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Background and Goal of Study: Oxytocin is often infused for labor induction or augmentation. When parturients are under labor epidural analgesia, the interaction between oxytocin and local anesthetics is concerned. Therefore, we tested the hypothesis that IV oxytocin modifies the duration and intense of neural blockade by bupivacaine. We used castrated male rats to eliminate the effect of sex hormone.
Materials and Methods: The study was approved by the Ethics Committee on Animal Research of our institute. In 24 male Wister rats, the right jugular vein was catheterized, then both testicles were removed under isoflurane anesthesia. The catheter was fixed on their backs, and rats were allowed to recover from anesthesia. On the next day, both sides of the ischiatic nerve were exteriorized under isoflurane anesthesia. A small paper disc soaked with bupivacaine 0.5mg was placed on the left ischiatic nerve, while saline-soaked disc was put on the left nerve. After disc placement, either oxytocin (1 U/ml) or saline was infused at 1ml/hr through the jugular vein catheter. Meanwhile the rat was recovered from anesthesia. A technician blinded to infused solution measured the threshold of thermal withdrawal response (TTWR) of both paws every 15min from 30min to 120min after nerve block with bupvacaine. The thresholds in two groups were compared using a repeated ANOVA. A $p<0.05$ was defined as statistically significance.
Results and Discussion: The values of % maximum possible effect (100%; complete blockade, 0%; full recovery) calculated from the TTWR were similar between two groups for 1 hr after nerve block with bupvacaine. However, The mean +/- SE value in the oxytocin group was significantly lower than that in the saline group at 75min (73 +/- 12% vs. 100 +/- 0 %). At 90min, the value in the oxytocin group was also significantly lower than that in the saline group (47 +/- 16% vs. 80 +/- 10 %). This suggests that the neural blockade with local anesthetic may be worn off early during oxytocin infusion for labor induction or augmentation. Our results are not consistent with the fact that oxytocin has a protective effect against hypersensitivity from peripheral nerve injury (1). The mechanism of the observation in this study remains determined by further experiments.
Conclusion: When a high dose of oxytocin was infused, the neural blockade with bupivacaine was worn off early.
Reference: 1. Gutierrez S, Liu B, Hayashida K, et al. Anesthesiology 2013; 118: 152-9.

9AP9-9

Clinical use of tapentadol extended-release and causes of treatment discontinuation on a therapeutic chronic pain unit (PU)

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Background and Goal of Study: Patients with moderate to severe chronic pain benefit with an opioid analgesic.Often opioids are associated with adverse effects that causes therapy discontinuation.Tapentadol is a centrally acting analgesic with a dual mechanism of action developed in attempt to decrease the intolerability issue associated with opioids.In Portugal it only become 'reimbursed' in March 2014.This study aims to analyze the adverse effects that cause treatment discontinuation and the use profile of tapentadol in our PU.
Materials and Methods: We retrospectively analyzed all patients in our PU treated with tapentadol from March 2014 until November 2014.Demographic data,type of pain,duration of treatment,maximum daily dosage of tapentadol and concomitant analgesics were collected.Treatment discontinuation or dose reduction and its causes were registered (Table 1).

	Gastrointestinal symptoms: Nausea/vomiting (n=6); Constipation (n=5); Diarrhea (n=2); Gastric discomfort (n=2)	Leak of analgesic effect	Dizzyness	Unknown	Legs Edema	Reduction of analgesic needs	Others
Abandon (n=26)	14	7	5	2	2	1	4
Dose reduction (n=5)	1	1		1		1	2
Total	15	8	5	3	2	2	6

[Table 1]

Patients without complete information were excluded.
Results and Discussion: We found 135 patients under tapentadol treatment for chronic pain.Eight patients were excluded remaining 127 patients(92 females and 35 males) with a median age of 63 years(minimum: 32 years; maximum: 91 years).Most of the patients(84.2%) were under tapentadol treatment for non-cancer chronic pain.Twenty-six patients(20.5%) discontinued the treatment and five(4%) had a daily dosage reduction (all these patients had concomitant analgesic drugs)(Table 2).

	Total (n=127)	Abandon (n=26)	Dose reduction (n=5)
Female	92	20	4
Male	35	6	1
Oncologic Chronic Pain	20	3	0
Non Oncologic Chronic Pain	107	23	5
Concomitant Analgesic Drugs	118	26	5
Tapentadol as ghe only Analgesic Drug	9	0	0

[Table 2]

Twenty-three of the patients that discontinued tapentadol(88.5%) were treated for non-cancer pain. Median time duration of the treatment before treatment discontinuation was 38 days(minimum: 1 day; maximum: 120 days).Most frequents reasons for treatment discontinuation were gastrointestinal intolerance (GII)(62.5%),leak of analgesic effect(30.8%) and dizziness(19.2%).
Conclusion: Tapentadol is used more frequently in non-cancer pain in our PU.GII was the most frequent adverse effect responsible for tapentadol treatment discontinuation.

9AP9-10

Comparison of oxycodone consumption between surgical pleth index-guided analgesia and conventional analgesia practice during sevoflurane anesthesia: a randomized controlled trial

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Background and Goal of Study: Monitoring of the nociceptive response to stressful stimulation and anti-nociceptive drug effect remain a challenge during general anesthesia. The surgical pleth index (SPI) derived from the photoplethysmographic waveform amplitude and heart beat interval is proposed to titrating analgesic drugs during anesthesia. There are reports on the effect of SPI on the consumption of opioids including remifentanil, fentanyl and sufentanil, but no report about its effect on oxycodone requirement. We hypothesized that SPI guidance can reduce intermittent intravenous oxycodone consumption during general anesthesia, and shorten extubation time in patients underwent thyroidectomy.
Materials and Methods: The study protocol was approved by the Institutional Review Board. Thirty patients who underwent thyroidectomy were randomized to have oxycodone bolus injection either adjusted according to SPI-guided or conventional analgesia practice (control). In both groups, anesthesia was maintained with sevoflurane to keep bispectral index value between 40 and 60. In the SPI group, oxycodone 1 mg was administered when SPI value was above 50, and patients in control group, were received oxycodone 1 mg by clinical parameters like hypertension or tachycardia. Intraoperative oxycodone consumption and extubation time were recorded. The number of hypertension, tachycardia and somatic response events, and postoperative pain and recovery score were also recorded. Statistical analysis was performed using SPSS version 12.0. Data were compared by t-test or Chi-square test, as appropriate.

Results: Patients' characteristics were comparable between the groups .The mean [standard deviation (SD)] oxycodone consumption in the SPI group [4.13 (2.23) mg] is significantly lower than control group [5.87 (2.29) mg] during general anesthesia (P=0.045). The mean (SD) time to extubation was significantly shortened in the SPI group, 10.5 (3.68) min vs 14.1 (5.28) min. The incidences of hypertension, tachycardia, hypotension, bradycardia and unwanted somatic response events were comparable between the groups. There were no differences between the groups with regard to numerical scale for pain and modified Aldrete score at post anesthesia care unit.
Conclusion: SPI-guided analgesia during sevoflurane anesthesia reduces the consumption of oxycodone and extubation time compared with conventional opioid administration by clinical parameters in patients undergoing thyroidectomy.

	SPI group (n=15)	Control group (n=15)	P-value
Intraoperative oxycodone consumption (mg)	4.13 (2.23)	5.87 (2.29)	0.045
End of surgery-extubation (min)	10.5 (3.68)	14.1 (5.28)	0.039
Intraoperative episodes			
Tachycardia	2.93 (3.06)	3.74 (2.82)	0.46
Hypertension	2.40 (2.32)	3.47 (2.80)	0.27
Somatic movement	0.07 (0.26)	0.33 (0.26)	0.35

Data are expressed as mean (standard deviation). Tachycardia: heart rate > 90 bpm or > 20% of baseline heart rate, if it is above 75 bpm. Hypertension: mean arterial pressure > 100 mmHg or > 20% of baseline mean arterial blood pressure, if it is above 83 mmHg. Somatic movement: coughing, grimacing and effort of breathing while mechanical ventilation was applied.

[Oxycodone dose, extubation time, intraop. events]

	SPI group (n=15)	Control group (n=15)	P-value
Gender (F/M)	12/3	11/4	0.50
Age (yr)	45 (39-51)	44 (40-49)	0.72
Height (cm)	160 (156-165)	161 (156-166)	0.79
Weight (kg)	60 (54-65)	61 (55-68)	0.70
ASA (I/II)	10/5	11/4	0.50
Surgery time (min)	74 (61-88)	74 (59-89)	0.96
Total anesthesia time (min)	92 (76-107)	93 (75-110)	0.90

Data are expressed as mean (95% CI) or absolute numbers.

[Patient characteristics and clinical data]

9AP9-11

Postoperative analgesia after total knee arthroplasty: single injection femoral nerve block combined with IV. continuous infusion of morphine and metamizole versus PCA-epidural

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Background and Goal of Study: The use of femoral nerve block (FNB) is accepted practice for analgesia after total knee arthrosplasty (there is increasing evidence that less invasive regional analgesic techniques are as effective as epidural analgesia). It has been demonstrated a limited duration of analgesia for single FNB. At present there is controversy about application of block simple or the use of peripheral nerve catheters. The FNB should be supplemented with opioides and other analgesic IV. within a strategy of multimodal analgesia, this would improve pain control.
The purpose of this study was to compare the analgesic efficacy of single-dose femoral nerve block combined with i.v. continuous infusion of morphine and metamizol versus PCA epidural after total knee arthropalsty. Secundary outcomes included side effects and adverse events.
Materials and Methods: Observational study of 40 elective primary unilateral total knee replacement operations, under spinal-epidural anesthesia. The safety and efficacy of the following 2 techniques were compared. Group I: a single-dose of 20 ml de bupivacaína al 0,5% for femoral nerve block (neurostimulation technique) combined with continuous infusion iv. using elastomeric pump with morphine, metamizol and ondansetrón, and group II with PCA-epidural(electronic pump) with bupivacaine 0,07% and fentanil 2ug/ml (Grupo II). The following variables were recorded at 24 and 48 hours postoperative: pain was assessed through verbal numeric rating scale, nausea y/o vomiting (PONV), sedation, pruritus, motor blockade**,** as well as need for rescue analgesia (morphine).
Results: Twenty two BNF+analgesics infusion iv. by infusor and eighteen epidurals were performed. At 24 hours pain score at rest was lower in group 1 than in group 2 (0.86 vs 1.25) without statistical significance. At 48h pain score was significantly lower in Group 2 (mean 1.18 vs 0.67) ($p<0.05$). Incidence of pruritus was higher in group 2 with significant difference ($p<0.05$), sedation, of nausea /vomiting, motor blockade, as well as need rescue analgesia (morphine) were similar for both groups.
Conclusion(s): Both methods provide efficient postoperative analgesia. However, epidural-PCA analgesia provides better postoperative analgesia on the second day after surgery. The frequency of pruritus was significantly higher in the epidural-PCA group.
Reference: Fowler SJ[1], and col..Br J Anaesth. 2008 Feb;100(2):154-64.

9AP10-2

Effect of intraperitoneal administered Rubus coreanus on hyperalgesia induced by repeated intramuscular injection of acidic saline in rats

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Background and Goal of Study: Rubus coreanus (RC), Korean black raspberry, is known to be associated with medicinal properties through various investigations. Many studies reported RC had a higher antioxidant and anti-inflammatory potential, which can suggest analgesic property of RC. Therefore, we hypothesize that RC would have a beneficial effect for pain management. The aim of this study was to assess the antinociceptive activity of RC on hyperalgesia induced by repeated intramuscular injections of acidic saline in rats and to examine the mechanisms involved.
Materials and Methods: Chronic pain model was made by injecting pH 4.0 acidic solution 100 μl at right gastrocnemius muscle 48 hours apart.[1] For first experiment, 60 rats were randomly assigned to 5 groups. Rats were injected intraperitoneally with a 0.9% saline vehicle (control group) or various doses of RC (10, 30, 100, and 300 mg/kg). For second experiment, 84 rats randomly assigned to 7 groups. Rats were injected intraperitoneally with 300mg/kg of RC, and, after 10 min, yohimbine, dexmedetomidine, prazosin, naloxone, atropine, and mecamylamine were injected intraperitoneally. For both experiments, the mechanical withdrawal threshold (MWT) was assessed with von Frey filaments at both sides.
Results and Discussion: The MWT was significantly increased after intraperitoneal injection of 300 mg/kg of RC when compared with the MWT after the development of hyperalgesia. Injection of RC with yohimbine and mecamylamine showed a significant decrease in the MWT when compared with RC injection, while dexmedetomidine showed a significant increase in the MWT. RC had an analgesic effect. RC may be mediated by alpha-2 adrenergic receptor and nicotinic cholinergic receptor.
Conclusion: RC showed an antinociceptive activity against chronic muscle-induced pain in rats.
Reference: 1. Sluka KA, Kalra A, and Moore SA. Unilateral intramuscular injections of acidic saline produce a bilateral, long-lasting hyperalgesia. Muscle Nerve 2001; 24: 37-46.

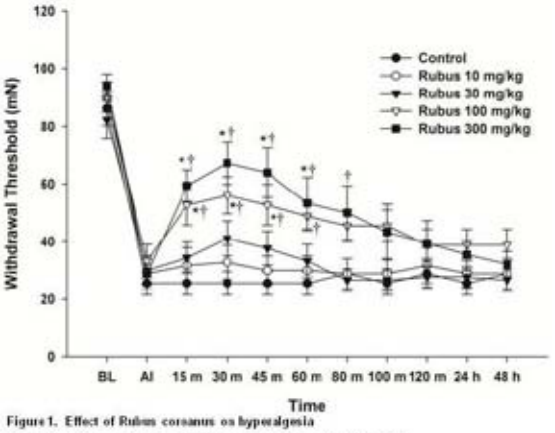

Figure 1. Effect of Rubus coreanus on hyperalgesia
BL: before the first injection, Al: 24 hours after the second injection.
*P < 0.05 compared with Al, † P < 0.05 compared with control group.

[Figure 1. Effect of Rubus coreanus on hyperalgesia]

9AP10-3

Effect of lidocaine loaded poloxamer-alginate-$CaCl_2$ mixture in a rat model of incisional pain

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Background: Although postoperative pain and adhesion are problematic issue, there is no clear strategy yet. A frequently used local anesthetic, lidocaine, has analgesic, anti-hyperalgesic, and anti-inflammatory properties. A poloxamer-alginate-$CaCl_2$ mixture (PACM), as an effective anti-adhesive agent, has been proved its preventive effect of postoperative adhesion. Given the various actions of lidocaine, we considered it of interest to combine PACM and lidocaine suggesting beneficial effects on postoperative pain and adhesion. The aim of this study is to identify the effect of lidocaine loaded PACM in a rat model of incisional pain.
Materials and Methods: Ninety rats were evenly allocated in 6 groups: sham group S; control group C; lidocaine loaded PACM group L0.5, L1, L2, and L4. After plantar incision and adhesion formation[1], PACM in group C and 0.5%, 1%, 2%, and 4% lidocaine loaded PACMs in group L0.5, L1, L2, and L4 were applied at incision site. Mechanical withdrawal threshold (MWT) of the hindpaw was measured by von Frey filament: before surgery; 1, 2, 4, 6, 8, 24, 48 hours, and 2 weeks after surgery. Serum IL-1β and IL-6 levels were measured 1, 2, and 48 hours after surgery. Two weeks after surgery, rats were sacrificed and inflammation and fibrosis were assessed under microscopic evaluation.
Results: MWT was significantly increased in group L4 compared with group S at 1, 2, 4, 6, and 8 hours after surgery; compared with group C at 1, 2, 4, and 6 hours after surgery. Both inflammation and fibrosis showed significant reductions in group L2 and group L4 compared with group S. Serum level of IL-1β in group L0.5, L1, L2, and L4 was significantly attenuated compared with group C at 2 hours after surgery. Serum level of IL-6 was significantly blunted in group L1, 2, and 4 compared with group C at 48 hours after surgery.
Conclusions: Lidocaine loaded PACM reduces postoperative pain, inflammation, and adhesion in a rat model of incisional pain, which can present the possibility of clinical application to control both pain and adhesion after surgery.
Reference: 1. Brennan TJ et al. Characterization of a rat model of incisional pain. Pain 1996; 64: 493-50.

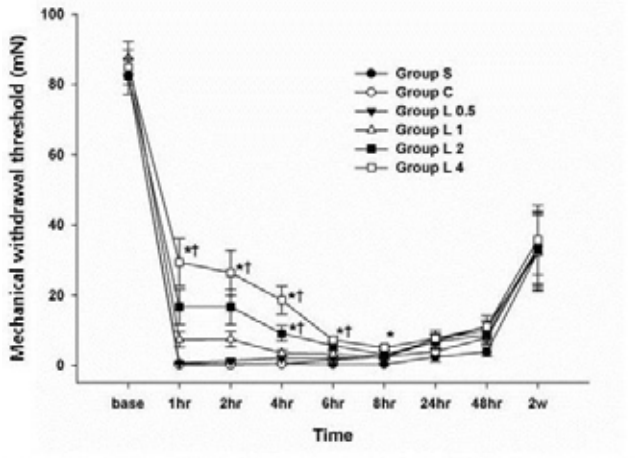

Figure 1. Pain behavioral test by measurement of mechanical withdrawal threshold
Data are presented as mean ± standard error of the mean.
*P < 0.05 compared with Group S. †P < 0.05 compared with Group C.
‡P < 0.05 compared with Group L0.5.

[Figure 1. Pain behavioral test by measurement of MWT]

9AP10-4

Intraneuronal Ca2+ stores after peripheral nerve injury: findings in the adjacent uninjured neurons

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Background: Neuropathic pain occurs at a variable frequency following damage to peripheral nerves. Distinct changes in cytoplasmic handling of the second messenger Ca2+ have been observed in animal models in injured primary sensory neurons after painful nerve injury, but it remains unclear if neuropathic pain originates from the axotomized or adjacent intact neurons, whose cytosolic Ca2+ store alterations after nerve injury were investigated herein.
Methods: Male Sprague-Dawley rats underwent spinal nerve ligation (SNL), where the fifth (L5) and sixth lumbar spinal nerve are ligated and cut, whereas L4 is left intact. Control rats received only anesthesia and skin incision. After surgery, rats were tested for hyperalgesic behavior by stimulation of the ipsilateral hindpaw with a 22G needle. Animals with ≥20% hyperalgesia-type behavioral responses were considered hyperalgesic while non-hyperalgesic animals had a rate of ≤5%. On post-operative day 21-28, the rats were sacrificed, and the dorsal root ganglion (DRG) neurons were plated on cover slips. Cytoplasmic Ca2+ alterations after caffeine, ionomycin and thapsigargin were imaged with Fura-2, whereas mag-Fura-2 was used to asses intraluminal [Ca2+] within the endoplasmic reticulum (ER). Only intact L4 neurons were considered for this abstract.
Results: After SNL, resting Ca2+ levels were reduced in animals displaying hyperalgesic behavior (94±9nM; n=113; p=0.003), but not in non-hyperalgesic animals (117±19nM, n=25) as compared to the control group (145±10nM, n=64). Complete release of Ca2+ stores with high-dose caffeine revealed diminished transients in hyperalgesic animals, but not in non-hyperalgesic animals. Application of ionomycin and thapsigargin did not show any significant alterations. Ca2+ concentrations measured directly within the ER were also not different in both hyperalgesic (127±11nM, n=27) and non-hyperalgesic (151±20nM, n=18) animals as compared to control neurons (167±18nM, n=33).
Discussion: Axons of L4 neurons undergo Wallerian degeneration with the axotomized L5 neuron axons, and the L4 DRG lies close to the site of injury, both of which may result in a contribution to the generation of neuropathic pain. The lower resting Ca2+ concentration and the diminished maximum releasable Ca2+ by caffeine support the notion of a hyperexcitable L4 neuron as a pathogenetic factor. However, Ca2+ store handling does not seem to be uniformly affected, as other experiments revealed no difference.

9AP10-5

OATP1A2 is involved in cellular morphine uptake in vitro

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Background and Aim: Opioids like morphine are highly potent drugs for pain treatment but have a narrow therapeutic index and a high inter-individual variability. This results in a high risk of adverse reactions due to genetic variability or drug interactions. Parameters of opioid variability determined so far (e.g. the μ-receptor OPRM1, the glucuronosyltransferase UGT2B7 and the efflux transporter P-glycoprotein) can only explain a portion of this phenomenon. Uptake transporters enable absorption of drugs from the gut and distribution to effect and elimination sites, thus preceding any other step of pharmacokinetics. Organic anion transporting polypeptide OATP1A2, an uptake transporter variably expressed at the blood-brain barrier, might as well contribute to the variability of morphine effects. However, evidence for morphine transport by OATP1A2 is lacking. Therefore, we investigated if cellular uptake of morphine is enhanced by OATP1A2 in a cell model.
Methods: Human embryonic kidney cells stably over-expressing OATP1A2 were incubated with radiolabeled morphine. Cellular morphine uptake was measured by liquid scintillation counting after cell lysis. Enhancement of morphine uptake by OATP1A2 vs. control cells was confirmed in a preliminary screening. Detailed characterization of morphine transport consisted of time-dependent (10 s - 30 min; 10 nM morphine) and concentration-dependent (0.3 nM - 1 mM morphine; 1 min) uptake experiments. Furthermore, inhibi-

tion of morphine uptake by the established OATP1A2 inhibitor naringin was investigated.
Results and Discussion: Morphine uptake into OATP1A2 cells was 1.5 times higher vs. control. Time-dependent uptake was linear for up to 2 min before slowly reaching saturation. Concentration-dependent uptake showed only slight saturation at very high concentrations indicating Michaelis-Menten kinetics. However, reliable K_m and V_{max} values could not be determined due to the low affinity and limited solubility of morphine. Nonetheless, naringin was able to inhibit morphine uptake (IC_{50} = 1.6 μM). Thus, morphine uptake was OATP1A2-dependent in our study.
Conclusions: Morphine was a substrate of OATP1A2 in our cell model. Therefore, OATP1A2 might be involved in morphine brain uptake and contribute to the variability of morphine effects. However, further experiments are necessary to assess the influence of OATP1A2 genetic variants on morphine uptake. Moreover, these findings have to be confirmed in clinical trials.

9AP10-6

Role of spinal dopamine receptors in a rat model of trigeminal neuropathic pain

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Background and Goal of Study: The spinal dopaminergic transmission has been recognized to be important in the process of pain modulation. But, the actions of descending dopaminergic control on spine are not well defined. The involvement of spinal dopamine D1, D2, and D4 receptors in trigeminal neuropathic pain has been poorly investigated. Chronic constriction injury to the infraorbital nerve (ION-CCI) has proven a useful model for trigeminal neuropathic pain. The present study evaluated the possible role of spinal dopamine D1, D2, and D4 receptors in ION-CCI rat model.
Materials and Methods: Male Sprague Dawley rats underwent unilateral CCI to the right ION. Two nylon (5-0) ligatures were tied around the ION. Series of von Frey filaments were used to determine pain hypersensitivity to mechanical stimulation on day 14 after surgery. A polyethylene (PE-10) catheter was implanted for upper cervical spinal injection of drugs. The rats were allowed to recover for 7 days. The time course of the antiallodynic effects and the dose-response effects of intrathecally administered a dopamine D1 receptor agonist SKF38393, a dopamine D1 receptor antagonist SCH23390, a dopamine D2 receptor agonist Sumanirole, a dopamine D2 receptor antagonist L-741626, a dopamine D4 receptor agonist A412997, and a dopamine D4 receptor antagonist L-745870 were examined. The time course data for the dose-response effects were analyzed by two-way analysis of variance and Tukey-Kramer multiple-comparison test.
Results and Discussion: Intrathecal administration of SCH23390, L-741626, and L-745870 increased mechanical thresholds in a dose dependent manner (P<0.05) (figure 1). Intrathecal administration of SKF38393, Sumanirole, and A412997 did not alter mechanical thresholds.
Conclusion: The results indicated that spinal dopamine D1, D2, and D4 receptors may play an important role in a rat model of trigeminal neuropathic pain.

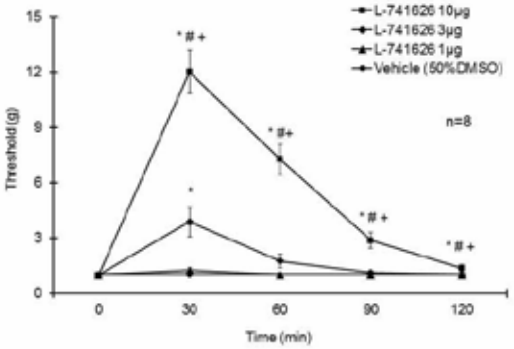

Figure 1 Intrathecal administration of L-741626 (dopamine D2 receptor antagonist) produced dose-dependent antiallodynic effects (n=8)
* P < 0.05 compared with vehicle (50%DMSO) group.
# P < 0.05 compared with 1 µg-treated group.
+ P < 0.05 compared with 3 µg-treated group.

[Figure 1]

9AP10-7

Systemic hypersensitivity to pain in a rat model of oro-facial neuropathic pain. Similarity to human pain chornicity

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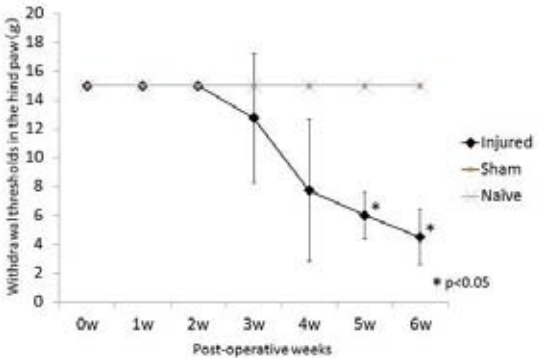
Background and Goal of Study: Chronic pain is very difficult to treat because the mechanisms are unclear and we have a limited strategy to develop the new analgesics. Brain is considered to be an important role in pain chronicity. And recently substantial evidences indicated that brain abnormality affected perception of pain in human.
Pain perception is basically different from person to person. However, generally patients with chronic pain exhibit higher sensitivity to noxious stimuli than healthy volunteers.
The goal of this study is to confirm the sensitivity to noxious stimuli in non-nerve injured sites of the nerve-injured pain model to reveal that rats' model of orofacial neuropathic pain would be useful for evaluating the systemic hypersensitivity induced by the brain abnormality after the long-lasting painful stimulation.
Materials and Methods: After the approval of the animal committee of Osaka University graduate School of Medicine, 20 SD rats were used for the study. We used infra-orbital nerve loose ligation model as an oro-facial neuropathic pain model. We evaluated the pain-related behaviour using von Frey Filaments every week until six weeks after surgery. The time course data were analyzed by two-way analysis of variance and Tukey-Kramer multiple-comparison test using SPSS10.01 software.
Results and Discussion: In nerve injured area, 2 weeks after surgery, injured animal expressed pain-related behavior and prolonged until 6 weeks after surgery (P< 0.05). Moreover, from 5 weeks after surgery, nerve-injured animals significantly decreased the withdrawal threshold in their hind paw, intact area of nerve injury (p<0.05).



[Figure. Withdrawal thresholds in the hind paw of oro-facial neuropathic pain model]

Conclusion(s): The sensitivity to noxious stimuli has changed not only in nerve injured area but also in their hind paw in oro-facial neuropathic pain model. This phenomenon is similar to those of patients with chronic pain whose sensitivity to pain is changed systemically. This model is useful to evaluate the systemic hypersensitivity in animals.

9AP10-8

The effect of analgesics on metastasis in experimental cancer models: a systematic review and meta-analysis of literature

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Background and Goal of Study: Pain in cancer patients is common and various classes of analgesics are used to control it. It has been stated that certain analgesics can reduce the risk of cancer metastasis (NSAIDs) and others increase that risk (opioids), but the evidence is not clear[1,2,3]. Clarification is necessary since the mortality rate of cancer primarily depends on recurrence and metastasis. Therefore, we conducted a systematic review and meta-analysis

on original articles concerning the effects of analgesic treatment on metastasis in experimental cancer.
Materials and Methods: Four search components were used in PubMed and Embase: “analgesics”, “anaesthetics”, “metastasis” and “animals”. We included a total of 147 studies where we extracted study characteristics and outcome data on the number and incidence of metastases. The methodological quality and bias within each study was assessed using the SYRCLE Risk of Bias tool. In the meta-analysis, we included 353 comparisons between analgesic versus control treatment, 216 (± 4000 animals) on the number of and 137 (± 3000 animals) on the incidence of metastases.
Results and Discussion: The studies included in our analysis predominantly involved NSAIDs or opioids. Overall, we found that treatment with analgesics significantly decreased the number and risk of metastasis. NSAIDs proved to be the most potent inhibitors, whereas opioids do not appear to be effective. We also noted methodological factors that influence efficacy, such as species, type of NSAIDs administered, timing and duration of the treatment.
Conclusion(s): We found a positive correlation between NSAIDs and reduced number and incidence of metastases in experimental cancer models. Opioids neither increased nor reduced the risk of number of metastasis. It is possible that the effect of NSAIDs is primarily a result of reduced inflammation via COX inhibition. Furthermore, our findings appear to be robust irrespective of the varied animal models and designs included in this review.
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1. Buggy DJ, et al. Consensus statement from the BJA Workshop on Cancer and Anaesthesia. Br J Anaesth 2014
2. Benish M, et al. Perioperative use of beta-blockers and COX-2 inhibitors may improve immune competence and reduce the risk of tumor metastasis. Ann Surg Oncol 2008; 15: 2042-52
3. Fujioka N, et al. Morphine-induced epidermal growth factor pathway activation in non-small cell lung cancer. Anesth Analg 2011; 113: 1353-64

9AP10-9

Somatosensory and transcriptomic profiles in patients with myotonic dystrophy type 2 and myalgia

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Background and Goal of Study: Myotonic dystrophy type 2 (MD2) is an autosomal dominant multisystem disease commonly characterized by progressive weakness, myotonia, and muscle pain. A nationwide study revealed that chronic muscle pain has significant negative impact on the overall health of affected individuals.The genetic mutation is CCTG expansion repeat of the cellular nucleic acid-binding protein which disrupts the splicing of many downstream effector genes. This splicopathy might explain the pathogenic mechanisms that underlie and contribute to the development of chronic muscle pain. The goal of this cross-sectional study is to characterize the pain phenotype and genetic changes in the muscle tissue of patients with MD2.
Materials and Methods: The study population is a german cohort of 30 genetically confirmed MD2 patients (13 males and 17 females) and 14 healthy subjects. We utilized the quantitative sensory testing (QST) protocol of the German Research Network on Neuropathic Pain to generate comprehensive somatosensory profiles. Pain was also assessed by a standardized pain questionnaire of the German society of Pain and the McGill Pain Questionnaire. The tests were conducted in a blinded manner on 3 areas: dorsum of hand (pain-free area), shoulder, and thigh region (commonly affected areas). The pressure pain thresholds were obtained for 8 sites: extensor digitorum communis, deltoid, anterior tibialis and quadriceps muscles on the left and right sides. We performed RNA sequencing analysis (IPA® and GOrilla) of 12 skeletal muscle biopsy specimens from MD2 patients (6 patients with and 6 without myalgia).
Results and Discussion: We found significant decrease in pressure pain thresholds in patients with myalgia compared to pain-free MD2 and healthy subjects ($p=0.0033$, ANOVA). Moreover, patients with myalgia had a significant decrease in pain thresholds for cold ($p=0.002$, ANOVA), and heat ($p=0.034$, ANOVA) compared to pain-free MD2 and healthy subjects. RNA sequencing of muscle biopsies revealed 73 differentially expressed genes in MD2 patients based on the presence or absence of muscle pain.
Conclusion(s): We found mainly distinct somatosensory profiles in MD2 patients with myalgia. Our transcriptomic analysis indicates that MD2 related myalgias are primarily of muscular origin. The results may also help to understand other more common reasons for muscle pain such as fibromyalgia.

9AP10-10

The expression and analgesic effect of microRNA 23b for neuropathic pain induced by spinal nerve ligation

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Background and Goal of Study: MicroRNAs (miRNAs) are small noncoding transcripts that can control expression of protein-coding mRNAs at the posttranscriptional level and play an important role in regulating synaptic plasticity. Significant up-regulation of miRNA-23b in spinal cord was noted in our microarray miRNA profiling in neuropathic pain. We hypothesized the up-regulation of mir-23b plays a role in the treatment of neuropathic pain. In this study, we examined the antinociception produced by regulation of mir-23b in spinal cord for neuropathic pain.
Materials and Methods: Spinal nerve ligation (SNL), a model of neuropathic pain, was performed to induce neuropathic pain. In treatment group, 4 nmole mir-23b mimic were administered 3 days after SNL (n=6 each group). Four nmole locked nucleic acid (LNA) -mir-23b inhibitor was injected intrathecally in naïve rat (n=6 each group). Behavioral tests were performed 1 day after injection of LNA-mir-23b inhibitor or mir-23b mimic. Rats received SNL only and naive rats were assigned to be control groups. The spinal cord was dissected for analysis of mir-23b after behavioral test.
Results and Discussion: Significant increase of mir-23b was noted in spinal cord of rats received SNL only. Intrathecal injection of 4 nmole mir-23b mimic could diminish SNL-induced allodynia and thermal hyperalgesia. Contrastly, injection of LNA-mir-23b inhibitor inhibited the expression of mir-23b and induced mechanical allodynia in naïve rats.
Conclusions: SNL induces up-regulation of mir-23b in spinal cord. Inhibition of mir-23b produces hyperalgesic effect. Intrathecal administration of mir-23b mimic produces antinociceptive effect for neuropathic pain.
Acknowledgements: This work was supported by National Science Council Grant MOST103-2314-B-214-003-MY3, NSC 103-2321-B-214-001-, and E-Da Hospital Grant EDRJ 103054, 103055, Taiwan.

9AP10-12

Pulsed radiofrequency attenuates complete Freund’s adjuvant-induced epigenetic suppression of potassium-chloride co-transporter 2 expression

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Background and Goal of Study: Pulsed radiofrequency (PRF) treatment offers pain relief for patients suffering from chronic pain who do not respond well to conventional treatments. We tested whether PRF treatment attenuated complete Freund’s adjuvant (CFA) induced inflammatory pain. The profile of spinal epigenetic modification of Slc12a5 (encoding Potassium-chloride co-transporter 2 (KCC2)) was evaluated to elucidate the potential mechanism.
Materials and Methods: Male Sprague-Dawley rats were injected with CFA into the plantar surface of the left hindpaw to induce inflammation. PRF (20 ms of 500-kHz RF pulses, delivered at a rate of 2 Hz; maximum temperature 42 degrees C) was delivered to the L4 anterior primary ramus just distal to the intervertebral foramen of adult CFA or saline rats. The hind paw withdrawal threshold to von Frey filament stimuli and withdrawal latency to radiant heat were determined before and after CFA. Acetyl-histone H3 and H4 was determined by chromatin immunoprecipitation in spinal dorsal horn from CFA rats. KCC2 expression was determined by Western blot and real time RT-PCR. GABA synaptic function was evaluated by patch clamp in lamina II neurons.
Results and Discussion: Slc12a5 transcription was suppressed through histone deacetylase (HDAC)-mediated histone hypoacetylation, resulting in decreased efficacy of GABAergic signaling in CFA rats. PRF increased histone acetylation and KCC2 expression; partially restored the GABA synaptic function and relieved sensitized pain behavior.
Conclusion: These findings suggest PRF might be an alternative therapy for inflammatory pain. One of the underlying mechanism is through KCC2, which is an important determinant for the efficacy of inhibitory neurotransmission in the spinal cord and its expression levels is regulated by histone acetylation epigenetically following inflammation.
Acknowledgements: This work was supported by NSC research grant 102-2314- B-182-029

9AP11-4

Physical exercise therapy for chronic low back pain treatment: a case report

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Background: Chronic low back pain(CLBP) is a large and costly problem in primary care, with a lifetime prevalence of 80%. It results in high levels of healthcare cost, being a major cause for long term sickness amongst the workforce.(1)Therapeutic options include analgesic drugs and exercise prescription.(2)
Case report: We report the case of a 44-years male, overweight (BMI 29kg/m2) and with hypertension that consulted his family physician complaining of CLBP. Lumbar CT revealed vertebral degenerative changes but no disc herniation or nerve impairment. Several analgesics, in association with other drugs, in multiple therapeutic schemes had been tried without success. At the moment he wasn't taking any medication. We assessed patients' disability using the Portuguese version of Roland Morris disability questionnaire(RMDQ), and obtained a score of 18 out of 24. Patient clearly stated that wasn't willing to start any other medication and, not having a surgical indication, a lifestyle change and exercise program was suggested, according to the American Academy of Orthopedic Surgeons recommendations. One individually designed exercise program was prescribed, which included 3-5 weekly sessions of brisk walk in regular ground for 30-45 minutes and 3 weekly sessions(30 min) of resistance training. Four weeks later our patient claimed to be significantly better. He resumed all previous activity and still wasn't taking any medication. He managed to complete the prescribed program and was currently performing 3 weekly brisk walking sessions an 3 weekly resistance training sessions. In 4 weeks, our patient lost 1,5kg and RMDQ score was now of 6 out of 24. After 12 weeks he remained asymptomatic.
Discussion: In the reported case, CLBP was managed without the use of any drugs. The RMDQ scores prior and after the intervention, as well as the weight drop and the patient feedback confirmed the success of our approach in this case. Physical exercise, when prescribed respecting individual interests and abilities, might reduce or even eliminate the need for drugs, leading to the decreased symptoms and increasing CLBP patients' quality of life.
References:
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Learning Points: Physical exercise may be helpful for CLBP patients, reducing symptoms and increasing the return to normal daily activities and work. When possible, exercise programs should be considered a first line approach.

9AP11-7

Setting up of a chain of care for chronic pain in patients with diabetes mellitus, using sciatic perineural catheters for long-term analgesia: feasibility and evaluation of the effectiveness

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Goal of Study: Diabetic mellitus patients have chronic neuropathic pain, which is often resistant to systemic analgesics and significantly impact the quality of life [1]. The aim of our study is to
1) evaluate the feasibility of an alternative analgesia technique that consists of a long-term sciatic perineural catheter placement in medical unit of diabetology and then
2) evaluate the effectiveness of the technique.
Methods: A prospective, monocentric, non-randomized study was conducted over two years. The feasibility study was conducted in the first year and its effectiveness was evaluated in the second year. The medical and paramedical staff of the Department of Diabetology has been trained in regional analgesia techniques. All diabetic patients in the optimized systemic treatment failure were consecutively included. Written consent was obtained from all patients. Popliteal-sciatic nerve catheters were inserted under ultrasound guidance. Ropivacaïne was started (2 $mg.mL^{-1}$). The primary endpoint was pain evaluated at 48 hours. Pain intensity was measured by a score on a 0 - 10 numeric rating scale (NRS). Secondary endpoints were mean pain, the relief of patients, the impact on quality of life and morphine consumption. All the criteria were evaluated at day 0, day 2, catheter ablation and one month after the ablation.
Results: Feasibility was evaluated during one year. 52 perineural catheters were placed in 37 patients, with a median duration of catheter days per patient of 13 [5-23] days. No systemic toxic or infectious complications occurred. Effectiveness was evaluated in the second year. 17 catheters were placed in 12 patients. 83% of patients had NRS ≤ 3 at 48^{th} hours. As the catheter was in place and one moth after the ablation, the relief of patients was $\geq 70\%$. Mean pain, the relief of patients and the impact on quality of life were significantly lower ($p < 0,05$). Morphine consumption decreased on day 2, ablation catheter and one month after its ablation too ($p < 0,05$).
Conclusion: The use of sciatic perineural catheters for analgesia of chronic painful diabetic patients in systemic treatment failure was possible and effective within an extra surgical environment. The analgesic management and the quality of life were optimized and even extended after stopping local anesthetics.
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1. Davies M et al. The prevalence, severity, and impact of painful diabetic peripheral neuropathy in type 2 diabetes. Diabetes Care 2006;29:1518-22.

9AP11-8

Thalamic pain secondary to cerebral toxoplasmosis on AIDS patient

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Background: Pain in HIV/AIDS patients may have diverse mechanisms. Nearly half of the pain is neuropathic, reflecting injury from viral infection, opportunistic agents or neurotoxic drug effects[1]. Pain treatment is complex particularly in the setting of antiretroviral therapy.
We report the case of an AIDS patient with thalamic pain, followed in a Chronic Pain Unit (CPU) for 11yrs.
Case report: 55 year-old man with AIDS (CDC-C3), TB and Cerebral Toxoplasmosis, sent to CPU with thalamic pain (2002). He complained of severe pain (VAS 8) in the right hemobody with numbness, altered thermal sensivity, electric discharge, hemiplegia, pressuring sensation in the head. Current medication: lopinavir/ritonavir, lamivudine and stavudine, pyrimethamine, sulfadiazine, folinic acid. CE-TC:"3 hypodense rounded lesions in left hemisphere: one thalamic and 2 in parieto-temporal cortex". Initial prescription was: Gabapentin 400mg id (titration to 1600mg/day), Amitriptylin 25mg (titration to 50mg/day), Tramadol 50mg 3id. One year later hyperalgesia and facial dysesthesias lead to scheme modification: Tramadol(ER) 200mg 2id, Gabapentin 2400mg/day, Amitriptyline 75mg/day; pain was controlled for 2yrs. Patient developed facial dynamic allodynia, foreign body sensation in the eye and spasticity; the last led to Baclofen prescription. Gabapentin was progressively reduced due to renal lesion. Pain control was achieved for 1yr. Then, reactivation of toxoplasmosis and intolerance to amtriptyline occurred; buprenorphine 35μ/h TD and venlafaxine 75mg were started. Buprenorphine was rapidily withdrawn due to interactions. In the following 6yrs pain was controlled (VAS 2-3); drug adjustments required to renal function. Patient died in 2014.
Discussion: Chronic pain on HIV-infected individuals can be severe and disabling. Treatment can be difficult as multiple mechanisms are involved. Antiretroviral therapy poses the risk of pharmacological interactions and drug toxicity. We emphasize ritonavir inhibition of CYP3A4 and 2D6, increasing plasmatic concentrations and toxicity of drugs metabolized by the same way (fentanyl, oxycodone, buprenorphine, tramadol). This drugs were avoided or used cautiously. Attention was focused on adjustment on drugs with renal clearance. Patient motivation was also crucial.
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Learning points: Pain treatment improves life quality in AIDS patients. Attention must be paid to drug interactions and toxicity.

9AP11-11

Usefulness of preoperative thoracic paravertebral block in postoperative pain management after renal resection surgery

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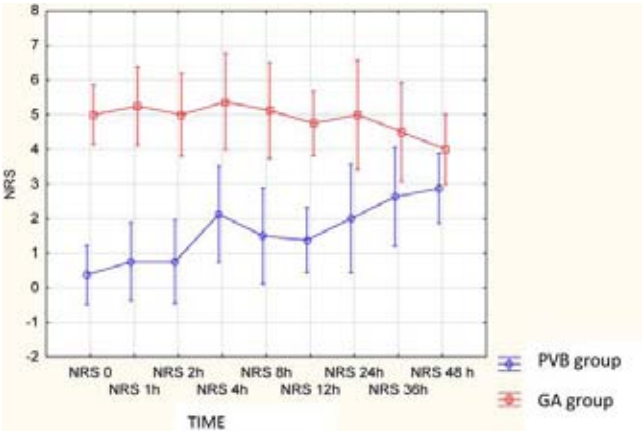
Background and Goal: Thoracic paravertebral block (ThPVB) is commonly used in thoracic surgery. It provides effective analgesia, reduces autonomic surgical stress response, incidence of chronic postoperative pain, PONV and shortens hospitalisation compared to solely used general anaesthesia. The goal of this study was to assess the usefulness of ThPVB in postoperative pain management after renal resection surgery.
Materials and Methods: 16 patients ASA I-III scheduled for elective partial or complete renal resection were randomly assigned to 2 groups. PVB group received preoperative ThPVB and general anaesthesia. GA group received standard general anaesthesia. Both groups were treated postoperatively with oxycodone IV PCA combined with 1g i.v. paracetamol every 6 hours, and 50 mg i.v. ketoprofen as a rescue drug. We recorded pain severity in NRS, oxycodone consumption at time points and total, incidence of PONV, hypotonia, bradycardia and level of sedation in Ramsay scale through the first 48h. We measured patients satisfaction and overall benefit of analgesic score in OBAS and Likert scale 24h and 48h after the surgery. Demographic data was analysed with one way ANOVA with post-hoc Tukey test. To determine differences between the groups and establish a correlation between the repetitive measurements we used multivariate repeated measures ANOVA with Bonferroni correction where necessary. Results are presented as mean and standard deviation for the demographic data and 95% confidence intervals for repetitive measurements.



[NRS in group PVB and GA]

Results: Patients demographic data were similar between the groups. There was statistically significant difference in total oxycodone consumption between the groups in favour of PVB group 48 h after the surgery (PVB group - 67±27 mg vs GA group - 133±28 mg; p<0,0002). There was a significant difference in NRS between the groups (Graph).
Conclusion: In our study preoperative ThPVB was an effective analgesic technique in reducing opioid consumption after renal resection surgery. Methods and drugs used in postoperative pain management in both groups were safe but it is necessary to confirm the results on a larger study population.

9AP11-12

Glutamate receptor (GRIK1) gene influences risk of chronic postsurgical pain

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Background and Goal of Study: Glutamate is a major excitatory neurotransmitter that contributes to the development of pain hypersensitivity. In this study, we tested the association between single nucleotide polymorphisms (SNP) of glutamate receptor ionotropic kainite 1 (GRIK1) gene and chronic postsurgical pain in a large cohort of surgical patients.
Materials and Methods: The study was approved by the Clinical Research Ethics Committee. Written informed consent was obtained from 1,152 consecutive adult patients having a wide range of surgical procedures. At 12 months after surgery, patients were asked to rate the intensity and characteristics of pain over the surgical site using the modified brief pain inventory (mBPI) and neuropathic pain questionnaire. Genomic DNA was extracted from blood samples collected before surgery.
We genotyped all known (n=48) SNPs in the GRIK1 gene with minor allele frequency >5% in the Chinese Han population. Data were analyzed by using PLINK1.07 software. Multivariate logistic regression was used to analyze the association between GRIK1 SNPs and chronic postsurgical pain.
Results and Discussion: At 12 months, 246 patients (21.3%) reported chronic postsurgical pain. Among these patients, 58 (5.0%) had severe pain with mBPI score >5 (out of 10). Ten SNPs (*rs2253443, rs2832392, rs1011794, rs459249, rs2300306, rs363426, rs2300318, rs3787671, rs2254136, rs2255985*) were significantly associated with chronic postsurgical pain (p values <0.02). Following Bonferroni correction and adjusted for age, gender, education level, prior pain, and smoking habits, the minor allele (AA) of SNP *rs2253443* increased the risk of chronic postsurgical pain [adjusted odds ratio (95% confidence intervals, CI): 2.33; 1.19-4.56, p=0.013].
Conclusion(s): Preoperative identification of genetic variations in GRIK1 gene may facilitate prediction of patients at risk of chronic postsurgical pain. Further functional analysis of the SNP is required to define the mechanisms contributing to chronic pain after surgery.

Intensive Care Medicine

10AP1-3

The roles of the ACE inhibitor captopril on inflammatory response in septic human neutrophil and mortality in endotoxemic mice

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Background and Goal of Study: Angiotensin - converting enzyme (ACE) mediates inflammatory response in healthy lungs via angiotensin II and plasminogen activator inhibitor -1. Neutrophils play an important role in the development of acute lung injury associated with severe sepsis. However, the ability of ACE directly participating in LPS-induced neutrophil activation has not been fully examined. This study was performed to evaluate the effects of the ACE inhibitor captopril on lipopolysaccharide (LPS) - induced neutrophil activation and mortality in LPS - induced endotoxemic mice.
Materials and Methods: To assess possible interactions between captopril and LPS on neutrophil activation, neutrophils from human blood were incubated with various concentrations of captopril (0, 1, 10, 50 and 100 nM) and LPS (100 ng/ml). The protein levels for interleukin (IL)-6, 8 and tumor necrosis factor (TNF)-α were measured using ELISA 4 hr after incubation period. To elucidate the intracellular signaling pathway, We measured the levels of phosphorylation of p38 mitogen activated protein kinases (p38), extracelluar signal-regulated kinase (ERK)1/2 and c-Jun amino-terminal kinases (JNK) with western blot analysis and nuclear levels of nuclear factor (NF)-κB with electrophoretic mobility shift assays 0.5 hr after incubation period. We also examined the effect of captopril (30mg/kg, IP) on mortality of mice treated with LPS (20 mg/kg, IP) to determine whether these effects of captopril also have in vivo significance.
Results and Discussion: Captopril attenuated LPS - induced neutrophils activation including expression of p38, JNK, NF-κB, IL-6, 8 and TNF-α. Captopril also attenuated mortality in LPS - induced endotoxemic mice.
Conclusion(s): Captopril can attenuate mortality in LPS - induced endotoxemic mice via the attenuation of neutrophil activation caused by LPS.

10AP1-5

The involvement of mitochodria-mediated mechanism for the pathogenesis of sepsis-associated encephalopathy on cecal ligation and puncture model in mice

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Background and Goal of Study: The pathophysiology of sepsis-associated encephalopathy (SAE) is complex and related to numerous process and pathway, especially, ROS production and mitochondrial dysfunction are considered to play an important role to induce SAE. However, the real mechanisms producing neurological impairment in sepsis remain incompletely elucidated. Based on this background, the aim of this study is to investigate the important role of free radicals and mitochondria mediated necrotic-apoptotic pathway for the pathogenesis of SAE in terms of the molecular biological and pathohistological approaches in mice brain with cecal ligation and puncture (CLP) model.
Materials and Methods: All experiments are approved by the animal ethical committee of Tokyo Medical University. C57/BL6 mice at 8 weeks of age were subjected to sepsis by CLP. Mice were divided into CLP vehicle group (CLPV), CLP with edaravone® (free radical scavenger) group (CLPE) and sham-operated group(S). Mice in CLPV and CLPE were injected saline or edaravone intraperitoneally at a dose of 10 mg/kg twice a day individually. Analysis of the mortality, histological change, mitochondrial Electron microscopic(EM) analysis and Expression of Bcl-2 family gene (Bcl-2 and Bax) in each group were performed. Statistical differences were considered significant if the *p* value was less than 0.05 by one-way ANOVA.
Results and Discussion: CLPE showed significant improvement of the mortality compared to the CLPV(11% vs 35%:$p<0.05$) after 24h of recovery. Pathohistological analysis also showed the marked reduction of the neuronal cell death in both parietal cortex and hippocampus in CLPE ($p<0.05$) after 18h of recovery. EM analysis showed mitochondrial morphological changes including marked swollen and some have disrupted cristae in CLPV but not in CLPE after 18h of recovery. Caspase-3 staining showed apoptotic cells in hippocampus in CLPV, however they were significantly ameliorated in CLPE. One of the bcl-2 family, bax showed the increase of its mRNA and protein level after 12h of recovery in CLPV, however they were significantly suppressed in CLPE.
Conclusion(s): In conclusion, our study showed the evidence that pathophysiology of SAE are induced by mitochondrial-mediated necrosis/apoptosis due to free radicals. Our study also indicates a new therapeutic approach, free radical scavenge, for the intervention of SAE.
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10AP1-7

The effect of somatotropin and or testosterone administration to survival trend in sepsis rat model marked with the marker changes of interleukin (IL)-6, tumor necrosis factor (TNF)-α, expression of mammalian target of rapamycin (mTOR), p70S6 kinase (p70S6K) and prealbumin

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Background: Recent data in the United States of sepsis is the 10th leading cause of death with the largest number of approximately 750,000 cases yearly and an increase of approximately 8.7% incidence yearly. Body's initial response to sepsis by secreting proinflammatory cytokines, anti-inflammatory cytokines and at the cellular level through the Mammalian Target of Rapamycin signaling (mTOR) Signaling Pathway, septic conditions would decrease the level of expression of mTOR and p70S6K that causes disruption of cell metabolism, a decrease in protein synthesis and inhibition of cell growth and proliferation resulting in lower cell survival.
Objective: The aim of this study is to determine the effects of somatotropin and or testosterone administration in a sepsis rat model on survival trends on some proinflamatory markers : IL-6, TNF-α, and metabolic markers : expression of mTORp, p70S6K and prealbumin.
Materials and methods: This is a randomized controlled trial study conducted on 30 male Wistar rats. The inclusion criteria were age 3-4 months, body weight 200-250 gr, adaptation process for 2 weeks, treated in a cage (50x44x20) cm^3, with room temperature and good ventilation, given food and drink ad libidum. The rats were divided into 5 groups (A, B, C, D and E), each group consisting of 6 rats. Induction of sepsis by the cecal inoculum (intra peritoneal) technique was performed on rats in groups A, B, C and D. Group E served as a negative control (without induction of sepsis). On day 4 after induction, all groups were tested for IL-6, TNF-α and prealbumin, and RT-PCR to measure the baseline expression of mTORp and p70S6K. Group A received 0,02 mg of somatotropin subcutaneously once daily for 6 days, 20 mg of testosterone intramuscularly single dose and 20 mg of meropenem intramuscularly twice daily during the study, Group B received somatotropin and meropenem, Group C received testosterone and meropenem and Group D received only meropenem. The effects of drug administration were evaluated by re-examining the marker levels of IL-6, TNF-α and prealbumin and expressions of mTORp and p70S6K in all surviving rats at day 11 and day 18.
Results and discussion: The data showed that administration of somatotropin and or testosterone in the sepsis rat model decreased significantly in level of the markers TNF-α, IL-6 with group D<C<B<A respectively ($p<0,000$). On the otherhand prealbumin and expressions of mTORp and p70S6K showed significant increased with group A>B>C>D>E respectively ($p<0,000$).
Conclusions: The combined administration of somatotropin and testosterone has a role in improving the survival of sepsis rats by decreasing proinflamatory marker levels (TNF-α and IL-6) and increasing metabolic marker levels (mTORp, p70s6K and prealbumin).

10AP1-8

Erythrocyte purine nucleotide metabolites in experimental sepsis

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Background and Goal of Study: It has long been recognized that nucleotides and their catabolites play vital roles in regulating many biological functions, especially in the cardiovascular system. Erythrocyte concentrations of purine metabolites are sensitive and mechanistic biomarkers for many of pathological events *in vivo*, and may be used for diagnosis, monitoring of disease progression and as targets for development of novel drugs and treatment strategies. We studied the erythrocyte (RBC) levels of ATP, ADP, AMP, GTP and GDP in experimental endotoxemia in rats.
Materials and Methods: Endotoxemia (n=14) was induced by intravenous administration of 15 mg/kg lipopolysaccharide (LPS). Blood samples were collected after 1 hour of endotoxemia and centrifuged immediately to separate plasma and RBC. RBCs were suspended in PBS, and lysed by adding cold trichloroacetic acid. Samples were centrifuged again to collect the RBC lysates. RBC lysates were analysed by HPLC (1). Results were compared to healthy animals (n=11). Control experiments were performed in animals without general anesthesia (restrained, n=13; freely moving; n=9).
Results and Discussion: Levels of purine nucleotide metabolites in erythrocytes were not altered by general anesthesia. Endotoxemia caused a significant decrease in ATP and GTP levels in RBC ($p<0.05$). Levels of ADP, AMP and GDP were also reduced (n.s.). Studies of purine nucleotide levels in plasma during sepsis have shown significant increases, e.g. in ATP, ADP and AMP (2). Release of nucleotides and their catabolites from RBCs might be a source for extracellular nucleotides in sepsis (3). Furthermore, a break down of RBC ATP in sepsis might be involved.
Conclusion: Erythrocyte purine nucleotide metabolism should be further explored as potential target for new diagnostic and therapeutic approaches in sepsis.
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10AP1-9

Therapeutic effect and its potential mechanism of anti-Tim3 antibody in mice with sepsis

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Objective: The aim of this study is to explore the therapeutic effect and its potential mechanism of anti-Tim3 antibody in mice with sepsis.
Methods:
1. Classic CLP mice models were established according to literature.The expression of Tim3 on lymphocytes of each group was measured by flow cytometry.
2. Sixty-four C57BL/6 mice were randomly divided into four groups, i.e., Sham group CLP group, Isotype antibody control group, anti-Tim3 antibody group. Survival time of mice in each group was recorded for 7 days after CLP challenge. At 24h after surgery, lung and liver tissue of mice in each group were harvested for pathological examination. Thymus and spleen tissue of mice in each group were harvested for TUNEL pathological examination. Thymus and spleen tissue were stained with AV-PI for T cell apoptosis. Plasma TNF-α, IL-10, IL-6 and IFN-γ were examined by ELISA. Bacterial clearance rate of blood and peritoneal lavage were determined. .
Results:
1. At 24h after CLP surgery, The expression of Tim3 on $CD8^+$ T cells was significantly higher in sepsis group than that of sham group($P<0.01$).
2. Anti-Tim3 antibody, saline, or Isotype antibody was given to mice, respectively. It showed that anti-Tim3 antibody improved the survival of septic mice, compared with CLP and Isotype group ($P<0.01$).
3. At 24h after CLP surgery, the damage of lung and liver tissue was attenuated in anti-Tim3 group compared with CLP and Isotype group. Our TUNEL staining results indicated that the apoptosis in anti-Tim3 group were lower than that of CLP and Isotype group. The proportion T cell apoptosis of thymus and spleen tissue was significantly lower in anti-Tim3 group compared with CLP and Isotype group. The expression of TNF-α, IL-6, and IFN-γ in anti-Tim3 group were significantly lower than that of CLP and Isotype group. The expression of IL-10 in anti-Tim3 group was significantly higher than that of CLP and Isotype group. Bacterial clearance rate of blood and peritoneal lavage was significantly improved in anti-Tim3 group compared with CLP and Isotype group. the number of Neutrophils of peritoneal lavage in mice from anti-Tim3 group was increased significantly compared with that CLP and Isotype group ($P<0.01$).
Conclusion: Anti-Tim3 antibody could inhibit the apoptosis of T cell apoptosis in thymus and spleen, with improvement in abdominal and blood bacterial clearance rate, and regulation the number of neutrophils and improve the survival of mice with CLP.

10AP1-10

Norepinephrine infusion during deep depth of sevoflurane anesthesia worsens the outcome of endotoxemic rats

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Background and Goal of Study: We previously showed that 2 minimum alveolar concentration (MAC) of sevoflurane anesthesia for 4 hours worsened the prognosis of endotoxemic rats (1). To examine if low blood pressure during anesthesia is the major cause of poor outcome, we performed another series of study using norepinephrine (NE) to restore blood pressure during sevoflurane in endotoxemic rats.
Materials and Methods: With our institutional approval, 66 male rats (325g-375g) were randomized into 3 groups after preparatory surgery: 1 MAC group, 2 MAC group or 2 MAC+NE group. All animals were administered intravenous injection of lipopolysaccharide (LPS, 0.5 mg/kg) and anesthesia was maintained with sevoflurane at 1.7% in 1 MAC group and 3.4% in the other groups for the next 4 hours. The 2 MAC+NE group received continuous infusion of norepinephrine (3 μg/kg/min) to restore systemic arterial blood pressure up to 1 MAC group. After confirming full emergence from anesthesia, the trachea was extubated and thereafter survival time was recorded for the next 24-hours. Plasma interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α) were measured using enzyme-linked immunosorbent assay. Under the same experimental settings, lungs were taken at 4 hour after LPS injection, the mRNA expressions of inflammatory cytokines and inflammatory cytokines in supernatants of lung tissue homogenates were measured. One-way analysis of variance (ANOVA) and log rank test were used where appropriate. P value less than 0.05 was considered significant.
Results and Discussion: The survival rates of 1 MAC, 2 MAC and 2 MAC+NE groups during 24 hours were 70%, 39% and 18%, respectively. The rate of 2 MAC+NE group was significantly lower than those of the others. Simultaneously, plasma TNF-α level was significantly higher in 2 MAC+NE group compared to 2 MAC group at 2-hour after LPS injection. Significant increase in both mRNA and excretion of inflammatory cytokines in lung tissue were found in 2 MAC group compared to 1 MAC group.
Conclusion(s): Norepinephrine infusion under 2 MAC sevoflurane anesthesia augmented the discharges of inflammatory cytokine and concurrently worsen the outcome in endotoxemic rats.
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1. 2014 ASA Annual Meeting (A3016), New Orleans, USA, 2014

10AP1-11

Vasopressin inhibits nuclear factor-κB activation in endotoxin-activated macrophages

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Introduction: Vasopressin is a peptide synthesized in hypothalamus with function of vasoconstriction and antidiuresis. In addition, vasopressin possesses immuno-modulation capacity. Our previous data demonstrated that vasopressin can inhibit endotoxin-induced upregulation of inflammatory molecules in activated macrophages. Expression of inflammatory molecules is tightly regulated by transcription factor nuclear factor-κB (NF-κB). We sought

to elucidate whether vasopressin could inhibit endotoxin-induced NF-κB activation.
Methods: We employed a murine macrophage-like cell line, RAW264.7 cells, to facilitate investigation. RAW264.7 cells were randomized to receive phosphate buffered saline (PBS), vasopressin (1000pg/ml), lipopolysaccharide (LPS; 100ng/ml) or LPS plus vasopressin (designated as the PBS, V, LPS and LPS+V groups, respectively). For inflammatory molecules assay, cell cultures were harvested at 24 hours after reaction and the concentrations of chemokine (macrophage inflammatory protein-2, MIP-2) and cytokine (interleukin-6, IL-6) were measured. For NF-κB assay, cell cultures were harvested after reaction for 30 minutes and the levels of inhibitor-κB (I-κB) degradation, nuclear translocation of NF-κB and NF-κB-DNA binding activity were measured.
Results: LPS significantly upregulated the expression of MIP-2 and IL-6, as the concentrations of MIP-2 and IL-6 of the LPS group were significantly higher than those of the PBS group (both P< 0.001). Vasopressin significantly inhibited these effects of LPS, as the concentrations of MIP-2 and IL-6 of the LPS+V group were significantly lower than those of the LPS group (P=0.004 and < 0.001). LPS also significantly induced NF-κB activation, as the cytosolic protein concentration of phosphorylated I-κBα (p-I-κBα, the indicator of I-κB degradation), the nuclear protein concentration of phosphorylated NF-κB p65 (p-NF-κB p65, the indicator of NF-κB nuclear translocation) and the NF-κB-DNA binding activity of the LPS group were significantly higher than those of the PBS group (all P< 0.001). Moreover, vasopressin could significantly inhibit these effects of LPS, as the cytosolic protein concentration of p-I-κBα, the nuclear protein concentration of p-NF-κB p65 and the NF-κB-DNA binding activity of the LPS+V group were significantly lower than those of the LPS group (P< 0.001, =0.002 and 0.034, respectively).
Conclusion: Vasopressin inhibits nuclear factor-κB activation in endotoxin-activated macrophage.

10AP2-1

The influence of pretreatment with intracerebroventricular injection of HMGB1 on the sleep-wake cycle and the melanin concentrating hormone-induced hippocampal acetylcholine release in rats

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Background and Goal of Study: High mobility group box 1 (HMGB1) is a novel cytokine-like mediator which induces inflammation and sepsis. HMGB1 can mediate memory impairment in sepsis patients. Melanin concentrating hormone (MCH) has memory function, and one main target site of MCH is hippocampal formation for memory consolidation. We demonstrated that MCH intracerebroventricular (ICV) administration increases the rapid eye movement (REM) and nonREM sleep and the hippocampal acetylcholine (ACh) release. The aim of this study is to investigate the influence of pretreatment with ICV injection of HMGB1 on the sleep-wake cycle and the hippocampal ACh release by MCH ICV administration.
Materials and Methods: 26 male Wistar rats weighing 280 to 320g were used. 5-7 days before the experiments, the rats anesthetized with pentobarbital were outfitted with an electroencephalogram (EEG) and electromyography (EMG) socket, a microdialysis cannula in the hippocampas, and a microinjection tube into the lateral cerebral ventricle. 24 hours before the experiments, ICV injection (5 μl) of HMGB1(1 μg) or normal saline (NS)(control) was performed. The hippocampal ACh releases were detected using in vivo intracerebral microdialysis in freely moving rats. Once basal levels of ACh were stabilized (2hrs), samples were collected every 20 minutes and measured by high-performance liquid chromatography. Rats were given ICV microinjection (5 μl) of either MCH (1 μg) or NS (control). The hippocampal changes in ACh releases, EEG and EMG were observed for 3 hours.
Results and Discussion: Pretreatment of HMGB1 (n = 12) significantly increased the nonREM episode time (P<0.001) and decreased the waking episode time (P<0.001) compared with NS control group (n = 14). NS(pretreatment)-MCH group (n = 6) significantly increased the REM episode time compared with NS-NS group (n = 8) (P<0.05). There was no significance in any episode time between HMGB1(pretreatment)-MCH group (n = 6) and HMGB1-NS group (n = 6). NS-MCH group significantly increased the hippocampal ACh releases compared with NS-NS group (P<0.01). HMGB1-MCH group significantly increased the hippocampal ACh releases compared with HMGB1-NS group (P<0.05).
Conclusion(s): Pretreatment with ICV injection of HMGB1 influenced sleep-wake cycles. However, HMGB1 pretreatment had no effect on the hippocampal ACh release by MCH ICV administration.

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10AP2-2

Low-dose dexmedetomidine improves sleep quality pattern of elderly patients after noncardiac surgery in the intensive care unit: a randomized controlled trial

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Background and Goal of Study: Sleep disturbances are prevalent in post-surgical patients, particularly those who were admitted to the intensive care unit (ICU). Its occurrence can produce significant adverse consequences.
The purpose of this study was to investigate the effect of low-dose dexmedetomidine infusion on the sleep architecture in postoperative elderly patients in the Intensive Care Unit (ICU).
Materials and Methods: This was a randomized, double-blind, and placebo-controlled trial. Seventy-six patients of 65 years or older who were admitted to the ICU after non-cardiac surgery and did not require mechanical ventilation were randomized to receive either dexmedetomidine (continuous infusion at a rate of 0.1μg/kg/h, n = 38) or placebo (n = 38) for 15 hrs, i.e., from 5 pm on the day of surgery until 8 am on the first day after surgery. Polysomnogram was monitored during the period of study drug infusion.
Subjective sleep quality was assessed by the patient using an 11-point numeric rating scale where 0 indicates the best possible sleep and 10 indicates the worst possible sleep.
Results and Discussion: Complete polysomnogram recordings were obtained in 61 patients (30 in the placebo group and 31 in the dexmedetomidine group). Compared with placebo, dexmedetomidine infusion significantly prolonged the total sleep time (median [interquartile range]) (Placebo group: 130.3 [71.9-219.9] min vs. Dexmedetomidine group: 213.0 [124.0-323.5] min, p = 0.028), decreased the percentage of stage N1 sleep (84.2 [28.2-98.7]% vs. 56.4 [13.3-83.4]%, p = 0.038), increased the sleep efficiency (15.0 [7.9-26.3] vs. 22.4 [14.2-37.1]%, p = 0.033) and the percentage of stage N2 sleep (15.8 [1.3-62.8]% vs. 43.5 [16.6-80.2]%, p = 0.048). It also significantly improved the subjective sleep quality in both all enrolled patients (4.0 [2.0-8.0] vs. 1.5 [0.8-4.3], p = 0.004) and those who were included in the sleep architecture analyses (3.0 [2.0-7.3] vs. 1.0 [0.0-3.0], p = 0.005). However, it increased the incidence of hypotension (5/38 vs. 15/38, p = 0.009).
Conclusion(s): For non-mechanically ventilated elderly patients who were admitted to ICU after noncardiac surgery, the night-time infusion of low-dose dexmedetomidine improves the overall sleep quality, but adverse effects occurred. Future studies with a relative large sample size are needed to further valid the safety and benefit of this strategy for elderly surgical patients in the ICU.

10AP2-3

Discrepancy of correlation for dosage of long-term administration of dexmedetomidine and plasma concentrations between adults and infants (<10kg) in critically ill patients

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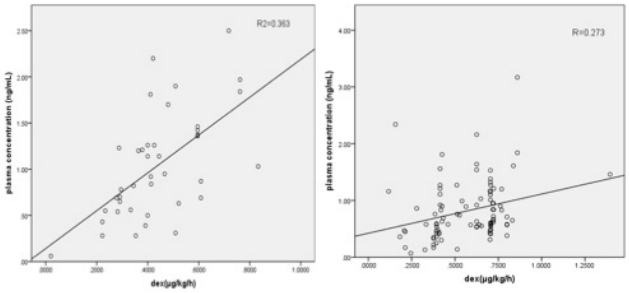
Background and Goal of Study: Dexmedetomidine (DEX) is a highly selective central α_2-agonist with a sedative effect for patients in pediatric intensive care units (PICU). Currently, there is little information regarding the relationship between dosage and concentration during long-term drug infusions of DEX and we previously demonstrated that in adult patients with a dosage of 0.20-0.83 μg/kg/h, patients could obtain an effective DEX concentration of 0.22-2.50 ng/ml that moderately correlated with the administered dosage (r=0.653, P<0.001). However, there is little information regarding the effect of long-term drug infusions of DEX in infants. We conducted a prospective, observational, cohort study measuring DEX concentrations in infants and compared it with data of adults.

Materials and Methods: All patients (<10kg) admitted to the PICU at Nagoya City University Hospital for 6 months were eligible, with the exception of patients in whom dosages of DEX were changed within 3 hours. DEX concentrations were measured by ultra performance liquid chromatography coupled with tandem mass spectrometry.
Results and Discussion: Twenty-six (57.8%) of 45 patients received DEX at 0.12-1.40 μg/kg/h and 95/203 samples included DEX. The median administration duration was 87.6 hours (range, 6-540 hours). The range of dexmedetomidine plasma concentrations was from 0.07 to 3.17 ng/ml. The plasma DEX concentration had a slight correlation with the administered dosage (r=0.273, P=0.007). The approximate linear equation was y=0.690x+0.423. The range of the Richmond Agitation-Sedation Scale was 0 to −5.
Conclusion(s): In conclusion, a dosage of 0.12-1.40 μg/kg/h in infants in this setting produced an effective DEX concentration of 0.07-3.17 ng/ml. However, the plasma DEX concentration had a small correlation with the administered dosage (r=0.273, P=0.007) and this tendency was different from that of adult data.



[Comparison between adults(left) and infants(right)]

10AP2-4

Agitation and delirium in ICU: a particular problem for those with a history of alcohol abuse?

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Background and Goal of Study: Patients with alcohol-related disease constitute an increasing proportion of ICU patients. They may be predisposed to developing agitation and delirium due to baseline cognitive defects and altered physiology exacerbated by critical illness. Agitation and delirium affect up to 80% of ICU-admitted patients and cause significant psychological and physiological harm.
However, there is currently limited evidence regarding the influence of alcohol use on these outcomes in ICU.
Materials: This retrospective analysis of a prospectively-acquired database (June 2012 to May 2013) included level three patients who were ≥18 years. 257 patients were stratified into 3 risk categories: alcohol dependency (n=69), at-risk (n=60) & low-risk (n=128) according to either Fast Alcohol Screening Test (FAST) scores if recorded prior to ICU admission or by WHO criteria for alcohol-related disease. Patients in the two higher risk cohorts were matched to low-risk patients by APACHE-II and a diagnosis of sepsis. Data on agitation and delirium was collected using validated retrospective chart-screening methods for each day of admission.[1] Agitation and sedation scores (Bloomsbury scale) were retrospectively recorded and agitation defined as a Bloomsbury score of three.
Results and Discussion: Incidence of agitation was significantly higher amongst alcohol dependent patients compared to low-risk patients (66.7% vs. 50.8%, p=0.034), as was delirium (68.3% vs. 48.3%, p=0.041). Statistical significance was retained on multivariate analysis. Duration of agitation (5.5 vs. 3 days, p=0.005) and delirium (5 vs. 3 days, p=0.005) were significantly longer in alcohol dependency. Alcohol dependent patients were significantly more likely to experience an adverse event during ICU admission compared to low-risk patients and were predisposed to both lower conscious levels and greater agitation according to sedation scores. In contrast, at-risk patients were not more agitated or delirious and were not at a heightened risk of experiencing an adverse event during ICU admission.
Conclusions: This service evaluation demonstrates that alcohol dependent patients are significantly more likely to develop agitation and delirium whilst admitted to ICU and consequently, at higher risk of adverse events. However, more moderate "at-risk" drinkers are not predisposed to this same elevated risk relative to low-risk patients.
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	Alcohol Dependence Cohort		At-Risk Cohort	
Factor	**Odds Ratio (CI)**	**p**	**Odds Ratio (CI)**	**p**
Agitation	2.97 (1.27-6.92)	0.012	1.05 (0.46-2.41)	0.916
Delirium	3.28 (1.38-7.79)	0.007	1.33 (0.59-2.97)	0.495
Adverse Events	2.65 (1.29-5.46)	0.008	0.97 (0.51-1.87)	0.930

Adverse events defined as: attempted/actual self-extubation; attempting to get out of bed; pulling at NG/NJ or other lines

[Table 1. Odds ratios for the risk of developing agitation, delirium & adverse events for alcohol cohort subgroups compared to low-risk cohort (models adjusted for age & sex)]

10AP2-5

Use of dexmedetomidine in addition to benzodiazepines for severe alcohol withdrawal syndrome (AWS) in the ICU

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Background and Goal of Study: Benzodiazepines are the first line treatment for AWS. However their efficacy remain controversial[1], furthermore they may prolong weaning from ventilator, increase pneumonia risk, prolong rehabilitation and hospital stay[2]. Dexmedetomidine (DEX) could be an alternative or additive drug for AWS management; it provides sedation, decreases autonomic activity and has no effect on respiratory function[3]. The goal of this prospective controlled study was to report safety and efficacy of DEX added to benzodiasepine sedation in patients with AWS.
Materials and Methods: 40 patients with diagnosed AWS by DSM-V criteria and CIWA-Ar score ≥ 35 (alcohol withdrawal score) were allocated in 2 groups: group 1 (n=20) who recieved benzodiasepines (diazepam) and group 2 (n=20), who recieved DEX infusion (mean dose 1 mcg/kg/hr) additionaly to benzodiasepines. DEX was given for 48 hr (mean, CI 95%: 24; 78) with mean goal RASS -1 (CI 95%: 0; -2).
Results and Discussion: The percentage of effective sedation (duration of goal sedation level in hours /duration of total sedation × 100) was 52% in group 1 and 76% in group 2. Antipsychotics (haloperidol) were used in 6 (30%) patients in gr. 1 and 1 patient (0,05%) in gr.2. Diazepam consumption were decreased in gr.2 (mean consumption 38 mg/day versus 18mg/day respectively). No excessive sedation was observed and no patients were intubated. Lenth of ICU stay and the incidence of complications (exept of bradycardia) vere similar in both group. Bradycardia incidence were significantly higher in group 2 (p<0,05) with no requiring discontinuation of DEX. It also help to avoid intubation. Hypotension and bradycardia are common adverse effects.
Conclusion(s): Adjunct therapy with DEX is effective and safe to control symptoms in severe AWS. DEX allowed lower doses of other agents to be used (benzodiasepines, antipsychotics). Bradycardia is common side effect during DEX infusion.
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10AP2-6

The influence of alcohol-use on sedative requirements in ICU-admitted patients: a service evaluation

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Background and Goal of Study: Alcohol-related disease is implicated in up to a quarter of all ICU admissions. This population are predisposed to developing alcohol withdrawal syndrome, hepatic encephalopathy and baseline cognitive defects which means they may be more difficult to sedate. Although sedation has a role within ICU, its use can be associated with a predisposition to delirium and prolonged ICU stays. We aimed to determine whether ICU-admitted alcohol-abuse patients have different sedative requirements compared to patients with no alcohol issues.
Methods: This retrospective analysis of a prospectively-acquired database (June 2012 to May 2013) included patients who were ≥18 years from a 20-bed general ICU. 257 patients were prospectively stratified into 3 risk categories: alcohol dependency (n=69), at-risk (n=60) & low-risk (n=128) according to Fast Alcohol Screening Test (FAST) scores and WHO criteria for alcohol-related disease. The two higher-risk cohorts were matched to low-risk patients by APACHE II and a diagnosis of sepsis. Mean daily dosages were calculated for each patient for 11 commonly used sedatives and log-transformed prior to fitting the regression model. Total number of individual sedative drugs received and receipt of third line drugs (clonidine or dexemedetomidine) was recorded. Agitation and sedation scores (Bloomsbury scale) were retrospectively extracted.
Results and Discussion: 7731 Bloomsbury sedation scores were collected (mean 3.5 per patient day). Analysis demonstrated a predisposition to lower conscious levels in alcohol dependence and agitation in both alcohol subgroups. Alcohol dependent patients received a wider range of sedatives (3.2 vs. 2.6, p=0.019), were significantly more likely to receive benzodiazepines (OR 1.67 CI 1.16-2.39, p=0.005) and haloperidol (OR 1.51 CI 1.02-2.24, p=0.040) but no more likely to receive propofol or opioids. However, they did not receive higher daily doses of any sedatives, including propofol, but did receive significantly less alfentanil (p=0.004) compared to the low-risk group.
Conclusions: Alcohol dependent patients were more prone to sub-optimal and fluctuating sedation levels, required certain sedatives more often but did not necessarily require greater mean daily doses of sedative agents such as propofol, in contrast to findings in previous studies. Indeed, this cohort may require less alfentanil perhaps due to hepatic encephalopathy and altered drug metabolism.

10AP2-7

Awareness and knowledge how to diagnose delirium amongst the nursing staff in a Cardiothoracic Intensive Care Unit (CTICU) within a London teaching hospital

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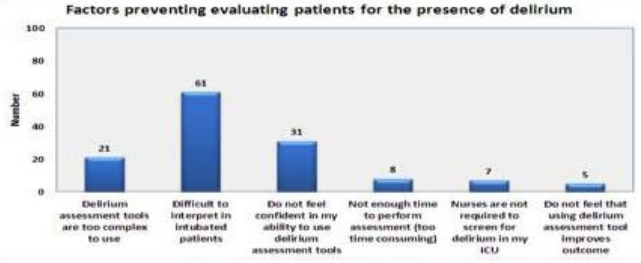
Background and Goal of Study: Delirium is associated with poor outcomes and is an independent predictor of death in intensive care patients (1). Delirium prevalence in the CTICU was found to be 26%, and was under diagnosed (2). We aimed to demonstrate nursing staff knowledge of delirium and assessment tool the Confusion Assessment Method for the Intensive Care Unit (CAM -ICU) and to identify factors preventing nurses from diagnosing delirium.
Materials and Methods: It was a prospective study. Locally designed electronic questionnaire was used, and anonymously collected data analysed after exporting to the excel sheet.
Results and Discussion: 84 nurses completed the questionnaire in July 2014. 45% (n=49) of nurses did not understand what delirium was, although 98% (n=82) agreed that screening for delirium was essential. 31% (n=26) identified CAM -ICU as the screening tool.
With regards factors preventing evaluation of patients for delirium, most common were difficulties in ventilated patients (2/3 responders) and lack of confidence with the use of delirium assessment tools (1/3rd), contrastingly time pressures, lack of recognition of importance of delirium did not play significant part.



[Figure 1. ESA graph]

Results of this study showed that nursing staff awareness of delirium and knowledge of the CAM -ICU were suboptimal. Secondly it showed that lack of such knowledge was the main factor in preventing nursing staff from evaluation of patients for the presence of delirium.
Conclusion(s): The study suggests that improving nursing staff awareness and knowledge of the CAM-ICU may improve diagnosis of delirium in CTICU patients. Further teaching of the nursing staff to rectify current deficiencies in knowledge is therefore mandated.
Wider application of our results must be interpreted with the knowledge that the non validated questionnaire was developed and applied locally.
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10AP2-8

Target controlled infusion (TCI) versus manually controlled infusion (MCI) of propofol for sedation mechanically ventilated patients in ICU

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Background and Goal of Study: TCI propofol for sedation may provide more easily to control sedation level, reduce the likelihood of excessive sedation and require less intervention, however it could be more expensive [1]. The effectiveness of TCI compared with MCI remains controversial, there are no studies comparing MCI versus TCI for sedation mechanically ventilated patients in ICU [1;2].
Materials and Methods: 42 patients who were expected to need sedation for mechanical ventilation for 24 to 72 hrs were included in this prospective randomized controlled study. Patients were allocated in 2 groups: group 1 (n=20) who received propofol MCI (1-3 mg/kg/h), group 2 (n=22) who received propofol TCI (1-3 mg/ml). Sedation level was measured with RASS and the median goal level was -1 (CI 95%: -2;0).
Results and Discussion: No statistically significant differences were detected regarding the duration of sedation or mechanical ventilation between 2 groups. The percentage of effective sedation (duration of goal sedation level in hours /duration of total sedation × 100) was 60% in group 1 and 77% in group 2; recovery time (from sedation stop to RASS 0) was 12,5 versus 10 min respectively. Most of patients in both groups (80%) were ventilated with pressure support ventilation. The incidence of rescue additional propofol boluses and infusion stops were significantly higher in group 1 (p< 0,05). Patients ability to communicate pain were better in group 2, although it was not significant (p>0,05). There were no statistically significant differences in propofol consumption, however it tend to increase in group 2. Length of ICU stay and the incidence of complications were similar in both groups.
Conclusion(s): TCI of propofol may provide more stable sedation level for mechanically ventilated ICU patients and require less intervention. However further studies are needed to increase the statistical power and probably get significant differences.
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10AP2-9

Role of propofol in critically ill patients: sedation and nutrition?

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Background and Goal of Study: During acute phase of disease, in most critically ill patients, the energy intake is deficient comparing with the nutritional requirements, resulting in negative energy balance. Propofol is a lipid-soluble, short-acting, intravenous (IV) hypnotic, administered continuously to provide sedation in Intensive Care Unit (ICU) patients and provides 1.1kcal/mL as fat. In the early days of hospitalization, the calories provided by IV-glucose solutions and by propofol are, often, the only nutritional support (NS) that these patients receive.
Our aim was to evaluate the impact of propofol in energy intake that is provided to patients in the first two days of hospitalization, in different portuguese ICUs.
Materials and Methods: Preliminary analysis of a prospective, multicenter, observational study that is being carried out in seven ICUs. Inclusion criteria: patients ≥18 years-old, length of hospital ICU stay ≥7 days, and to have received only artificial NS. Studied variables: age, sex, ICU admission reason, type of NS provided, daily energy intake and respective nutritional composition, volume and type of IV solutions and the amount of propofol that was daily infused.
Results and Discussion: 94 patients analyzed, 61.7% male, mean age 60.6±16.8 years, mean weight 72.7±15.1Kg, mean height 1.65±0,1m. ICU medical admission accounted for 57.4%, with mortality rate of 23.1%. For the whole sample, enteral nutrition (EN) was provided in about 69.5% of the evaluation days and parenteral nutrition (PN) in 11.4%; in 19.1% of days, patients received only IV-glucose solutions and propofol. Average daily energy intake 13.3 ± 4.9 kcal/kg/day (53% of minimum requirements). The amount of energy provided by propofol on day 1 was 87.1Kcal (out of 299.7Kcal provided) and on the second day was 111.1kcal (out of 676.5Kcal provided). By assessing the mean supply of different macronutrients (g/Kg/day): it was provided 105% of the minimum requirements for carbohydrates, 71% of the minimum recommended lipid and only 66% of the minimum recommendations in protein.
Conclusion: In the early days of hospitalization, propofol represented 16 to 29% of the caloric support provided to critically ill patients. It is also apparent that, the additional use of IV glucose fluids and propofol has beneficial effect in reducing the deficit of carbohydrates and lipids, leaving protein as the macronutrient in greater deficit.

10AP2-10

Evaluation of efficacy and hemodynamics effects of inhalational sedation with sevoflurane in patients on mechanical ventilation in ICU

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Background and Goal of Study: Critically ill patients in ICU often require mechanical ventilation and sedation. It is known that volatile agents are efficient and safe in general anaesthesia and may be used in ICU as alternative to intravenous anaesthetics. Inhalational anaesthetics also allow performing easy adjustment of sedation level by end-tidal concentration measurements. We aimed to evaluate efficacy of sedation with volatile anaesthetic sevoflurane and its influence on hemodynamics in patients on mechanical ventilation in ICU.
Materials, Methods and Design: A prospective study. 27 patients on prolonged mechanical ventilation (18 males, 9 females; 18 after abdominal surgery, 6 - after combined trauma, 3 - after incised wounds) were followed up in ICU. The sedation level was evaluated with RASS scale and auditory evoked potentials (AEP) system, hemodynamic parameters - by impedance plethysmography. Sedation was performed by AnaConDa (anaesthetic conserving device) with sevoflurane. The target sedation level was from -2 to -3 RASS. Duration of sedation was from 3 to 8 hours. Monitoring of Et sevoflurane was performed in all the patients. Statistical analysis was performed by Wilcoxon criterion calculation.
Results and Discussion: The mean rate of sevoflurane infusion was 3,0±0,6 ml/h, sevoflurane concentration - 0,5±0,2%. We achieved the target sedation level in all the patients. Significant fall of AAI index (AEP) was observed during the period of sedation (from 52,18±3,16 to 41,2±2,18; $p<0,05$). MAP and HR decreased from the 3rd hour of the therapy (respectively from 93,44±4,24 to 85,84±2,07 mm Hg and from 109,89±4,5 to 97,56±6,95 per minute). Thus, MAP remained in normal ranges and tachycardia reduced. Cardiac index (CI) and stroke index (SI) decreased during the first 3 hours of sedation and significantly increased from the 4th hour (respectively CI from 2,47±0,50 to 3,88±0,47 ml/min/m2; $p<0,05$ and SI from 24,67±6,36 to 45,67±1,65 ml/m2; $p<0,05$). Increase of CI and SI combined with decrease of HR reflects more effective heart work that may be induced by cardioprotective effect of sevoflurane.
Conclusion(s): Application of inhalational anaesthetic sevoflurane in patients in ICU provides adequate level of sedation and has no negative influence on circulation parameters. Sedation with volatile anaesthetics in ICU is a promising way and studies should be continued in different groups of patients.

10AP2-11

Inhalation sedation with sevoflurane in patients with burns

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Background and Goal of Study: It is known that sedation in the ICU is used to solve a number of problems, including the creation of patient comfort, support during respiratory support. The most commonly used for intravenous sedation drugs: opioids, benzodiazepines, non-inhalation anesthetics (e.g., propofol) and deksmetomidin haloperidol. The appearance in Russia device for inhalation sedation AnaConDa opens the possibility of its application in the ICU.
Objective: To present the experience of sevoflurane inhalation sedation during respiratory support in patients with burns.
Materials and Methods: A prospective study involving 19 patients aged 59 years (body weight - 82 kg 82 (70-89) kg, height 175) with thermal burns (area of 10% to 80%), which is in the process of respiratory support was carried sevoflurane inhalation sedation using AnaConDa under ICU regional burn center. Before the start of sedation was assessed severity of the patient on the scale of APACHE II, SOFA; FiO2, PEEP, PaO_2/FiO_2, PaO2, the effectiveness of sedation scales RASS, Ramsay, the level of BIS, as well as the amount of sevoflurane (ml). Estimated duration of the "start" period (15, 30 and 60 minutes from the start of sedation) and thereafter every 6 hours. Descriptive statistics presented as median (Me) and quartiles (25 and 75 percentiles).
Results and Discussion: Before the start of sedation assessment of the severity of the patients on the scale of APACHE II - 13 (10,5-17,5) points at SOFA - 8 (6,0-9,5), GCS - 13 points. Prior to the beginning of sedation score was 2 RASS (2,0-2,0) at Ramsay 1 (1,0-1,0); and after 15, 30 and 60 minutes after the start - 1 (0,0-2,0) and 1 (1.0-2.0); 1 (-2,0-1,0) and 2 (1.5-3.0); -2.0 (-2,5 (-1.0)) And 3 (3.0-4.0), respectively.
Changes in the level of sedation after the "start" period during the day sedation is presented in Table 1.

Indicators	Hours		Hours	
	08-14	14-20	20-02	02-08
Amount of sevoflurane, ml; Me, (25-75 percentile)	33(30-36)	33(30-36)	33(30-36)	33(30-36)
RASS, points; Me, (25-75 percentile)	-2(-2.0-1.0)	-2 (-2.5-0.5)	-2(-2.5- (-1.5))	-2(-2.5-(-1.5))
BIS, %; Me, (25-75 percentile)	66.5(65.0-69.5)	68.0(65.0-69.0)	68.0(65.0-70.0)	68.0(65.0-71.0)
Ramsay, points; Me (25-75 percentile)	3(1.5-3.0)	3(2.5-4.0)	3(3.0-4.0)	3.0(2.0-3.5)

[Table 1]

In general sedation time was 24 hours and 30 minutes after closure of sedation was RASS rating 1 by Ramsay - 1 points.
Conclusion: Inhalation sedation with sevoflurane in a SAR was quite effective technique that allows to create comfort for the patient during respiratory support for patients in the "early period" burns.

10AP2-12

"It's what they would have wanted" - Do healthcare workers plan for critical illness and incapacity?

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Background and Goal of Study: Patients with critical illness often lose their autonomy. We assessed how many healthcare workers had a living will and how many had nominated another person to have power of attorney over their affairs. We then assessed if healthcare workers believed that their families would be aware of their wishes regarding organ support and cardiopulmonary resuscitation (CPR). Finally, we assessed if they had discussed their wishes with their family.
Methods: We developed a questionnaire regarding the issues listed above. We handed this out to 100 healthcare workers within our hospital.
Results: We handed out 100 forms and received 100 forms at data collection. 1 form was discarded as it was handed out to a non-healthcare worker.
Question 1
Do you have a living will? (Also known as advance decision / advanced directive)
15/99 (15%) people had a living will.
Question 2
Have you appointed anyone to act as power of attorney over your affairs?
12/99 (12%) people had appointed a power of attorney.
Question 3
If you were critically unwell and could not communicate, do you believe that your family would be aware of your wishes regarding:
a) Continuing or withdrawing treatment such as invasive ventilation / dialysis / cardiac support
68/99 (69%) believed their family would be aware of their wishes.
b) CPR
70/99 (71%) believed that their family would be aware of their wishes.
Question 4
Have you explicitly discussed your wishes regarding the following with your family?
a) Continuing or withdrawing treatment such as invasive ventilation / dialysis / cardiac support
50/99 (51%) had explicitly discussed their views with their family.
b) CPR
51/99 (52%) had explicitly discussed their views with their family.
Discussion: 15% of healthcare workers had a living will and just 12% had a nominated power of attorney. This may be related to the fact that our population was of working age and less likely to have severe medical conditions.
Approximately two-thirds of participants felt that their family would be aware of their wishes regarding organ support and CPR. It is surprising that only approximately 50% of healthcare workers had discussed issues such as this given that they will have more experience of dealing with issues surrounding critical care and life-sustaining treatments.
Conclusions: We need to carefully consider the sources of information that we use when trying to assess what our patients' wishes would have been.

10AP3-1

Influence of Body Mass Index on outcome of traumatised patients in intensive care

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Background and Goal of Study: A relation between Body Mass Index (BMI) and mortality after severe trauma has been revealed already by a few studies (1, 2). However, mild obesity is considered to be benefical for patients' outcome when intensive care treatment is needed due to organ failure (3). Whether this phenomenon might persist in multiple trauma has never been investigated yet.
Aim of the present study was to analyse intensive care courses after multiple trauma with regard to BMI.
Materials and Methods: Patients (age ≥16, Injury Severity Score ≥9 with subsequent stay in intensive care) registered in the TraumaRegister DGU® (registry of trauma, German Society of Traumatology) within the years 2005-2008 were enrolled. Three groups were separated by weight (I: BMI <20kg/m², II: BMI = 21-29 kg/m² and III: BMI >30kg/m²). Intensive care progress was analysed by triple matched pair analysis and matching was performed for sex, age, injury pattern, and need for surgery.
Furthermore, a subgroup containing patients with an Abbreviated Injury Score (AIS) ≥ 3 in two regions was analysed. Data are presented as mean and standard deviation. Besides absolute p-values for significance, linear p-values were calculated for trends over the three groups.
Results and Discussion: We enrolled 748 patients (272 in subgroup). BMI was 18.7 ± 1.2 kg/m² in group I, 24.3 ± 1.9 kg/m² in group II, and 35.7 ± 5.1 kg/m² in group III. Patients in group I and III had significantly more premorbidities than those normal weighted (p=0.003). Incidence of organ failure (OF) and multi OF (MOF) was higher with increasing BMI (p lin.=0.005 and 0.035 respectively). In particular, incidence of respiratory and cardiovascular failure was higher (p lin.=0.019 and 0.002 respectively). Time of invasive ventilation was prolonged with increasing BMI (p=0.002). Mortality in the first 24 hours after admission was comparable over all groups, whereas the total in-hospital mortality rate increased with higher BMI (p lin.=0.025).
Conclusion(s): Higher BMI has no influence on early mortality after multiple trauma. However, mortality is increased during in-hospital stay. In contrast to the underweighted, premorbidities seem to influence the incidence of secondary OF after trauma in obese patients more strongly.
References:
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10AP3-2

The effect of body weight in acute respiratory distress syndrome patients

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Background and Goal of Study: Obesity, due to an increase in body weight, has been reported to be associated in healthy subjects to a higher reduction in functional residual capacity and to a stiffening of lung and chest wall elastance, which promotes alveolar collapse and hypoxemia [1], compared to normal body weight. Thus, it should be relevant for a safer mechanical ventilation setting to know if obese ARDS patients could be affected by a higher derangements in lung mechanics.
Materials and Methods: One hundred one sedated and paralyzed ARDS patients were divided in three classes according to body mass index: normal weight, overweight and obese. At 5 and 45 cmH_2O of PEEP two lung CT scans were performed. Lung recruitability was estimated as the ratio between the difference in not inflated tissue at PEEP 5 cmH_2O and not inflated tissue at PEEP 45 cmH_2O to the total lung tissue at 5 cmH_2O of PEEP [2]. Lung superimposed pressure was computed as *Section height (cm) * Section density (section tissue [g]/section volume [ml])*. Total superimposed pressure was computed as *Lung superimposed pressure * Respiratory system elastance / Lung elastance* [3].
Results and Discussion: The total lung weight was not different between groups (Table 1). The overall lung recruitability was 15.6 ±10.9% and was not affected by the body weight. The lung gas volume (i.e. the end expiratory lung volume) and the total superimposed pressure were significantly lower and higher, respectively (1024.3±465.7 vs 1296.5±692.6 ml, and 21.7±7.3 vs 17.0±4.0 cmH_2O), in obese group compared to normal weight group (p< 0.05).
Conclusion(s): In ARDS obese patients, recruitability was similar to non obese patients while the total superimposed pressure was affected by the body weight and the end expiratory lung volume was lower, suggesting a possible higher PEEP requirements.

	Normal weight group (n=44)	Overweight group (n=36)	Obese group (n=21)	p value
Total lung weight (g)	1726.0±714.5	1470.0±472.6	1362.8±341.3	0.179
Total lung gas (mL)	1296.5±692.6	941.1±533.5*	1024.3±465.7*	0.041
Lung recruitability (%)	15.19±9.9	18.1±13.0	12.3±8.7	0.233
Total superimposed pressure (cmH2O)	17.0±4.0	19.2±6.8	21.7±7.3*	0.014

* p<0.05 vs normal weight group

[Main CT scan variables in studied population]

References:
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10AP3-3

Enhanced abdominal inflammation in acute respiratory failure - is the culprit ventilator associated abdominal edema or inadequate perfusion? A magnetic resonance imaging pilot study

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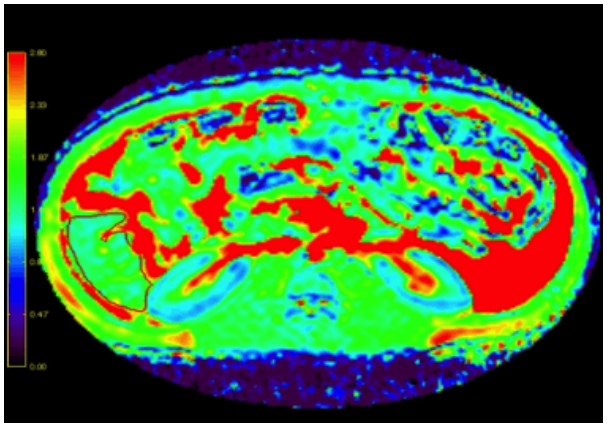
Background and Goal of Study: Multiple Organ Dysfunction is the leading cause of death in Acute Respiratory Distress Syndrome (ARDS). In previous studies, we have found that mechanical ventilation enhances abdominal edema due to reduced lymph drainage, and increases splanchnic organs inflammation, in an endotoxemic ARDS model[1]. However, it is unclear whether the mechanism of the increased inflammation is edema *per se*, or a possible reduced perfusion.
This study's aim was to explore the two mechanisms in a porcine endotoxemic model using Magnetic Resonance Imaging (MRI).
Materials and Methods: In 8 anesthetized and mechanically ventilated pigs, endotoxin was infused during 6 hours. Animals were randomized into two groups: 1) Normal mean arterial pressure (NMAP): mean arterial pressure (MAP) higher than 65mmHg; 2) Low mean arterial pressure (LMAP): MAP 50-60 mmHg. Intravenous noradrenaline kept MAP in the range.
The perfusion of the splanchnic organs was assessed with Diffusion-Weighted Imaging, an MRI technique that measures water molecule movements and enables separation between *diffusion* (movement of molecules within tissues) and *perfusion* (flow of molecules in the microcirculation). The perfusion fraction's contribution to global water movement (*f value)* in intestine, spleen and liver (target organs) was calculated. See Figure 1.
Edema was examined by *histological analysis in intestine* and *wet-dry weight* in target organs.
In intestine samples inflammation was measured by histological analysis.
Results and Discussion: Hemodynamics in the two groups was similar, except for MAP (mean values: 86 mmHg in HMAP and 54 in LMAP). No significant difference in edema was detected in wet-dry weight and histological analysis.
The perfusion fraction *(f value*) was lower in the LMAP than MAP group in all studied tissues (intestine, liver, spleen), although of borderline significance.
Histological analysis showed more inflammation in the LMAP group.
Conclusion(s): This study shows that abdominal inflammation could be related to reduced abdominal perfusion rather than edema formation during ventilator treatment.
Reference: 1. *Critical Care 2013,17:R126*



[Figure1. DWI-MR. ADC (Apparent Diffusion Coefficient) map. It allows to quantify water molecules at microscopic levels in a selected organ or tissue. ROI (Region of Interest) is a selected area on the slice of MR, for whom f value is calculated]

10AP3-4

Low tidal volume ventilation adherence in postoperative acute respiratory failure, a clinical audit

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Background and Goal of Study: Low tidal volumes ventilation (LTV) is the only strategy proved to reduce mortality in ARDS. Our aim was to describe the adherence to LTV recommendations before and after implementing educational interventions and establishing a protocol in our postoperative care unit.
Materials and Methods: In a retrospective descriptive study, we reviewed records of patients admitted to our postoperative intensive care unit during 6 months. We included all patients who required 24 hours or more of mechanical ventilation and had a PaO2/FiO2< 300. Exclusion criteria were unilateral lung injury, cardiogenic respiratory failure and cardiac, thoracic or neurosurgery. We obtained 2 daily ventilation and arterial gasometry records.
Records were classified into 3 categories.
1) Optimal ventilation: tidal volume 4-6ml/kg ideal body weight (IBW) + plateau pressure ≤ 30cm H2O + pH > 7.30.
2) Acceptable ventilation: pH< 7,15 with any ventilation or; tidal volume 4-6ml/kg IBW with any pH or; plateau pressure 30-35cm H2O with any pH or; tidal volume >11ml/kg IBW + pH <7.35 or; plateau pressure >35cm H2O + pH <7.35.
3) Hyperventilation: tidal volume >11ml/kg IBW + pH >7.35 or; plateau pressure >35cm H2O + pH >7.35.
Later, we presented the results to our staff and developed a protocol with a series of aids to promote LTV and repeated an identical data recollection for a period of 6 months.
Results and Discussion: We included 26 patients (602 records) in the first audit and 14 (280 records) in the second one after intervention.
Only 2.2% of the records in the first audit meet criteria for optimal ventilation. The rate for Acceptable ventilation was 83.2%. Hyperventilation rate was 14.6%.
When we re-audited our staff, we found an improvement from the original results. An 8.5% of the records meet criteria for optimal ventilation; while the rates for Acceptable and Hyperventilation were 80.9% and 10.6% respectively.
Conclusion(s): Although most records in our first audit were considered as acceptable ventilation we did found a high rate of unnecessary hyperventilation, and a margin for improvement. Protocol implementation and continuous education of our staff proved worthy as solutions to improve a clinical intervention in our second audit. Although we did have fewer patients than in our original audit in a similar time period, we were capable of increasing our rate of optimal ventilation and reducing that of hyperventilation successfully.

10AP3-5

Predictive factors for the failure of non-invasive ventilation in the management of acute exacerbations of chronic obstructive pulmonary disease

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Background and Goal of Study: Non-invasive ventilation (NIV) has changed the management of acute exacerbations of chronic obstructive pulmonary disease (COPD) by reducing the need for endotracheal intubation. However, a subpopulation of patients does not respond to NIV and still requires intubation and invasive ventilation. We assessed pulmonary function parameters and arterial blood gas values as predictive factors for the failure of NIV.
Materials and Methods: We performed a retrospective study of all the patients admitted to our emergency department with an acute exacerbation of COPD requiring NIV in 2013. Pre-admission pulmonary function parameters (FVC, FEV1, PEF1) as well as arterial blood gas values upon admission were retrieved from the patient's charts and correlated (Spearman correlation) with the need for endotracheal intubation. Initial NIV-settings were EPAP: 6cmH2O and IPAP: of 12cmH2O. These settings were adjusted according to the patient's need and the physician's discretion. On top of NIV, all patients received standard care consisting of O2, IV corticosteroids, inhaled bronchodilators, and IV antibiotics if infection was suspected. Data are presented as median [IQR].
Results and Discussion: 50 patients (20 male, age: 67 years [63-77]) were included in the study. pH and pCO2 on admission were 7.29 [7.24-7.36] and

61.7mmHg [50-77], respectively. Pre-admission FVC, FEV1 and PEF1 (% of the predicted value for age and gender) were 61% [49-83], 38% [26-49] and 37% [63-77], respectively. 7 patients (14%) required intubation. The need for intubation was inversely correlated with arterial pH upon admission (r: -0.3, $P=0.05$) and pre-admission FVC (r: -0.4, $P=0.04$).
Conclusion: Patients with an acute exacerbation of COPD and lower arterial pH on admission and/or lower pre-admission FVC have a higher failure rate of NIV with need for intubation and invasive ventilation.

10AP3-6

Bilateral parotitis in a patient under continuous positive airway pressure treatment

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Background: Conditions like bacterial and viral infections, mechanical obstruction due to air and calculi and drugs can cause parotitis. We have presented a case of unusual bilateral parotitis in a patient under non-invasive continuous positive airway pressure (CPAP) therapy for chronic obstructive pulmonary disease (COPD) exacerbation in intensive care unit.
Case report: A 36 year-old male patient was admitted to intensive care unit with the diagnosis of COPD exacerbation. Antibiotherapy, bronchodilator therapy and non-invasive positive pressure ventilation were initiated. Painless swellings were developed at the 3rd day of admission on the right and a day after this on the left parotid glands. Amylase levels were increased and ultrasonographic evaluation revealed bilateral parotitis. No intervention was made. The patient was discharged on the 6th day on clinical improvement and regression of parotid swellings without any complications.
Discussion: Etiological mechanisms of parotitis comprise mechanical trauma, infection, hypersensitivity reactions, obstruction of parotid ducts with calculi, air and thickened secretions, parasympathetic stimulation, muscle relaxation, and drug reactions. Our patient had some of these risk factors. With ranitidine, that our patient also was using, there had been reports of drug induced parotitis. However, our patient used the drug throughout the hospital stay and parotitis recovered spontaneously. Besides this, increased oral cavity pressure due to CPAP application as a treatment regimen may have caused retrograde air movement in Stenon duct and obstruction. Akcaboy et al.[1] blamed retrograde air flow into parotid gland and intraoral pressure rise in the development of postoperative parotitis. Our patient had intermittent CPAP application as treatment regimen. This may have been associated with pneumoparotit due to increased intraoral pressure. We have not investigated other viral and bacteriological reasons for parotitis other that mumps in our patient. These factors should have been considered as well. Parotitis can occur after retrograde air flow in the Stenon duct during CPAP application. After exclusion of infectious reasons and possible drug reactions we can focus on this diagnosis.
Learning Points: CPAP can result in parotitis obstructing the Stenon duct with air.
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10AP3-7

Comparison of early and late percutaneous tracheotomies in adult intensive care unit

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Background and Goal of Study: Percutaneous tracheotomy (PT) has become a good alternative for patients thought to have prolonged intubation in intensive care units (ICU). Prolonged endotracheal intubation has complications like laryngeal damage, vocal cord paralysis, glottic and subglottic stenosis, infection and tracheal damage. The most important benefits of tracheotomy are early discharge of the patient from the ICU and shortening of the time spent in the hospital.
In this retrospective analysis we aimed to present our experience with PTs and compare results of early and late PTs.
Materials and Methods: Percutaneous tracheotomies applied to 158 patients in adult intensive care unit have been analyzed retrospectively. Patients were divided into two groups as early and late tracheotomy according to their mechanical ventilation time before PT. Tracheotomies at the 0-7th days of mechanical ventilation were grouped as early and after the 7th day of mechanical ventilation as late tracheotomies. Patients having infection at the cite of tracheotomy, patients with difficult or potential difficult intubation, those under 18 years old, patients with positive end-expiratory pressure above 10 cmH_2O and those with bleeding diathesis or platelet count under 50.000 dl^{-1} were not included in the study. Durations of mechanical ventilation and ICU stay were noted. Regarding the comparison of quantitative data between the groups Independent Samples t-test was used for evaluation of data with normal distribution and Mann Whitney U test for data without normal distribution. x^2 test was used for comparison of qualitative data.
Results and Discussion: There was no statistical difference among the demographic data of the patients. Total mechanical ventilation application time in the early PT group was shorter than in the late PT group; 11.3 and 16.4 days, respectively; and the difference was statistically significant, $P<0.05$. We have found shorter hospital length of stay in the patients with early tracheotomy. Mean hospital length of stay for early and late PT groups were 17.4 and 31.0 days, respectively. The difference was statistically significant, $P<0.05$.
Conclusions: Early tracheotomy shortens mechanical ventilation duration and intensive care unit length of stay. We suggest early tracheotomy in patients thought to have prolonged endotracheal intubation.

10AP3-8

Criteria of extubation success of brain injured patients. Elaboration of a prognostic score (GODWEAN study)

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Background and Goal of Study: Delay in weaning of mechanical ventilation and extubation failure of ICU patients increase morbi-mortality. Few studies have evaluated extubation of brain injured patients and criteria of success remain uncertain and often contradictory.
Materials and Methods: We conducted a prospective observational study in 3 ICUs and enrolled 130 consecutively admitted patients for brain injury (51 (39%) severe TBI, 28 (21%) subarachnoid hemorrhages, 32 (25%) spontaneous intracerebral hemorrhages, 11 (8%) ischemic strokes, 8 (6%) post anoxic comas). Patients with abolished brainstem reflexes, intubated < 48h and with CNS infections were excluded. Enrolled patients accounted for a total of 154 extubations. Global evaluations focused on neurological, hemodynamic, respiratory status prior to spontaneous breathing trial and extubation. Primary outcome measure was failure of extubation defined by the need of reintubation or non-invasive ventilation within 48h. Secondary outcomes included reintubation delays and causes.

Results and Discussion: Mean extubation delay after ICU admission was 19 (3-51) days. We found 30 (19%) extubation failures (857 (5-2880) min) and 15 (10%) reintubations after 48h (5790 (3660-6240) min). Group success (S) and failure (F) didn't differ according to demographics, initial severity scores (SAPS2, SOFA), initial neurological status (GCS, brainstem reflexes) and type of brain injury. Selected results of univariate analysis are shown in the following table.

	Univariate analysis		
	Success (N=109)	**Failure** (N=45)	**p**
Neurological examination prior to extubation			
Confusion (CAM-ICU)	54 (50%)	30 (66%)	**0.047***
GCS	8.7 (3-10)	8.2 (4-10)	0.10
RASS	-0.53 (-5-1)	-0.4 (-4-1)	0.64
BPS	3.4 (3-7)	3.7 (3-6)	0.07
FOUR score	11.9 (4-14)	10.9 (6-14)	**0.032***
FOUR item « brainstem »	3.9 (1-4)	3.8 (2-4)	**0.04***
FOUR item « eye »	3.6 (0-4)	3.1 (0-4)	**0.02***
CRS	12.5 (1-23)	10.6 (3-22)	0.12
CRS item « arousal »	2.5 (0-3)	2.0 (0-3)	**0.003***
CRS item « visual »	3 (0-5)	2.5 (0-5)	0.09
GAG reflex	73 (67%)	28 (62%)	**0.0002***
Swallowing	57 (52%)	16 (35%)	**0.02***
Respiratory examination prior to extubation			
Breathing rate (/min)	18.3 +/- 4.6	20.6 +/- 5.2	**0.01***
p01 (mbar)	1.2 +/- 1.2	2.9 +/- 1.8	**0.0002***
Spontaneous cough	81 (74%)	30 (67%)	0.17
Suctioning cough	88 (81%)	34 (75%)	0.10

[Selected items of univariate analysis]

Multivariate analysis is currently under process.
Patients survival at ICU discharge was significantly associated with extubation success (S: 86 (79%) , F: 11 (24%) , p< 0.0001). Differences in GOS at ICU discharge and 3 months were significant (p=0.0008 and 0.04 respectively) but not at 6 months (p=0.07).
Conclusion(s): Our study gives new insights into predictive criteria of extubation success of brain injured ICU patients. To our knowledge, this is to date the largest cohort on this topic. Prognostic score needs to be elucidated and validated in a multi centric fashion and remains challenging since correlated with survival.
Reference: ClinicalTrials.gov Identifier: NCT02235376

10AP3-9

Incidence of swallowing dysfunction in patients weaning from mechanical ventilation

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Background and Goal of Study: Swallowing is a complex, vitally important function, and is prone to substantial dysfunction after mechanically ventilation. Tracheostomy, endotracheal and nasogastric tubes, which chronically irritate mucosa and cause local tissue damage. Chronic irritation of mucosa leads to desensitisation. Acquired neuromuscular weakness disables coordinated swallowing and impairs effective coughing. Clinical consequences are chronic aspiration, pneumonia and chronic malnutrion, thus leading to increased mortality after ICU stay.
Goal of this study was to establish the incidence of swallowing disorders in long-term ventilated intensive care patients by fiberoptic endoscopic evaluation of swallowing (FEES).
Materials and Methods: All patients able to communicate and respond to commands were examined by fiberoptic endoscopic evaluation of swallowing (FEES) as a part of newly established clinical routine. Swallowing disorders were graded by penetration-aspiration-scale (PAS) according to Rosenbek et al., adapted to FEES (1). Swallowing disorders are distinguished by items such as penetration (food bolus or saliva enters airway, but remains above vocal cords), aspiration (food bolus or saliva passes vocal cords), and visible or no residue after clearance by patients' swallowing and coughing.
Results and Discussion: Forty-four out of 98 patients were suitable for FEES. Three patients recovered from ARDS, 2 from cardiopulmonary resuscitation, the remaining 39 were surgical patients, 80% had had sepsis.
91% of patients presented with dysphagia. Dysphagia was associated with delayed removal of trachostomy tube, and prolonged mechanical ventilation and ICU-stay (3d [0-6d] vs. 10 [3-22d] from the day of FEES; median [IQR]; P=0.0159).
Conclusion(s): Swallowing disturbances occured in the vast majority of patients weaning from mechanical ventilation. Without routine FEES, some dysphagia, silent aspiration and pneumonia would have gone undiagnosed. Further investigation will show whether routine screening for dysphagia and logopedic treatment improves patients' outcomes in terms of re-admission, pneumonia and malnutrition.
Reference:
1. Rosenbek JC, Robbins JA, Roecker EB et al (1996) A penetration-aspiration scale. Dysphagia 11 (2): 93-98

10AP3-10

Prophylactic minitracheostomy affect early to mid term mortality in cardiac patients who are at risk of respiratory dysfunction

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Background: Minitracheostomy has been reported as an effective device to treat or prevent sputum retention after lung surgery. However, it is unknown whether prophylactic minitracheostomy is beneficial in cardiac surgical patients.The aim of this study is to assess if minitracheostomy prevents extubation failure in cardiac surgical patients.
Methods: The medical records of consecutive patients who were aged 19 to 89 and who were admitted to our ICU intubated after cardiac surgery from 2008 to 2014 were retrospectively reviewed.We collected the following data:APACHE score,presence or absence of prophylactic minitrachestomy and ultimate tracheostomy, days on mechanical ventilation,ICU stay,hospital stay, and mortality. Mortality in two groups was analyzed with Kaplan-Mayer technique.
Results: Of the 381 patients who were admitted to our ICU, 34(Age:71.3±8.9) had minitracheostomy placed after extubation (minitracheostomy group). Of these 34 patients, 23(68%) did not require re-intubation or tracheostomy while 11(32%) ended up trachestomy. Additional 17 patients(Age:67.8±11.5) had tracheostomy performed without minitracheostomy(conventional group). Of these 17 patients,11 (65%) were trachestomized without extubation trials,and the remaining 6(35%) had tracheostomy after failed extubation. The minitrachestomy group and the conventional group did not differ in their mean APACHE scores(20.4±6.8vs19.4±5.5, p=0.69).However, duration of mechanical ventilation was shorter in the minitracheostomy group compared to the conventional group(7.3vs16.9,p=0.001), also there were trends towards shorter ICU and hospital stay in the minitracheostomy group. (ICU:11.0±5.7vs16.5±1.1,p=0.06, Hospital:52.1±29.1vs91.6±83.0,p=0.07, respectively) Survival proportions of 3 years in two groups were 63% vs 87%, p=0.28.
Discussion: The results of this study showed that 2/3 of patients with minitracheostomy stayed extubated. The patients who were trachestomized without minitrachestomy had similar APACHE scores to those with minitracheostomy. This indicates that prophylactic minitracheostomy may facilitate extubation in some patients, and minitracheostomy group is predominant in early outcome. However survival rate of mid term was higher in tracheostomy group. Further research about indication of minitracheostomy will be required.
Conclusion: Prophylactic minitracheostomy may improve early outcome after cardiac surgery in patients who are at risk of respiratory dysfunction due to sputum retention.

10AP3-11

Effect-site concentrations of alfentanil for the relief of postoperative pain in the intensive care unit patients

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Background and Goal of Study: Alfentanil has a desirable pharmacokinetic and pharmacodynamic profile with a rapid onset and offset of action suggesting a very short half-life. It has also been shown to provide high quality analgesia after major operation such as abdominal and thoracic surgery. This study was performed to determine the optimal doses of alfentanil (effect-site concentrations) required to prevent pain and other discomforts after abdominal general surgery in the ICU patients.

Materials and Methods: A total of 34 general abdominal surgical patients (aged 45-79 years and ASA II-III) requiring artificial ventilatory care in the ICU were provided with alfentanil through the target controlled infusion (TCI) for 48 hours. Alfentanil was commenced to be infused at the initial target concentration of 30 ng ml^{-1} and slowly increased up to 105 ng ml^{-1} by increments of 5 ng ml^{-1} every five minutes, depending on systolic and diastolic arterial pressure and heart rate for the first 30 minutes after being transferred to the ICU, and then titrated up and down until the pain score became less than 3 (VAS; Visual Analogue Score <3).
Results and Discussion: Mean effect-site concentrations (ng ml^{-1}, Mean+/- SD) of alfentanil required to adequately control postoperative pain in the ICU were 66+/-8, 54+/-8 and 48+/-19 for intubation with artificial ventilation, intubation with spontaneous ventilation and after extubation, respectively. Mean effect-site concentrations (ng ml^{-1}, Mean+/- SD, Range) for VAS < 3 was 64+/-11, 50-95, and mean time for VAS < 3 was 5.6 hours since alfentanil was commenced.
Conclusion(s): The three mean effect-site concentrations of alfentanil obtained from this clinical trial using the TCI technique can be a guideline in the administration of the same opioid to relieve pain and other discomforts in the ICU patients who underwent abdominal general surgery.

10AP4-1

Impact of primary graft dysfunction grade III in early ICU postoperative evolution of lung transplants

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Introduction: Primary graft dysfunction (PGD) is one of the most common early severe complications after lung transplantation (LTP). Clinically it appears as lung opacities and pulmonary edema with hypoxia. Incidence ranges between 11-53%, ICU mortality is 29% and most of the deaths occur within 30 days (d) of transplantation.
Objectives: To determine the incidence, mortality and impact of PGD in lung transplant postoperative period, evaluating different variables in the ICU management.
Methods: Retrospective single center study including 102 LTP from June 2008 to September 2014. Several postoperative variables were evaluated, expressing the result in median +/- standard deviation.
Results: The 59% were male, with ages ranging 54+/-12 years. 63.7% were bilateral lung transplantation. 44% required cardiopulmonary bypass (CPB) with median time 241+/-76. The most frequent indications where Obstructive diseases with 37%, pulmonary fibrosis 33%, Pulmonary arterial Hypertension (HAP)17%, Cystic Fibrosis 7.8%, other 5%.
The mean UCI stay in lung transplant patients was 11d, with extubation in the first 48hours (h) in 55% of the cases and requiring Mechanical Ventilation (MV) in a mean time of 7d. 27% of the cases tracheeostomy was required.
23.5% developped PGD, from which 54.1% where grade III. In the analysis, PGDIII was significantly associated with MV>48h p0.00, OR 19.6, IC (2.4-158), need of tracheostomy p0.00, OR8.28, IC (2.3-29) and post operatory extracorporeal membrane oxygenation (ECMO) p0.04, OR16, IC (1.33-191), ICU >7d p 0.00, OR 11.1 IC(2.3-53), Renal failure p0.01 OR 6.3 IC (1.8-21.6) y Hemofiltration p 0.02 OR 3.6 IC (1.08-12.1), HAP post p0.01 OR 4.02 IC (1.2-13)
Global mortality was 17.6%. In patients with PGD mortality was 16% (4/24) and 15% in PGDIII (2/13). Global survival was 87.8% in the first year and 73.4% in 5 years (median follow up 1823,64 days). No differences where found in the global survival stratified rates between PGDIII and noPGD, nor in the firts year Log Rank 0.895 y 0.463
Conclusion: The incidence of PGD in our serie is similar to other studies. Patients with PGD grade III present higher rates of post operatory morbility, without having differences in survival or mortality. Based on our experience, the early use of ECMO and ultrafiltration in patients with PGD grade III could have led to lower mortality. This hypothesis requires a new study, which should include a higher number of patients.

GRADE	PaO2/flO2	Radiographic infiltrates consistent with pulmonary edema
0	>300	Absent
I	>300	Present
II	200-300	Present
III	<200	Present

[Recommendations for Grading of Primary Graft Dysfu]

10AP4-2

Postoperative arrhythmias in lung transplantation

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Background and Goal of Study: Arrhythmias early after lung transplantation (LT) are frequent and have a significant impact on morbidity and mortality. In this study we aimed to determine their prevalence as well as risk factors.
Materials and Methods: A retrospective single center study including all patients undergoing LT between October 2008 and October 2014 were designed to assess the occurrence of arrhythmias and its outcomes.
Results and Discussion: A total of 107 patients underwent lung transplantation during this time period: 38 underwent single and 69 underwent double lung transplant. The incidence of postoperative arrhythmias within 30 days in this cohort was 23.36%: eleven patients of these (44%) at the first four days post-LT. Most common arrhythmia was atrial fibrillation (68% of all arrhythmias), followed by atrial flutter (20%). Intravenous amiodarone was used in 52 % of patients.
The long-term mortality in arrhythmias group was higher: 24% (6 patients), when the global mortality of all patients was 16'82% (18 patients). The arrhythmias group was older (54.10 vs 52.85 years, p=0.12).
There was no statistically significant difference between the variables assessed (pulmonary hypertension, primary graft dysfunction, low cardiac output, extracorporeal circulation, extracorporeal membrane oxygenation, sex, indications for transplant, uni/bilateral transplantation) comparing patients with and without arrhythmic events except the use of continuous renal replacement therapies (p= 0.0017).
Conclusion: In our hospital, there was a high incidence of arrhythmias after lung transplantation, but it was lower than in other groups[1-2]. The development of early arrhythmias post-transplant is associated with increased mortality. The use of continuous renal replacement therapies increases the risk of postoperative arrhythmias.
References:
1. Raghavan D, Gao A et al. Contemporary analysis of incidence of postoperative atrial fibrillation, its predictors, and association with clinical outcomes in lung transplantation. J Heart Lung Transplant. 2014 Sep 28. pii: S1053-2498(14)01367-9 (epub ahead of print).
2. Henri C, Giraldeau G et al. Atrial fibrillation after pulmonary transplantation: incidence, impact on mortality, treatment effectiveness and risk factors. Circ Arrhythm Electrophysiol 2012; 5(1): 61-7.
Acknowledgements: We would like to acknowledge all members of Postoperative Intensive Care Unit of University Hospital 12 de Octubre at Madrid for all of their efforts.

10AP4-3

Complications after lung transplantation for pulmonary arterial hypertension (PAH): should we look to the right or to the left side of the heart?

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Background and Goal of Study: Idiopathic pulmonary arterial hypertension (IPAH) is associated with the highest short-term mortality after lung transplantation (22%)[1]. Episodic periods of hemodynamic decompensation accompanied by severe respiratory insufficiency have been described during the first days. The aim of our study was to identify episodes of acute pulmonary oedema associated with hemodynamic alterations in this population.
Materials and Methods: This is a retrospective single centre study including all patients with PAH that underwent bilateral lung transplantation (BLT) from March 2011 to September 2014. Data was analyzed for demographic variables, echocardiographic findings, need for extracorporeal membrane oxygenation (ECMO), ischemic time, bypass time, ventilator days, ICU length of stay and mortality. Endpoints were presence of primary graft dysfunction (PGD) or acute non-reperfusion pulmonary oedema (PE). PGD was defined and graded as ISHLT standard criteria. PE was considered as clinical or chest x-ray evidence with arterial blood gas deterioration.

Results and Discussion: 19 patients with PAH of WHO group 1 were collected. 3 patients required ECMO as a bridge to BLT and only 1 in the immediate postoperative course. 9 patients (47%) developed PGD. PE was described in 8 patients (42%) during weaning of mechanical ventilation. Concomitant increase of PAP and systemic blood pressure was observed. Postoperative echo findings revealed transient left ventricular systolic dysfunction (LVD) in only 2 cases with a drop of ejection fraction under 50%. Severe left diastolic failure was described in 1 patient. All patients showed a progressive normalisation of Right Ventricle (RV) function. An acceleration flow across the right ventricular outflow tract with increased pressure gradient was observed in 3 patients. 3-month mortality was 5,26% with only 1 patient died on 9th postoperative day due to a bilateral pneumonia.
Conclusion(s): The postoperative management of these patients is often challenging. Acute non-reperfusion pulmonary oedema is frequent and can complicate postoperative outcome. It has been postulated that the LV may be unable to handle normalized LV preload but pathogenesis is not clear and treatment must be set on an individual basis.
Reference: 1. The Registry of the ISHLT 2013. Yusen, Roger D. et al. JHSLT, vol 32, 10, 965 - 978.

10AP4-5

Organ donation referral and practice audit on a cardiac intensive care unit

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Introduction: There are currently over 7000 people on the transplant waiting list and during the last financial year, over 1300 people either died or became too sick to receive a transplant due to a shortage of available organs[1].
Methods: We audited organ donation referral and outcome for donation after circulatory death (DCD) or donation after brain death (DBD) on the Cardiac Intensive Care Unit (CICU), at the Northern General Hospital, over a 10 month period (October 2013 to August 2014). All recorded deaths on the CICU were examined as to the suitability for donation, whether the patient was referred to the organ donation coordinators and the patients' outcome. This audit did not require ethical approval.
Results: There were 29 recorded deaths from October 2013 to August 2014 on the CICU. Of these, 17 (58.6%) were male and 12 (41.3%) were female with mean age of 67 years old (SD of 10.9). The vast majority of the recorded deaths, 26 out of 29 (89.7%) were uncontrolled deaths (Maastricht Class 5). The mean length of stay on the CICU for these patients was 3 days (SD of 3.2). Of the remaining three patients: one died in theatre, one had critical care support withdrawn and subsequently died (Maastricht Class 3) and one patient was declared brainstem dead. The later two patients were referred to the Specialist Nurse for Organ Donation (SNOD). The Coroner refused permission to donate for the patient that had critical care support withdrawn. The patient that was declared brainstem dead went on to successfully donate. A SNOD independently reviewed the 26 patients with uncontrolled death, and felt they were not suitable for DBD or DCD.
Discussion: The present drive to increase referral rates for organ donation has coincided with the greater acceptance of organs from individuals. With this in mind, NHSBT asks to consider referral in all mechanically ventilated patients when a very high likelihood of death is recognized[1]. In line with current guidance, on our CICU only two out of the 29 deaths (6.9%) should have been referred for organ donation and were (100% compliance). Although most deaths on the CICU were not suitable for organ donation due to the uncontrolled nature of the deaths, clinicians should be aware of current guidance in this area as a small proportion on CICU patients may be suitable for DCD or DBD.
Reference: 1. Organ donation for transplant, Evidence update January 2014; Evidence Update 51 (NICE CG 135)

10AP4-6

Patients inform new patients with Excor BIVAD

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Background: At cardioth. ICU young patients receiving ECMO after severe cardiac failure. For those who survive the acute period many receive an Excor BIVAD and are often transplanted within 9 month. During the last two years we have a project at our ICU where former patients inform patients who are about to receive or recently have received a biventricular external heart pump, The project started because many of the patients felt very bad in their vulnerable situation.
Method: The experienced patient of both sexes returned to the hospital after the new patient had received the Excor and were awake at the ICU. Sometimes they brought a family member along or a close friend. They agreed that the information about other patients was kept secret.
8 patients have informed new patients (1-2 each) about all the practical things you need to know or want to know in their new life with an external heart.
We used a 14 question form and after the patients had informed a new patient they where asked to fill out the form. All 8 patients did. The questions were about how they felt about the information given by the staff and by the experienced patients.
Results: All 8 patients completed the questionnaire. Most patients were between 20 and 35 years old and several had small children. All patients have had a tracheostomy at some time and many had difficulty in talking. Some patients therefore used Lightwrighter® where they typed what they wanted to say and the machine spoke (with male or female voice) the message to the phone with their husband/wife or children or to us or the person informing them.
Almost all patients had a feeling of loneliness, frustration and anxiety. They felt that no one can understand the feeling of having their "heart on a cart beside them".
Information from another experienced patient was very good, because it was very trustworthy. The majority of the patients wanted to give information later on to new patients.
Discussion: This new concept of using patients informing new patients receiving Excor BIVAD was a success. It was possible to ask the personal questions like; "Can I take a shower?, Can you trust the batteries?, Can I be outside taking a walk in the forest?, Can my child/children sit in my lap?"
All patients agreed that this was a very good way of giving information with a very appreciated personal and reliable touch. They were not afraid of asking or answering intimate questions. This project is now part of our concept.

10AP4-7

Does extracorporeal membrane oxigenation improve life prognosis?

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Background and Goal of Study: Respiratory and cardiac failure refractory to conventional treatment have an elevated mortality. Extracorporeal Live Support (ECLS) therapy provides one chance for these patients. However associated complications cannot be underestimated. ECLS devices have a defined indication, but among them Extracorporeal Membrane Oxigenation (ECMO) is feasible in several critical conditions with different etiologies, which can provide short-term support to failing hearts and lungs. But is this situation an advantage or a disadvantage for our patients? Since the success of this therapies relies on careful selection of patients and ECLS perfusion strategy.
Materials and Methods: We restrospectively analized transfusion management in our patients on ECMO therapy from Mach 2012 to December 2014. Estadistic analysis was done with SPSS 20.
Results and Discussion: Among 25 patients on ECMO Maquet were reviewed, and we have found not only a progressively increasing use of ECMO in critically ill patients, but also an increase indication for cardiac failure. Indications for support were: Primary lung Graft Disfuction (PGD) (n=4), Pulmonary failure before transplantation (n=3), Acute Distess Respiratory Syndrome (n=1), Cardiogenic Shock(CS): due to primary cardiac graft failure (n=4), post-acute myocardial infraction (n=5), acute myocarditis (n=2), failure to wean from cardiopulmonary bypass in the setting of postcardiotomy (n=2), chronic heart failure (n=3),humoral rejection afeter cardiac transplantation (n=1). In 21 patients (84%) v-a ECMO device was established, whereas

v-v ECMO in 4 (16%). Always peripheral cannulation was choosen. Overall mean support time was 10.2 ± 10.3 days (range 1-46 days). Success rate, in terms on survival on ECMO 20% (n=5), cardiogenic shock indication has more mortality rather than respiratory failure p=0,04; OR 1.69 (95% CI 0.93-3.7). Weaning from ECMO support in 28% (n=7).
Conclusion(s): The high risk mortality in patients with cardiac shock on peripheral v-a ECMO, urge us to considerate if it isthe best practice. An important limitation of peripheral cannulation is left ventricular afterload mismatch, particulary in patients with very low cardiac output. Central cannulation would be considered as a better option, but a sternotomy is needed . Therefore peripheral ECMO could be a transition strategy to intermediate-term device.

10AP4-8

Incidence of sepsis related complications, common pathogens and antibiotic treatment for extra corporeal membrane oxygenator (ECMO) and ventricular assist device (VAD) patients

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Background: Harefield Hospital is a tertiary cardiothoracic centre for ECMO & VAD services in the area of Greater London accepting referrals for the south of the United Kingdom.
The aim of our study was to retrospectively review all patients treated with ECMO or VAD during the last 2 calendar years (2012-2013) with regards to days of ITU stay, outcomes, incidence of complications related with infection or sepsis as well as the use of antibiotics and inotropes.
Methods: We extracted data from the files of the perfusion department in order to identify the number of patients and personal details. The ICIP-ITU electronic documentation system was used in order to collect relevant information. A proforma was built for the facilitation of data collection.
All different pathogens, antibiotics and their combinations were recorded as well as specific inotropes, vasopressors and combinations of them respectively.
Results: 37 patients were identified, the mean length of ITU stay was 26.57±23.83. Patients who did not survive were 26 in number with mortality reaching 70.3%. 7 patients suffered complications of sepsis and 5 with ventilator associated pneumonia. The following pathogens were identified from different cultures: Clostridium Difficile 2 (5.4), Candida 7 (18.9), E.Coli 1 (2.7), Enterobacteria 1 (2.7), Klebsiella 1 (2.7), Pseudomonas 6 (16.2), Staph Aureus 4 (10.8), Aspergillus 1 (2.7), VRE 2 (5.4), Serratia 1 (2.7), No pathogen was found in 23 (62.2). 12 patients (32.4%) received culture guided antibiotic treatment. In 18 (48.6%) treatment was started empirically because of the severity of sepsis-infection related condition and finally 7 (18.9%) did not require cover during their ITU stay. Chi squared test was conducted to explore the relationship of different values with outcome (death).
No difference was found in death percentages between patients receiving different vasopressors or inotropes. Patients receiving teicoplanin, meropenem, ciprofloxacin or gentamycin had lower death percentages compared with patients that did not. (These results should be interpreted cautiously, as the sample size is small).
Conclusion: Mortality rates remain high in ECMO and VAD patients. A wide range of different pathogens can complicate patients with infection and sepsis leading to prolonged ITU stays and increased mortality rates.
Our study demonstrated that patients receiving teicoplanin, meropenem, ciprofloxacin or gentamycin had better survival.

10AP4-9

Successful use of interventional lung assist (iLA) in a patient with severe acute respiratory distress syndrome and septic shock after bariatric surgery

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Background: Postoperative respiratory complications in bariatric surgical patients are difficult to treat, due to the high body weight.
Case report: We report the case of a 20 year old woman (BMI 54,1, ASA III) after laparoscopic gastric bypass. On the 3rd postoperative day she developed a small bowel leak with consecutive peritonitis. The condition was complicated by an aspiration pneumonia with consecutive acute respiratory distress syndrome ARDS (Horowitz-index (HI) 49,7mmHg) and septic shock. According to the fast entry-criteria's (HI <50 mmHg >2 hours, PEEP>10mbar) and a combined hypoxic and hypercapnic (p_aCO_2 74 mmHg) respiratory failure an iLA ActiVVe®, Novalung, Germany was initiated. Two cannulas were inserted ultrasound-guided into the jugular and femoral vein. After starting the extra corporal membrane oxygenation (ECMO) p_aCO_2 decreased fast and oxygenation improved. Additionally ultraprotective lung ventilation was continued. Bronchoskopy was performed routinely and pleural effusions were drained. Prone position was not initiated because of the patients weight of 202 kg. Surgical therapy included the repair of the small bowel leak and abdominal dressing therapy. Due to leakage at the gastrojejunostomy with complete dehiscence of the anastomosis an esophageal fistula and drainage were performed. Renewing of the gastrojejunostomy was impossible due to massive peritonitis, sepsis and a BMI of 54. The course of disease was complicated by a septic shock with multiresistent bacterias and a critical illness polyneuropathy.
Initially the patient was fully dependant on the ECMO. Weaning was possible after 15 days. There were no cannulas or bleeding complications.
Discharge from the hospital was possible after 3 months without neurological disabilities. During the following 2 years the patient underwent restoring of the intestinal continuity by performing an esophagojejunostomy and plastic surgery. The patient is fully recovered with a BMI of 27.
Discussion: ILA is an effective device in treating ARDS, even in a bariatric setting. However, the treatment is very complex. The patient benefits from the sepsis-therapy combined with ultraprotective ventilation.
Reference: Murphy C, Wong DT. Can J Anaesth. 2013 60(9):929-45.
Learning Points: Extracorporal Membrane oxygenation is feasible in postoperative bariatric patients.

10AP4-10

Novel CO_2 removal device driven by a renal-replacement system without hemofilter. A first step experimental validation

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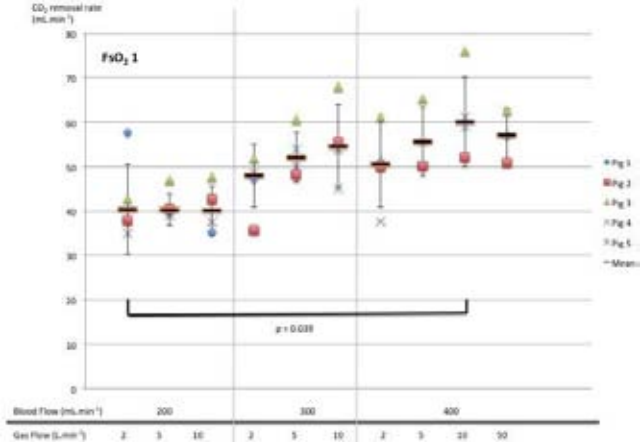
Background and Goal of Study: Management of ARDS patients includes low tidal ventilation with potentially deleterious hypercapnic acidosis. We tested the technical effectiveness of an easy-to-use standard pump-driven circuit in its ability to remove CO_2 from blood, as a first step validation of a novel $ECCO_2R$ system.
Materials and Methods: We conducted a prospective animal study on 5 female adult healthy pigs. Hypercapnic rendered animals were equipped with a low-flow CO_2 removal device (PrismaLung®, Hospal®) integrated on a CRRT platform *via* venovenous dual lumen 13Fr catheters. The rate of CO_2 elimination was examined *in vivo* using a hollow fiber gas-exchanger under various conditions (blood flow rates: 200, 300 and 400 $mL.min^{-1}$; sweep gas flows: 2, 5, 10 and 50 $L.min^{-1}$; FsO_2: 0.21 and 1).

Statistical analysis was performed with Student t-test.
Results and Discussion: The extracorporeal device produced CO_2 removal rates ranging from 35 to 75 mL.min^{-1}. Efficiency was increased with higher blood and sweep gas flows: reduction of PCO_2 of 40.2 ± 13.0 mmHg (relative decrease of 46%, p<0.001) and increase in pH of 0.24 ± 0.06 (7.21 before and 7.46 after filter, p<0.001).



[Carbon dioxyde removal rate with FsO2 100%]

Animals blood gases were significantly modified after 10 minutes of treatment: $PaCO_2$ decreased from 81.2 to 70.0 mmHg (relative decrease of 14%, p< 0.001) and pH increased from 7.17 to 7.22 (p< 0.001). No significant changes in arterial blood oxygenation were observed when using pure oxygen (increase of PaO_2 from 106 to 107 mmHg, p=0.36), allowing the use of ambient air as sweep gas through the membrane without loss of oxygenation.
Conclusion(s): A device based on a Prismaflex® platform was technically effective in removing CO_2 from blood, thus decreasing $PaCO_2$ and acidosis in hypercapnic pigs. Main advantages are the use of a novel stand alone gas exchanger kit easily implemented on widely available plateforms, small veno-venous catheters, low blood flows and low heparinization.
Hospal® (France) provided hollow fiber gas exchangers and Prismaflex® machines. Hospal® did not play any role in experiments design, data analysis, preparation and reviewing of the abstract and did not have access to data.

10AP4-11

Early recognition and successful resuscitation of an infant following traumatic iatrogenic rupture of the left internal iliac artery during arterial catheterization

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Background: Pediatric-focused education is emphasized for all practitioners in contact with children. In a case of a pediatric emergency the coordination of the involved medical team is extremely important and the role of the leader affects outcome.
Case report: A 56 days-old female infant (2910gr) born at 35 weeks of gestation presented to the cardiac catheterization lab for angioplasty (5F sheath) due to restenosis of the aorta after end-to-end anastomosis cause of coarctation. After anaesthetic induction with midazolam and fentanyl, atracurium was given and the patient was intubated. Maintenance was achieved with sevoflurane in O2/air and subsequent doses of fentanyl. Hemodynamic stability was achieved throughout the procedure. After extubation a sudden change in colour, the infant turned pale, was noticed by the anaesthesiologist who is an APLS/EPLS instructor. Peripheral pulses were undetectable and SpO2 was unrecordable, while heart rate rose to 160/min.
Under the instructions of the anaesthesiologist a cardiologist and a second anaesthesiologist were called and external pressure was applied over the left inguinal area where a possible hematoma was suspected. Through a 24G venous catheter fluid boluses of crystalloids, colloids and adrenaline were administered and the infant was reintubated. Blood was administered in a few minutes, the personnel of the OR was notified and the infant was urgently transferred. In the OR infusions of inotropes, blood and fresh frozen plasma were ready and infused through an intraosseous catheter.Laparotomy and repair of the injury reinstated palpable peripheral pulses and recordable pulse oxymetry. After 3 days in the ICU the infant was extubated with uneventful postoperative course.
Discussion: An uncommon but potentially life-threatening complication was successfully managed by the medical and nursing staff under the coordination of an experienced APLS/EPLS instructor. The development of instructors with a strong pediatric knowledge-base will provide more effective means to ensure high quality provision of pediatric emergency care.
References:
New Opportunity to Improve Pediatric Emergency Preparedness: Pediatric Emergency Assessment, Recognition, and Stabilization Course
Mark E. Ralston and Arno L. ZaritskyPediatrics February 2009; 123:2 578-580; doi:10.1542/peds.2008-0714
Learning points: Continuous education of health professionals is essential for the successful management of pediatric emergencies.

10AP5-1

Burn-related mortality in a reference burn care unit - 13 year experience

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Background and Goal of Study: Burn injuries continue to be a common health problem throughout the world. Its associated morbidity and mortality is a significant cause for concern [1]. We aim to characterize the population of patients that died in our intensive burn care unit over a period of 13 years.
Materials and Methods: A retrospective study was performed in patients who died between January 2000 and December 2012 in our Unit. Data was collected from all available medical records and analysed using descriptive methods. Associations were ascertained using the Pearson correlation. A p value less than 0.01 was considered significant.
Results and Discussion: A total of 277 patients died (14.2% of admissions). Mean age was 66 (+/- 20) years old, with a higher prevalence of males (69%). Fire burns (87,7%), boiling fluid (4.7%) and Lyell syndrome (3.6%) were the main sources of injury. The mean total body surface area (TBSA) affected was 40,3% (+/- 28); 49% of patients had over 60% TBSA. 90% had 3rd degree burns. Inhalation injury was present in 48% of cases and 84,8% were under positive pressure ventilation at the time of admission. Time of death ranged from 2 hours to 82 days (mean 17 days), with 21% (n=51) dying within 48 hours of admission. Main cause of death (92%) was multiple organ failure. An association between TBSA and age (Pearson -0,3) was found. TBSA (Pearson -0,31) and sepsis (Pearson -0,49) correlate with length of stay, suggesting they hasten the occurrence of death; as expected, a higher TBSA increases the incidence of sepsis (Pearson 0,38).
Conclusions: Fire was the most common source of injury and death. There was a very high prevalence of extensive and 3rd degree burns. Moreover, the older the patients are, less extensive must the injuries be for death to occur; this is in probable relation with a higher incidence of co-morbidities at this group. Furthermore, sepsis accelerates death, as one would expect, and has a higher incidence on those with more extensive burns. The yearly death rate remained fairly constant over the selected time period, higher than that of other centres [2]; as an intensive care unit, our centre deals mainly with the most severe cases - a possible explanation. In addition, it seems that our patients die at a later stage than those of other centres [2].
References:
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2. Burns. 2014 Jul 2. pii: S0305-4179(14)00169-7

10AP5-2

Role of skin cultures for earlier bacteraemia treatment in toxic epidermal necrolysis

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Background and Goal of Study: Toxic epidermal necrolysis (TEN) is a severe adverse cutaneous drug reaction that predominantly involve the skin and mucous membranes. It has an incidence of about 1 case/million per year. Experts recommend frequent monitoring of skin and blood cultures for early diagnosis of infection and antibiotherapy guided by results preventing its overuse. We conducted this study aiming to describe the epidemiology and assess the predictive value for bacteraemia of routine skin surface cultures.
Materials and Methods: We retrospectively analysed the chart of all patients with TEN hospitalized in our institution since January 1999 until June 2014. Blood and skin isolates were collected from laboratory database. Sensitivity (SEN), specificity (SPEC), negative (NPV) and positive (PPV) predictive values of skin cultures for the etiology of bacteraemia were assessed. Skin and blood cultures were compared with univariate analysis performed with Fisher Exact test using IBM SPSS Statistics 20.0 Software.
Results and Discussion: The qualitative skin and blood cultures performed in TEN patients (n=30) showed that the most prevalent microorganism isolated in blood cultures was A baumanni (27.8%). S aureus was isolated in 4 cases (22.2%), P aeruginosa and Enterobacteriaceae both in one case (5.6%). In skin cultures, S aureus was the most prevalent microorganism (28.0%), followed by A baumanii (20.0%), Enterobacteriaceae (16.0%) and P aeruginosa (12.0%). These cultures displayed good SPEC and NPV of bacteraemia for P aeruginosa (SPEC = 0.93; 95% CI, 0.77-0.99; NPV = 1; 95% CI, 0.87-1), methicillin-resistant S aureus (SPEC and NVP = 0.89; 95% CI, 0.71-0.97) and A baumannii (SPEC and NVP = 0.92; 95% CI, 0.74-0.99). SEN and PPV were relatively low for all pathogens studied. Skin colonization with A baumannii was associated with significant increased risk of bacteraemia
(OR, 75.0; 95% CI, 2.63-144.59; p = 0.004). Colonization with other pathogens was not associated with bacteraemia.
Conclusion: The most prevalent microorganism involved in bacteraemia, in our population, was A baumanii, which differs from literature whereby S aureus leads. Skin cultures showed a good NPV for bacteremia due to methicillin-resistant S aureus, P aeruginosa and A baumannii.
References:
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10AP5-3

Toxic epidermal necrolysis - retrospective analysis of almost fifteen years

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Background and Goal of Study: Toxic epidermal necrolysis (TEN) is a rare disorder characterized by mucocutaneous tenderness and typically hemorrhagic erosions, erythema and more or less severe epidermal detachment presenting as blisters and areas of denuded skin. Almost all cases appear to be caused by an idiosyncratic drug reaction. The average reported mortality rate of TEN is 25-35%; it can be even higher in elderly patients and those with a large surface area of epidermal detachment. More than 50% of patients surviving TEN suffer from long-term sequelae of the disease. The aim of this study was to analyze our experience treating TEN patients.
Materials and Methods: A retrospective study was carried out by analysing the medical records of consecutive TEN patients admitted at our Burn Unit from January 1999 to June 2014. A descriptive analysis was performed to determine the demographic data, etiology, severity index (SCORTEN) and variables recorded during hospitalization time. Continuous variables were reported as medians (interquartile range [IQR]).
Results and Discussion: Thirty patients were admitted, 13 males (43.3%) and 17 females (56.7%) with a median age of 53 years (IQR 72). The median time elapsed between the first symptom and hospitalization was 4 days (ICR 5), the discontinuance of the implicated agent was 4 days (ICR 11) and the length of hospitalization was 8 days (IQR 11). The median percentage of body surface area involved was 46% (IQR 82.5). The most common drugs involved in idiosyncratic reaction induced TEN were allopurinol (23.3%) and beta-lactam (20%). The treatment with acetylcysteine was used in 80% of the patients, intravenous immunoglobulins in 40%, systemic steroids in 56.7%, plasmapheresis in 50% and surgical cleaning in 36.7%. The most prevalent complications were pneumonia (40%), cardiac arrest (30%) and sepsis (23.3%). Our series showed an overall inhospital mortality of 36.7%, which was lower than the expected mortality based on SCORTEN (42.5%). It might represent a quality indicator of our Burn Unit.
Conclusions: Due to the high risk of mortality, management of TEN patients requires rapid diagnosis, evaluation of the prognosis, identification and interruption of the culprit agent, and specialized supportive care, ideally in an intensive care unit in order to achieve the best outcome for these patients.
References:
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10AP5-5

Do maximum procalcitonin blood levels correlate to characteristics of patients with bloodstream infection?

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Background and Goal of Study: In the past years number of patients, their age and comorbidity has risen substantially and they present longer stays in the post-anesthesia care unit (PACU). We hypothesize that maximum procalcitonin (mPCT) blood level in patients with positive bloodstream infection (BSI) correlate to age, days of PACU stay, total number of BSI, total number of other infection sites and personal history.
Materials and Methods: We conducted a retrospective observational study, where the patients with a stay in PACU longer than 48 hours were included. Patients with positive BSI were selected and mPCT linked using linear regression analysis (R^2) to various patients' characteristics such as age, days of PACU stay, personal history (cardiovascular and/or pulmonary and/or renal disease and/or immunosuppression), number of positive BSI and total number of other infection sources. A contrast of hypothesis was realised using the analysis of variance (ANOVA). Bacteremia rate and number of bacteremias per 1000 days of PACU stay were calculated.
Results and Discussion: 1162 patients during 2009-2013 were reviewed. We detected 109 positive BSI; 81 of them have PCT determination and were considered for linear regression. The bacteremia rate was 9.38% and the number of bacteremias per 1000 days was 14. Weak linear correlation was found for mPCT and age (R^2= 0.015 (p=0.28)) and mPCT and number of days in PACU (R^2=0.015 (p=0.28)), however the results are not statistically significant. There was no linear correlation for mPCT and total infection sources (R^2=0.004 (p=0.57)), mPCT and number of positive BSI (R2=0.002 (p=0.69)), mPCT and personal history (R^2=0.0005 (p=0.84)).
Conclusions: In our study we found no significant correlation between mPCT blood levels in patients with positive BSI and their characteristics. A multivariate analysis should be performed to detect factor that do influence the maximum value of PCT.
Reference: Timsit JF et al. Update on bloodstream infection in ICUs. *Curr Opin Crit Care.* 2012 Oct; 18(5):479-486.

10AP5-6

Norepinephrine may influence the effect of antibiotics

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Background and Goal of Study: Norepinephrine is widely used in the treatment of critically ill patents. Previous studies demonstrated that cathecolamines may enhance bacterial growth (1) and influence bacterial virulence (2). In this study we investigated the influence of norepinephrine on the minimal inhibitory concentration of antibiotics.
Materials and Methods: Norepinephrine concentrations: 0,027 - 3,5 ng mL^{-1}. Examined antibiotics: amoxicillin+clavulanic acid, cefotaxime, amikacin, oxy-

tetracycline, ciprofloxacin, and erythromycin.
Bacterial strains: *Staphylococcus aureus* ATCC 23925, *Escherichia coli* ATCC 25922, and *Pseudomonas aeruginosa* ATCC 27853.
Microbiological checkerboard method was used to determine the fractional inhibitory concentration index (FIC). This index determines synergistic (FIC≤0.5) or antagonistic (FIC≥4) interaction.
Results and Discussion: Norepinephrine has antagonistic interaction with amikacin on the examined *P. aeruginosa* and *E. coli* strains and with amoxicillin+clavulanic acid only on the *E. coli* strain. Our results may explaine one aspect of the difference between in vitro antibiotic sensitivity of the isolated bacterium and the clinical ineffectiveness of the same antibiotic in the patient.
Conclusion(s): Our results suggest that norepinephrine may influence the efficiency of antibiotic treatment.
References:
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2. Trends Microbiol 2008; 16:55.

10AP5-7

Adherence to empiric antibiotic treatment in peritonitis in a surgical ICU

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Background and Goal of Study: Adequate and early empirical antibiotic treatment together with the correct surgical source control is associated with improved prognosis in intrabdominal infection patients. Our aim was to review the adherence to the institutional intrabdominal infection protocol.
Materials and Methods: We took as reference the American IDSA and the Spanish GTIPO guidelines for empiric antibiotic treatment in peritonitis and adapted them after an epidemiological review of our hospital microorganisms antibiograms. Our Infection and Antibiotical Policy Commission approved the resultant institutional protocol in January 2013. We retrospectively included all abdominal infection patients admitted for more than 24 hours in our surgical ICU (SICU) during 2013. We collected the following data: age, sex, microbial cultures (if present, results and antibiogram), temperature (fever or hypothermia), low blood pressure, need for vasoactive treatment, tachycardia, tachypnea, mechanical ventilation or renal substitutive treatment, lactate levels and high risk factors for poorer evolution and antibiotic treatment. We compared the management adequacy compared with our institutional protocol.
Results and Discussion: Of the 198 patients admitted for more than 24 hours in our SICU, we included the 29 diagnosed patients for secondary (20) and tertiary (9) peritonitis. Nine cases were considered severe. 25 cases showed 2 or more criteria for SIRS, 16 needed vasoactive treatment and 16 lactate>2mmol/L.
Anaesthetists initiated the empiric antibiotic treatment most frequently (24 patients). Protocol was followed in 15 patients (51,7%), but only in one of the five patients treated initially by surgeons or emergency physicians. Samples for microbial culture were delivered before or during surgery in 11 patients (37,9%). Three patients lacked any microbial culture. The empirical treatment did not cover the sampled microbial in five patients.
Conclusion: We believe that a bundle of actions can be implemented to improve the adherence to the intrabdominal infection protocol, such as clinical sessions, protocol diffusion and cognitive aids to be distributed. A multidisciplinary approach is needed to include surgeons and emergency department physicians.
References:
Crit Care Med 2010;38(8):(S)
Rev Esp Quimioter 2009;22(3):151-172
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10AP5-8

Impact of early per-operative use of polymyxin-B hemoperfusion in septic patients undergoing emergency abdominal surgery

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Background and Goal of Study: Polymyxin-B hemoperfusion (Toraymyxin®) reduces blood endotoxin levels in abdominal sepsis. When used in intensive care unit in abdominal sepsis, it improved hemodynamics, organ dysfunction and clinical outcomes.[1]
This study aimed to evaluate the efficacy of endotoxin removal using a polymyxin-B adsorbing device during the per-operative setting of patients operated for abdominal sepsis, and to compare hemodynamic stability, fluid balance, vasoactive drugs use and outcome per- and post-operatively.
Materials and Methods: A prospective, single center, open, randomized controlled trial. Twenty-eight adults with severe sepsis or septic shock from abdominal origin and requiring emergent surgery were randomly assigned into two groups: the control group received conventional therapy, the PMX group received at least 2-hr per-operative session of polymyxin-B hemoperfusion plus conventional therapy.
Results and Discussion: Norepinephrine requirement decreased during the surgery in the PMX group (0.53 ± 0.83 to 0.29 ± 0.47 mg/h, $p=0.022$) but not in the control group (0.4 ± 0.41 to 0.42 ± 0.41 mg/h). The PaO_2/FiO_2 ratio increased in the PMX group (36 ± 20 to 45 ± 23 kPa, $p=0.024$), while it tended to decrease in the control group (43 ± 20 to 33 ± 12 kPa, $p=0.067$). As a result, at the end of the surgery, only 20% of the PMX patients versus 69% of the control patients were admitted in the intensive care unit ($p=0.02$). 28-day and 90-day mortality were not different between the two groups.

	PMX group n=15	CONTROL group n=13	p value
Demographics			
Age (yrs)	74 ± 11	70 ± 18	NS
Gender (M/F)	6/9	9/4	NS
SAPS II score (points)	49 ± 21	53 ± 30	NS
APACHE II score (points)	17 ± 8	16 ± 11	NS
Outcome			
Admission in ICU, n (%)	3 (20%)	9 (69%)	0.02
Total norepinephrine in mg at 6 hours	2.6 ± 4.3	5.1 ± 8.7	NS
Total volume infused in ml at 6 hours	4791 ± 1532	4367 ± 2652	NS

[Table 1]

Continuous data are expressed as mean ± SD. NS=non significant.
Conclusion(s): In this pilot study, per-operative session of polymyxin-B hemoperfusion significantly decreased norepinephrine requirement during surgery in patients with severe sepsis or septic shock from abdominal origin, was associated with better per-operative hemodynamic stability, and and required less frequent ICU admission.
References: [1] DN.Cruz, et al. JAMA 2009;301:2445-52.

10AP5-9

Guidelines for intrabdominal infection: adapting them to local flora

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Background and Goal of Study: Adequate and early empirical antibiotic treatment together with the correct surgical source control is associated with improved prognosis in intrabdominal infection patients. Our aim was to review the local microorganisms antibiograms to adapt the published guidelines to our institutional intrabdominal infection protocol.
Material and Methods: We revised the incidence in our hospital of Extended-Spectrum Beta-Lactamase (ESBL) producing *Enterobacteria*, *Pseudomona Aeruginosa*, azol resistant *Candida spp* and vancomicin resistant *Enterococcus*

from 2008 to 2011. After reviewing the literature, we took as reference the american IDSA and the Spanish GTIPO guidelines for empiric antibiotic treatment in peritonitis. Then, a multidisciplinary committee including surgeons, microbiologists, infectious disease department, and anaesthesia discussed the findings and consensused and adapted version for our hospital.

Results and Discussion: We found a higher *ESBL-producing Enterobacteria* incidence in blood samples (n= 240: 27% E Coli ESBL, 15,2% Klebsiella ESBL than the Spanish 2010 National Data (10,3% and 15,2% respectively). We registered a high incidence of resistant *Pseudomona Aeruginosa* to ciprofloxacino (33%), ceftazidima (35%), imipenem (37%) and meropenem (30%) and very low resistant to amikacina (2%). No *Acinetobacter baumanii* was found. The most frequent Candida was *Candida albicans* (57,9%) followed by *C.Parapsilopsis* (11%) with low incidence of Candida resistant to azoles: *C.Glabrata* (16%) and *C.Kruseii*.(0%). We also found low incidence of vancomicin resistant *Enterococcus spp (*2% E.Faecium). These data provided the Hospital Infection and Antibiotical Policy Commission local data to adapt the abdominal infection protocol to the local flora:

- Earlier carbapenem indication for nosocomial intrabdominal infection or patients at risk of ESBL enterobacterias.
- Amikacine as choose coadyuvant treatment in case of pseudomona suspicion.
- Fluconazol as empiric antifungal treatment.
- Vancomicin as choose antibiotic for enterococcus

Conclusion: Our study showed significant differences between our microbial flora and those reported in the literature. Local protocol adaptation should be performed based on local antibiogram data in order to avoid systematic use of wide spectrum antibiotics.

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Rev Esp Quimioter 2009;22(3)151-172
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10AP5-10

Should empiric treatment for secondary peritonitis include E. faecium?

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Background and Goal of Study: The role of enterococci as a pathogen in intraabdominal infections remains unclear with some evidence suggesting that enterococcal peritonitis is related with increased morbidity but not mortality[1]. Some authors recommend empiric antibiotic treatment for enterococci in some clinical scenarios, especially nosocomial peritonitis[2].

The aim of this study is to determine if non-adequate empiric antibiotic therapy for *E. faecium* secondary peritonitis is related to major complications during hospital stay. As secondary outcome, we compared differences in major complications and adequacy of antibiotic between nosocomial and community peritonitis.

Materials and Methods: Data was collected retrospectively from clinical charts of patients admitted between January 2008-September 2014. Patients were eligible if they were older than 18 years, underwent surgery for secondary peritonitis and had positive peritoneal cultures for *E. faecium*. Demographic data, clinical scores (ASA, SOFA 24hs), origin (community/nosocomial) and beta-lactamic resistance were recorded. Major complications (reintervention/percutaneous drainage and mortality) and length of surgical ICU stay were compared in both groups. For statistical analysis, SPSS software was used, along with chi-squared (Fisher or Pearson) and Mann-Whitney tests.

Results and Discussion: 90 patients were included (55% male). There were no differences on demographic characteristic variables, major complications or length of ICU stay (table 1) related to adequacy or not of *E. faecium* antibiotic coverage. In the subgroup analysis, we found that adequate *E. faecium* empiric coverage was greater in nosocomial vs community group (75% vs 24%, p .002). Major complications were greater on the nosocomial group (table 2).

Complication	Adequate (n=61)	Non-adequate (n=29)	p value
Reintervention/drainage	19 (31.1%)	6 (20.7%)	,301
Length of surgical ICU stay (mean days)	10,11	4,93	,200
Mortality	10 (16.4%)	5 (17.2%)	1

[Table 1: Adequate vs not-adequate/complications]

Complication	Community (n=32)	Nosocomial (n=58)	p value
Reintervention/drainage	2 (6.2%)	23 (40%)	,001
Length of surgical ICU stay (mean days)	3,56	11,14	,000
Mortality	2 (6.2%)	13 (22%)	,049

[Table 2: Complications related to origin]

Conclusion(s): In this study, mortality and major complications do not seem to be related to adequate *E. feaecium* coverage. Thus, routinely empiric coverage of *E. faecium* in secondary peritonitis might not be necessary.

References:

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10AP5-11

Intensive care unit mortality following novel multimodal treatment of peritoneal carcinomatosis

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Background and Goal of Study: Traditionally, patients with peritoneal carcinomatosis (PC) have been considered as having an incurable condition. They may benefit from the surgical removal of all macroscopic tumor, combined with loco-regional chemotherapy.

Therefore, cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) have been introduced as effective treatment for selective patients with PC. We aimed to investigate intensive care unit (ICU) mortality of patients with PC that underwent CRS and HIPEC at our Department.

Materials and Methods:

Patients: Patients treated for PC, between January 2007 and March 2014, at the Clinical Hospital Center Zagreb, were included in this study. We excluded those with extra-peritoneal malignant proliferation and ASA score of 4 and higher. A total of 94 CRS and HIPEC procedures were performed. The majority of patients suffered from ovarian cancer (N=46), followed by pseudomyxoma peritonei (N=20), and colorectal adenocarcinoma (N=17). Other primary tumor localizations included adenocarcinoma of the appendix, mesothelioma, and stomach cancer. One patient had PC of unknown origin. They were 76 females (81%) and 18 males (19%). The mean ± SD age was 55±13 years (range from 27 to 85 years old).

Perioperative Management: All patients underwent general anaesthesia, using sevoflurane, sufentanil, and rocuronium.

CRS. The same surgical team performed all procedures. Once surgical debulking was completed, both visceral and parietal peritonectomies were necessary for complete cytoreduction.

HIPEC. The Tenckhoff catheter, suction drains and temperature probes were placed through the abdominal wall and the abdomen was closed. The abdominal cavity was then filled with saline. After reaching the desired temperature (42.5° C), chemotherapeutics, dependent on the primaries, were added and perfusion of the heated chemotherapy was started for 90 minutes. Afterwards, all patients were transferred to the ICU.

Results: Early ICU mortality, within 30 days after the procedure, was 0.1%. On the 14th postoperative day one patient developed disseminated intravascular coagulopathy, which led to multi-organ failure and death.

Conclusion: CRS and HIPEC are complex procedures. Long learning curves for application of these techniques represent a major concern. Nonetheless, our low mortality rates show its power to gain life. Therefore, they should be considered as a standard multimodal treatment for PC in selected patients.

10AP6-1

Evaluation of the patients needing postoperative intensive care

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Background and Goal of Study: Patients needing postoperative Intensive Care (IC) can be predicted in the preoperative evaluation depending on their general status,age, comorbidities or surgical morbidity. This has led to a bed crisis in ICU and postponement of elective surgery, which has brought patients and relatives into conflict with physicians.

The aim of this retrospective study was to examine in a 1-year period, the mortality, indications and whether IC was really required by patients given indications for postoperative ICU.
Materials and Methods: The study comprised patients given postoperative ICU indication at the preoperative evaluation during 2014 after local ethics committee approval. Neonatal and emergency cases were not included. Patient data was obtained from the anaesthesia monitoring form, pre-anaesthetic evaluation form and from the hospital automated system records.
A record was made of demographic data, ASA, primary diagnosis, Charlson Mortality Index (CMI), the clinic giving ICU indication, reason for ICU, anaesthesia method, duration of ICU stay, APACHEII scores and mortality rates.
Results and Discussion: In the period 2013-2014,of 13,000 surgical patients, 304 were indicated for ICU. The mean age of patients was 64.38±16.02 years; mean ASA 2.72±0.63; meanCMI 2.91±1.38,mean APACHEII 16.39±9.40 and mean mortality rate 44.28±21.15%.62.8% of patients were ASA III, with a primary diagnosis of cancer in 47.7%. Indication for ICU was given by the Anaesthesia Clinic in 34.2% and Cardiology Clinic in 36.5%. The most common reason was close haemodynamic monitoring in 47.7%. General anaesthesia was applied to 77.9% of cases. Of the total patients, 34.2% were admitted to ICU postoperatively (40.4% of those indicated by Anaesthesia, 12.5% of Internal, 20% of Thoracic, 33.3% of Cardiology, 71.4% of Neurosurgery) and 3.9% were exitus in ICU. The mean stay in ICU was 3±4.50 days.
Statistically significant relationships in the same direction were determined between the ASA and APACHE II at 34.7%, between ASA and CMI at 32%, and between ASA and Predicted Mortality values at 30% ($p<0.01$).
Conclusion: Approximately one third of patients with an indication for ICU were admitted and approximately half of those were for close haemodynamic monitoring.
As the mean stay in ICU was 3 days and the actual mortality rate was much lower than the predicted rate, it can be considered that, rather than ICU admittance, there is a need for increasing post-anaesthetic care units for close haemodynamic monitoring.

10AP6-2

Outcome of patients with ICU length of stay 30 days and greater: a retrospective study

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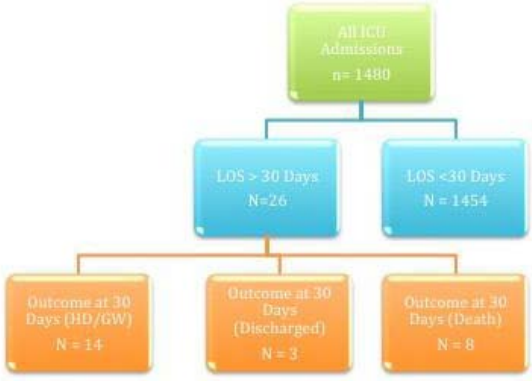
Background and Goal of Study: With the rapid advances in medical technology, the practice of intensive care has been able to treat and prolong the lives of the patients after their acute illnesses. However, this also reflects an increase in patients who remain critically ill for longer periods and require longer ICU treatment.
In our study, we define patients that stayed in a ICU for more than 30 days as long stayers or chronically critical ill (CCI).
We carried out a retrospective comparison of the outcomes at 90 days between CCI and the average patient in one of the government restructured hospital's surgical intensive care units admitted between 1 January 2012 to 30 June 2013.
Our goal was to examine characteristics and outcomes of patients with length of stay (LOS) >30 days.
Materials and Methods: The electronic medical records of the CCI were reviewed and the following data were analysed: admission characteristics, APACHE II scores, functional status and outcomes at 30 and 90 days. For the purpose of this study, the control group was designated as those patients who were admitted to ICU for less than 30 days.
Results and Discussion: CCI made up 1.82% of total SICU admissions. Average LOS is 54.5 days (31 to 115 days), whereas average ICU LOS in the control group is 5.6 days.
The average age of the CCI group is 73.5 with 60 and 92 being the extreme of the limits.
Mortality for CCI is 26.9% vs 16% for control group. For outcome at 90 days, only 10 (38.46%) were discharged from hospital. Of those discharged, only 5 were discharged back home.
Functionally, only 6 (23.08%) patients had tube-assisted feeding pre-ICU admission whereas all the CCI required tube-assisted feeding after admission. Only 1 patient had tracheostomy prior to ICU admission but 24 (92.3%) of them had tracheostomy tubes inserted eventually.



[Figure 1]

Conclusion(s): Patients with LOS > 30 days consumed a disproportionate amount of ICU resources, with a higher mortality and morbidity as compared to the control population. Their functional outcomes and quality of life are more dependent and require greater nursing needs.
Acknowledgements: Li Li, ICU Executive

10AP6-3

Application of MODS and SOFA scores in predicting outcome of critically ill patients

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Background and Goal of Study: Critically ill patients admitted to the intensive care unit (ICU) have different degrees and combinations of organ dysfunction or failure. We used two of the systems to evaluate these patients and to predict hospital mortality: Multiple Organ Dysfunction Score (MODS) and Sequential Organ Failure Assessment (SOFA) score.
Materials and Methods: In a prospective study we monitored critically ill patients admitted to the ICU. Demographic, laboratory and clinical data were collected during the past two years. Admission MODS and SOFA score and maximum MODS and SOFA scores were calculated and compared regarding hospital mortality. The prognostic ability of these two scoring systems were assessed by the areas under the receiver operating characteristic curves (AUC). Patients with length of stay in the ICU less than two days following uncomplicated scheduled surgery were excluded from data collection.
Results and Discussion: In the study period, there were a total of 832 (100%) patients admitted to the ICU. Data collection was successful in patients 698 (84%). Most patients were male 411 (59%) with an overall mean age of 58+18 years. The mortality in the ICU was 24% (201). The AUC of admission scores were 0,78+0,04 for MODS and 0,83+0,05 for SOFA in predicting mortality. The AUC of maximum scores were 0,86+0,05 for MODS and 0,92+0,04 for SOFA. Maximum MODS and SOFA scores had better ability in predicting mortality than the admission scores respectively ($p<0,05$). When directly compared, there were no significant differences between the MODS and SOFA score in outcome prediction.
Conclusion(s): The MODS and SOFA score are reliable outcome predictors in critically ill patients. Our results show that the maximum scores are more ability than admission scores to predict hospital mortality.
References:
1. Bota DP., Merlot Ch., Ferreira FL., Ba VN., Vincent J-L.The Multiple Organ Dysfunction Score (MODS) versus the Sequential Organ Failure Assessment (SOFA) score in outcome prediction. Intensive Care Med 2002;28(11):1619-24.
2. Amaral AC K-B., Andrade FM., Moreno R., Artigas A., Cantraine F, Vincent JL.Use of the Sequential Organ Failure Assessment score as a severity score. Intensive Care Med 2005;31(2):243-9.
3. Higgins TL. Quantifying Risk and Benchmarking Performance in the Adult Intensive Care Unit. J Intensive Care Med 2007; 22 (3) 141-56.

10AP6-4

Predictive factors of acute kidney injury in critically ill patients

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Background and Goal of Study: Earlier recognition of acute kidney injury (AKI) predictive factors could have important impact on right timing of therapeutic measures and lower mortality in critically ill patients. The goal of the study was to detect acute kidney injury occurrence predicitive factors in the first 24 hours of hospitalization.
Materials and Methods: This retrospective-prospective observational epidemiologic study investigated 251 critically ill patients-study subjects who were treated at Emergency centre of Vojvodina ICU department during 2011 and 2012. Potential predictive factors were identified out of medical records; the occurrence of AKI was noted according to RIFLE criteria. IBM SPSS version 20 was used for statistical analysis, standard statystical test were applied. Statystical significance was set at p value of less than 0,05. Multivariate logistic regression model was used for potential predictive factors. Statystically important factors were identified and their best sensitivity and specificity cut-off values were found using ROC curve analysis; These cut-off values were used for creating a potential scoring system that determines the risk for AKI occurrence.
Results and Discussion: The cut off value of urine output during first hour after furosemide intravenous bolus of 0.165 ml/kg body weight/h/miligram of administered furosemide has the highest sensitivity (82.3 %) and specifity (67.5 %) in differentiation of patients who would develop AKI which is in accordance with the study of Chawla and colleagues who developed furosemide stress test. The final suggested model of scoring system with the role of acute kidney injury prediction after 24 hours of treatment is presented in Table 1.

Risk factors	Beta	p	OR	95,0 % confidence interval	Score
Age ≥ 53 years	1,403	0,001	0,246	0,107-0,564	2
APACHE II ≥ 16	1,466	0,000	0,231	0,106-0,505	2
Urine output first 6 h < 0,875 ml/kg/h	1,908	0,000	6,740	3,023-15,032	3
Vasopressor administration (yes/no)	1,183	0,010	0,306	0,125-0,751	2
Potassium ≥ 4,515 mmol/l	1,249	0,001	0,287	0,133-0,617	2
Lactates higher than 2 mmol/l	2,323	0,002	0,098	0,023-0,411	4

[Potential scoring system for predicton of AKI]

Conclusion(s): Critically ill patients who are more likely to develop acute kidney injury are older, have higher APACHE II score values, lower avarage urine output in the first 6 hours after ICU admission, are administered vasopressor medication, have higher blood potassium and lactate concentration in the first 24 hours of their treatment.

10AP6-5

Continuous renal replacement therapy and acute kidney injury after lung transplantation

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Background and Goal of Study: Acute kidney injury (AKI) is a common occurrence after lung transplantation (LT); some of these patients need continuous renal replacement therapy (CRRT) postoperative; besides we sometimes use CRRT for management of fluid overload without AKI.
We aimed to describe the incidence and outcomes associated with AKI following LT.
Materials and Methods: We conducted a retrospective cohort analysis of all adult recipients of LT at a single center between 2008 and 2014.
Results and Discussion: Of 107 LT patients enrolled, AKI occurred in 32 (29.91%) within their stay in the postoperative intensive care unit (PICU) after LT, with severity classified as AKIN 1 in 73.33% (n = 22), AKIN 2 in 6.67% (n = 2) and AKIN 3 in 20% (n = 6). The incidence of AKI after double-lung transplantation was 39.13% compared to 13.15% following single-lung transplantation.
Of 32 patients with AKI, chronic kidney disease occurred in 13 (40.60%) and dialysis was necessary in 2 of these (15.38%).
Long-term mortality was not significantly higher in those with AKI compared with no AKI (18.75% versus 16%, respectively).
CRRT was received by 19 (59.37%); besides there were 8 patients without AKI but with CRRT for management of fluid overload. The mean PICU stay in LT was 11 days, while mean PICU stay in LT with AKI and CRRT was 23.74 days and in LT with CRRT without AKI was 17.38 days.
Multivariate analysis showed postoperative AKI and renal replacement therapy as risk factors for cardiac arrhythmias (p=0.0017).
Conclusion: AKI is a common complication after lung transplantation. In our center, we use CRRT more frequent than other series, and we often use CRRT for management of fluid overload without AKI; this makes easier the treatment of this kind of patients (increased lung vascular permeability**,** lack of lymphatic drainage). AKI is a risk factor for long-term chronic kidney disease and, along with CRRT, for arrhythmias.
References:
1. Fidalgo P, Ahmed M, Meyer SR, Lien D, Weinkauf J, Kapasi A, Cardoso FS, Jackson K, Bagshaw SM. Association between transient acute kidney injury and morbidity and mortality after lung transplantation: a retrospective cohort study. J Crit Care. 2014; 29(6):1028-34.
Acknowledgements: We would like to acknowledge all members of Postoperative Intensive Care Unit of University Hospital 12 de Octubre in Madrid for all of their efforts.

10AP6-6

Tubular dysfunction in critically ill patients

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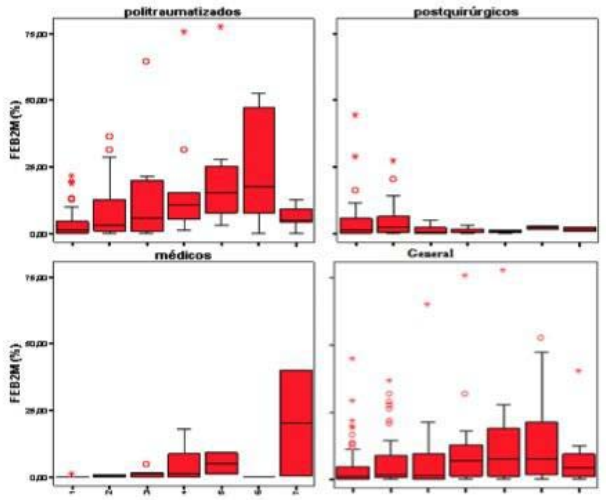
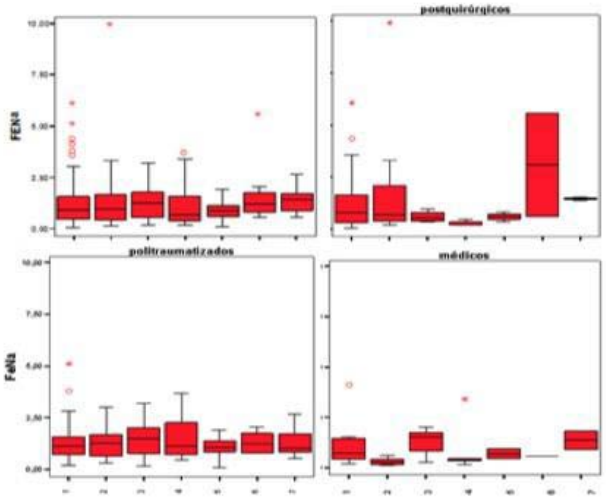
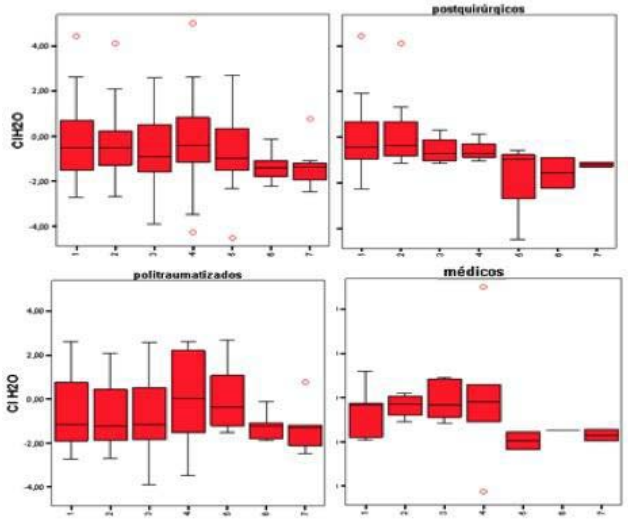
Background and Goal of Study: Data about renal function in critically ill patients is mainly focused on glomerular filtration.
However, there is a lack of information regarding tubular disorders. We describe an exploratory study about tubular disfunction in a cohort of patients admitted to ICU.
Materials and Methods: We developed a prospective observational study in a cohort of patients admitted to ICU. They were divided in “trauma group”, “medical group” and “post-surgical group”. 210 urine samples from 89 patients were obtained.
Routinely determinations of FeNa, B-2 microglobulin and free water clearance (CLH2O) were obtained. Ethic’s Committee of our centre approved the study.
Results and Discussion: The main characteristics of the population in the study are shown in Graph 1.
FeNa: The median values regarding FeNa showed a slight positive tendency along the days, with a negative trend at days 4 and 5. Most of these alterations belonged to trauma group (Graph 2).
ClH2O: ClH2O values are negative all the days (Graph 3). In days 4 and 5 trauma group shows a tendency to eliminate water even more pronounced.
FeB2M: Graph 4 details a considerable rise in FEB2M values, mainly attributable to trauma group.
Therefore is trauma group the one with most shifts: mean calculated FeNa ranges from 1’065% to 1’53% (days 4 and 5); median values of FeB2M rises up to 17’52% (day 6) and ClH2O shows a negative tendency, with a peak of positive clearance (0’791mL/min/1’73m2) between days 4 and 5. These findings concerning tubular function agree with the results obtained by Fuster Lluch et al regarding glomerular function. In this study a change in glomerular dynamics was observed in days 4 and 5, and they proposed the development of compensatory mechanisms following fluid administration; in our study, both FeNa and ClH2O show changes in days four and five respect previous and later days.
Conclusion(s): In our exploratory study we found that FEB2M, FENA and ClH2O values are altered in critically ill patients, especially in trauma group.
There is lack of data regarding tubular disfunction in adult critical patients. Several parameters have been proposed to quantify the efficacy of tubule functioning. ClH2O or B2M measure could work as important markers to assess about tubular function, but we do not have enough data to establish a real profit of them.



[FeB2M description in ICU patients]



[FeNa description in ICU patients]



[ClH2O description in ICU patients]

10AP6-7

Effects of allopurinol and apocynin on renal ischemia reperfusion injury

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Background and Goal of Study: Reactive oxygen species (ROS), which is a critical mediator of ischemia reperfusion (IR) injury, is generated by numerous sources, including xanthine oxidase (XO), NADPH oxidase (NOX), and the mitochondrial respiration chain. To ameliorate renal injury induced by IR, several therapeutic strategies to inhibit XO and/or NOX have been investigated experimentally. Allopurinol (ALP), a xanthine oxidase inhibitor, and Apocynin (APC), a NADPH oxidase inhibitor, inhibit ROS production via different mechanisms. Thus, combined administration of these inhibitors may be more effective than individual treatment. This study was designed to investigate the renoprotective effect of ALP and APC during renal IR injury individually and in combination.
Materials and Methods: After Institutional Animal Care and Use Committee approval, male Sprague-Dawley rats weighing between 275 and 325 g were included in this study. Rats (n = 30) were divided into: sham operation (Sham); renal IR injury only (Control: 30min ischemia followed by 24h reperfusion); ALP was administered 1h before the ischemia (ALP); APC was administered 1h before the ischemia (APC); ALP and APC were coadministered 1h before ischemia (ALP+APC). Then, blood (for Cr and BUN) and renal tissue (for MDA and SOD with spectrophotometer) were obtained for anlaysis. Histopathological analysis using PAS staining was also done.
Results and Discussion: Renal injury markers (serum Cr, BUN, histologic changes) demonstrated that pretreatment with ALP or APC alone, or together ameliorated renal IR injury ($P<0.05$). Decreased MDA and elevated SOD levels in the pretreatment with ALP or APC alone, or together group demonstrated that the amelioration of renal damage occurred through oxidative stress ($P<0.05$). However, there was no significant difference between treatment with a single drug and coadministration of ALP and APC.
Conclusion(s): ALP and/or APC individually and in combination therapy protects against renal dysfunction caused by IR. NOX and XO may act in series, rather than in parallel.
References:
Altintas R, et al. *J Endourology, 2013,* vol. 27, pp 617-24.
Liu PG, et al. *World J Gastroenterology, 2008,* vol. 14, pp 2832-7.

10AP6-8

Dexmedetomidine dose-dependently prevent ischemia reperfusion injury of kidney in a concentration-dependent manner in mice

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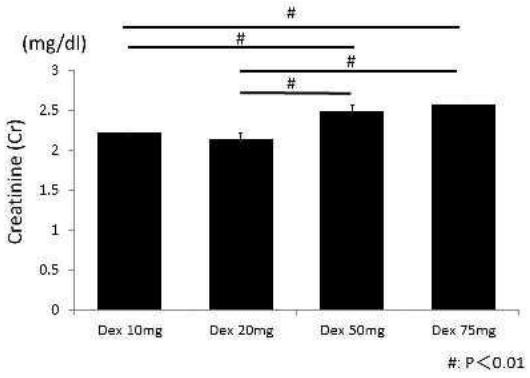
Background: Dexmedetomidine is selective agonist of the α2-adrenoceptors with anesthetic and analgesic. Recently, Dexmedetomidine have been reported brain-protective properties and diuretic effect of kidney. Acute kidney injury (AKI) is important complication for mortality during the perioperative period. Thus, we hypothesized Dexmedetomidine have effect of renal protection in the ischemia reperfusion injury dose-dependently.
Materials and Methods: All animal experiment procedures were performed in accordance with the guidelines for animal experimentation of Kitasato University School of Medicine. We made 4 groups, concentration of administer dexmedetomidine; 10ug/kg/hr(G1; n=8), 20 ug/kg/hr (G2; n=7), 50 ug/kg/hr(G3; n=5), 75 ug/kg/hr(G4; n=6). We made model of ischemia reperfusion injury of kidney in mice. The unilateral nephrectomy was performed 7 days before the ischemia reperfusion injury. The ischemic period is an hour. The mice were Inserted IV catheter into right internal jugular vein, and continuous injected dexmedetomidine from an hour before renal ischemia to an hour after renal ischemia-reperfusion, for 3 hours. At the 24 hours after ischemia reperfusion injury of kidney, we measured their Blood Urea Nitrogen (BUN) and serum creatinine (Cr). Statistical analysis was performed by using one-way Unpaired t-test, and statistical significance was set at $p<0.05$.
Results: There was no significant difference in mortality between groups. The creatinine was significantly lower value in G1 compared with G3 and G4 (2.22±0.036 versus 2.49±0.079 and 2.57±0.104). In addition, G2 significantly prevented the rise of creatinine relative to G3 and G4 (2.14±0.074 versus

2.49±0.079 and 2.57±0.104). Also, BUN was not significantly differences between groups.
Conclusion(s): Present study showed the dexmedetomidine might be prevented the ischemia-reperfusion injury in the kidney. However, the super-high level of dexmedetomidine exacerbated renal function.



[Creatinine]

10AP6-9

Recognition of risk factors for AKI and on-going care of patients prior to undergoing RRT in critical care-are we doing enough?

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Background and Goal of Study: NICE published guidelines for the care of patients at risk of acute kidney injury (AKI) in 2013[1] with recommendations for the prevention, detection and management of patients with AKI. This audit examines whether risk factors for AKI in the patients who needed renal replacement therapy (RRT) were present, and whether they were acted upon to potentially reduce the need for RRT.
Materials and Methods: A retrospective case note audit of all patients admitted to Southport District General Hospital between 4/2/13 and 17/1/14 that required RRT was conducted. Patients were identified by a search of the ITU database and 16 patients were found. A data collection form was used to collect data from case notes and computer records. Data was analysed using Numbers.
Results and Discussion: During the time time period 16 patients were identified, 12 required RRT for AKI, 3 were existing CKD 5 patients who were hyperkalaemic, and one patient for persistent acidosis secondary to sepsis. All patients had pre-existing risk factors, the recognition of which was poor. Nephrotoxic drugs were the most common (8 patients) however only 5 patients were noted to have this as a risk factor. On-going care was also inadequate, with only 33% of patents having correctly documented observations and early warning score to monitor for deterioration.
Conclusion(s): The majority (75%) of patients undergoing RRT had an AKI. Risk factors for AKI are not being noted or acted upon, the most common of these being nephrotoxic drugs and sepsis. Care on the ward can also be improved to reduce the risk of AKI, principally by improving the documentation of observations and fluid balance. We would recommend that early education for junior doctors about the importance and implications of AKI, including use of the AKI risk assessment currently in the medical clerking proforma would improve results. Ultimately there needs to be action rather than just documentation and therefore an AKI flowchart would be more appropriate, outlining the actions to take according to number of risk factors.
Reference:
1. NICE Clinical Guideline 169. Acute kidney injury: Prevention, detection and management up to the point of renal replacement therapy. August 2013. http://guidance.nice.org.uk/CG169

10AP6-11

A case series report: our experience with a citrate anticoagulation continuous veno-venous hemodialysis protocol in contraindication to systemic anticoagulation, heparin induced thrombocytopenia and high-bleeding risk population in a polyvalent critical care unit: transfusion requirements

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Background: Advantages granted to Regional Citrate Anticoagulation (RCA) for Continuous Renal Replacement Therapy (CRRT) include no systemic anticoagulation what may lower risk of bleeding and blood products consumption, longer life-time of extracorporeal circuits and better renal function recovery[1]. On the other hand, RCA increases complexity, costs and burden of work. Recently developed automated systems for RCA have facilitated their implementation and security has been improved.
Case Series Report: Between October 2011 and January 2013 1958 patients were admitted to our unit (325 AKI), heparin-CRRT was started in 52 patients as usual, 7 of them required shift to RCA-CRRT due to either contraindication to systemic anticoagulation, heparin induced thrombocytopenia or high-bleeding risk.
RCA was achieved by an automatized system with prefilter infusion of citrate adjusted to blood flow (post-filter iCa target 0.35 mmol/L) and post-filter Ca administration adjusted to filtrate flow (systemic iCa target 1,1-1,2 mmol/L). Readjustments were based on pH, BE and iCa sampled every 8 hours in patient and extracorporeal circuit[2].
Discussion: No difference in hydro-electrolytic balance was observed but higher bicarbonate and iCa arterial values in patients under Regional Citrate Anticoagulation, values observed within biological safety levels.
Patients whose anticoagulation regimen was not modified consumed 0.36 ± 0.37 hematic concentrates (HC) daily. The transfusion requirements of shift patients to RCA before the change of anticoagulation were 1.14 ± 0.61 HC/day, under RCA the requirements were 0.5 ± 1.18 HC/day. Patients turned to RCA consumed 1.8 times more HC under heparin anticoagulation than the other patients ($p<0.05$), under citrate anticoagulation HC consume matched the transfusion requirements of the other patients.
References:
1. Oudemans-van Straaten, H. M., et als. “ClinicalReview:Anticoagulation for Continuous Renal Replacement Therapy-heparin or Citrate?” Crit Care 15 (2011): 202.
2. Morgera, S., et als. “A safe citrate anticoagulation protocol with variable treatment efficacy and excellent control of the acid-base status,” Crit. Care Med., vol. 37, no. 6, pp. 2018-2024, Jun.
Learning Points: RCA has proven to be reasonably safe and effective but requires tighter controls that increase workload.
There may be a lower risk of bleeding that could result in improving outcome.
RCA may be of choice in selected patients.

10AP7-1

The use of intraventrikuler colistin in the management of multi-drug resistant Acinetobacter baumannii: a case report

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Introduction: Acinetobacter species-induced meningitis is rare and usually seen as hospital-acquired infections upon placement of external or internal ventricular catheters after neurosurgical interventions or head trauma. Multidrug resistant Acinetobacter Baumannii meningitis has a high morbidity and mortality. Its long and difficult management constitutes a great risk as well. In this report, we present the treatment of a case who had Acinetobacter meningitis.
Case report: A 14-year old female patient with a weight of 60 kg apllied to emergency department with vomiting 1 month after cranioplasty with synthetic material for traumatic frontal bone defect. Upon computerized tomography of brain, she was found to have hydrocephalus and had external ventricular drainage (EVD) catheter placed. Ten days later, she developed Staphylococcus hemolyticus meningitis diagnosed from cerebrospinal fluid (CSF) culture and transferred to intensive care unit. According to culture

antibiogram results, she started 600 mg linezolid bid treatment. Her cranial magnetic resonance imaging (MRI) showed abscess formation in left frontal area with ventriculitis and ependymitis. She was taken to operating room to have synthetic cranioplasty material removed. She had occlusion of EVD catheter which was replaced for 4 times later. She continued to have high fever and repeated cultures of tracheal aspirate and cerebrospinal fluid revealed Acinetobacter Baumannii infection. She received colistin (300 mg loading dose and 300 mg/day intravenous with 5 mg/day intraventricular in maintenance) and sulbactam:cefoperazone (3 gram:2 gram intravenous). The efficacy of treatment was assessed with CSF culture and cell counting. Despite sterile CSF cultures, patient continued to have high fevers and had cranial CT performed. She had hydrocephalic severe dilatation in third and lateral ventricles secondary to infection and operations which could have potentially disrupted temperature regulation in hypothalamus and led to central fever. Her antibiotherapy was terminated and the patient was discharged.
Discussion: The mortality rate is high in multi-drug resistant A.baumannii meningitis. Recent studies recommended addition of intrathecal and intraventricular treatments to standard intravenous therapy. The prognosis would be better in patients who receive systemic and intraventricular treatments together.

10AP7-2

Cerebral circulatory arrest due to tension pneumocephalus during cranial surgery - postoperative evaluation and care

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Background: Tension pneumocephalus (TP) is a rare but potentially life-threatening complication of cranial surgery[1]. It is characterized by continued air influx to intracranial region, leading to mass effect over the underlying brain and neurological deterioration[2]. We describe a case of TP occurring during tumor ressection.
Case report: A 58-year-old woman, ASA II, underwent elective craniotomy for ependymoma resection under total intravenous anesthesia. After dura mater closure patient suddenly developed hypertension (230/160 mmHg), bradycardia (30 bpm), zero bispectral index (BIS) and bilateral mydriasis unresponsive to pharmacological measures. Urgently re-opening was performed with immediatly clinical status improvement, ongoing hemorrhage excluded and dura mater was closed without further complications. Computed tomography (CT) reveals gas collection from cortical planes to the basal ganglia with mesenchepalic compression. She was admitted in the neurocritical intensive care unit (NCCU) sedated with propofol and remifentanil, hemodynamically stable with left anisocoria and presenting BIS 40. Follow-up CT showed parcial reabsorption of the intracranial gaseous component. Weaning of sedation was performed with caution and the patient was succefully extubated after consciousness recovery with mild right hemiparesis. Discharge to the ward occurred 2 days later with a GCS of 14 and without neurological deficits.
Discussion: Pneumocephalus is common after neurosurgical procedures, but usually benign and spontaneously absorbed. TP is rare and can result in an important mass effect, leading to increased intracranial pressure, decrease cerebral pressure perfusion below critical closing pressure and eventually cerebral circulatory arrest. Intraoperative contributing factors may include: head position, hydrocephalus, osmotherapy, hyperventilation and duration of surgery[2]. Avoidance of these factors, high index of suspicion, confirmation with neuroimaging and prompt decompression are important in attenuating mortality and morbidity. This case illustrates the importance of prompt recognition and timely decompression.
References:
1. Swan, MC.; et al. J CranioMaxillofac Surg. 2013; 41(8): 850-5.
2. Pradipta T.; et al. Indian Journal of Neurotrauma. 2013; 10 (2):127-130
Learning Points:
TP is a potentially life-threatening complication of cranial surgery.
Prompt descompression is important in attenuating mortality and morbidity.

10AP7-3

Review of sedation practice in tertiary neuro centre

Rungta A.[1], Griffiths S.[2], Hulgur M.D.[1], Ahmed H.[3], Saxena V.[4]
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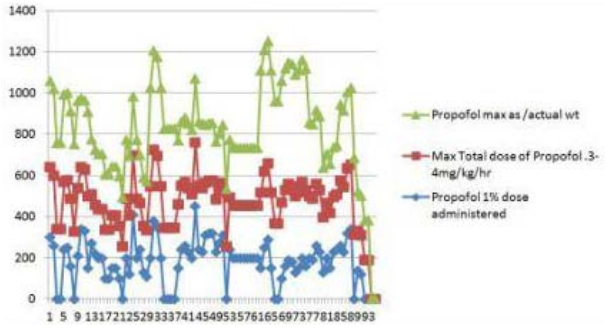
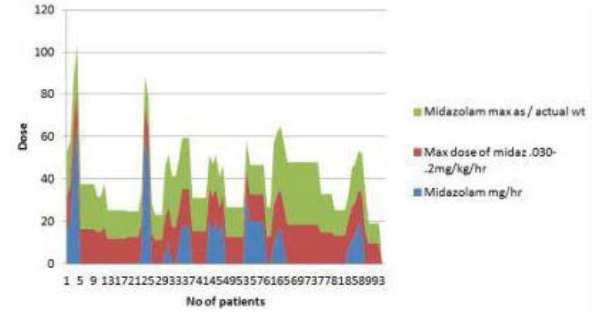
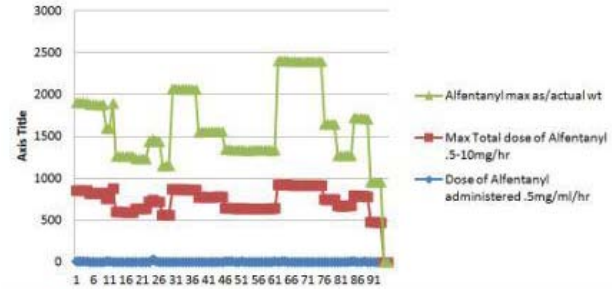
Background: Most patients in the ICU require some form of sedation to help them comply with the treatment. Problems with excessive and inadequate sedation is common. Hospital guidelines exist but in reality this is difficult to implement due to complicated calculations. The clinical needs at times, warrants usage of the sedative drugs in doses which exceed the recommendations. As there was no sure shot way to assess whether or not upper limit of the drug is routinely crossed, we conducted a prospective audit.
Methods: Included all patients admitted to our ICU between March - May 2014 who got any form of sedation. 93 patients recruited. The maximum dose administered in the last 12 hrs was taken as the max dose for that period. Data was collected for every patient till they came off sedation. We compared the sedation practice in three areas- actual dose given, recommended maximum dose depending on actual body weight and recommended max. dose dependent on adjusted body weight. We looked at Propofol, Alfentanyl and Midazolam
Results:



[Propofol]



[Midazolam]



[Alfentanyl]

Discussion: This audit demonstrated that the sedative drugs that were administered in our ICU were within safe limits. There was a small window of opportunity to increase the dosage depending on the need. Calculations to use drugs as per adjusted body weight are complicated and an online computer based tool would be needed.

Reference: Hansen et al:Use of sedating drugs and neuromuscular blocking agents in patients requiring mechanical ventilation for respiratory failure. JAMA 1991, 266:2870-2875

10AP7-4

Desflurane versus propofol for postoperative sedation of mechanically ventilated liver transplant recipients

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Background and Goal of Study: Careful drug selection and monitoring of adequacy of sedation can minimize the risks of over sedation and side effects. To compare Desflurane (Des) versus Propofol (P) sedation with regards to haemodynamics, recovery profiles, side effects and costs
Methods: A prospective randomized controlled pilot study involving 60 mechanically ventilated recipients. Equally randomized to be sedated with Des in air/oxygen 1 litre min^{-1} or P 4mg/kg/hr. Patient State Index (PSI) of SEDLine (Masimo, Irvin, CA) was used for sedation depth (50-75) and altering Des % and P intravenous infusion rate. Ramsay sedation score (RSS) was monitored as well. Fentanyl was used to assist sedation and additional analgesia. Transesophageal Doppler (TED) parameters were recorded hourly, corrected flow time (FTc) of TED was used for fluid optimization. Memorization of five words, Trieger dot, digit symbol substitution tests and response to eye opening were recorded.
Results: Systemic vascular resistance (SVR) and mean blood pressure (MBP) were better preserved with Des vs, P under comparable PSI readings between both groups at all measuring points (SVR, MABP and PSI after 2hrs sedation 908.93±139.5 vs. 617.6±104.5 dyn.sec.cm^{-5}, $P<0.01$ and 77.0±3.8 vs. 63.4±6.3 mmHg, $P<0.01$, 63.30±6.374 vs. 62.2±5.8,P=0.517 respectively), in contrast the mean RSS was consistently higher with Des compared to P, $P<0.01$ at all times. Rapid recovery with Des sedation vs, P (2.0±1.1 vs.13.1±4.4min, P<0.01). Eye opening (PSI>75), five words recall, trieger dot test and digit symbol substitution were better with Des. Less norepinephrine was required with Des (n=10) (33.3%) compared to P (n=23) (76.7%), ($P=0.001$). Cost was lower with Des (0.9±0.3 vs. 1.6±0.4 Sterling £/hour, ($P<0.01$). Ventilation duration shortened with Des vs, P (6.83±2.00 vs. 8.26±1.68 hour, $P=0.004$) with comparable arterial blood gases at start ($P>0.01$). Fentanyl was frequently combined with P to reduce its effect on SVR and MBP. (483.3±168.3 vs, 100±0.00 μg, $P<0.05$). Total consumption of Des and P were (53.13±10.30 ml vs. 1010.33±205.06 mg).
Conclusions: Des sedation guided with PSI preserved better the haemodynamic parameters, enhanced recovery at a lower cost compared to Propofol. PSI was able to provide a consistent and comparable depth of sedation with two different sedative drugs as Des and P in contrast to RSS.
Acknowledgements: Statistics advice by Dr Elsayed Amr.

10AP7-5

Influence of the hypnotic agent on primary graft dysfuction after liver transplant

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Background and Goal: Morbidity and mortality rates in orthotopic liver transplantation (OLT) have decreased in the past few years. Risk factors related to severe postoperative complications, such as primary graft dysfunction(PGD), still need to be analyzed. Volatile anesthetics were reported to decrease total hepatic blood flow. According to new studies, not only hepatic blood flow is preserved, but also it may have a beneficial preconditioning effect on liver graft function. Propofol has been used in OLT safely as well.
The aim of this study is to evaluate the influence of the hypnotic agent used during OLT on PGD, and to look for the main risk factors associated.
Materials and Methods: A retrospective analysis of patients who underwent OLT between November 2005 and December 2013 was performed. We evaluated the incidence of PGD(defined as an ALT or AST levels higher than 1500 U/ml on the first 3 days after surgery). We analyzed if the hypnotic agent used had any influence on the incidence of PGD. A multivariate analysis was done to evaluate the hypnotic effect, adjusting this analysis with those confounding factors with statistical association in the univariate analysis. A logistic regression was carried out to analyze risk factors associated with PGD, using as well, those variables with statistical significance in the univariate analysis.
Results and Discussion: The incidence of PGD was 42,2% (114 patients). We found no differences between the propofol group (89 patients, 43.2%) and the sevorane group (25 patients (39,1%)). Adjusting the logistic regression analysis with the confounding factors found (ischemia times, donor age, MELD, surgery duration, reperfusion syndrome, catecholamines, donor sodium level and aprotinine), we didn't find significant difference between the two groups (OR 0,970 (CI 0,509-1,848).
Statistical association was found between PGD and the following risk factors: cold ischemia time (OR 1,003 (CI 1,001- 1,005)), catecholamines (OR 2,407 (CI 1,372- 4, 225)), length of surgery (OR 1,003 (CI 1,000- 1,006)), and reperfusion syndrome (OR 1,679 (CI 1,372- 4,223)).
Conclusion: Adjusting the multivariate analysis with the confounding factors, no statistical difference was found between the two groups . We can suggest that both hypnotics are equally safe in OLT despite methodical limitations of our study (retrospective and not aleatorized).
New prospective studies are needed in order to confirm the absence of differences between them.

10AP7-6

Hepatocellular carcinoma or severe cholestasis are associated with hypercoagulability in cirrhotic pretransplant patients?

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Background and Goal of Study: Recent studies in cirrhosis revealed rebalanced hemostasis which can easily shift towards bleeding or thrombosis. Patients with cholestatic liver disease showed a hypercoagulable state compared to non cholestatic etiology .Hepatocellular carcinoma patients are also at high risk of thrombembolic complications.The aim of this study was to assess the differences in coagulation profiles induced by the presence of hepatocellular carcinoma or prolonged severe intrahepatic cholestasis in pretransplant cirrhotic patients.The secondary aim was to assess the differences in intraoperative bleeding and transfusion requirements between those patients.
Materials and Methods: In this retrospective observational study were included 62 pretransplant cirrhotic patients divided in 3 groups: group-A cirrhotic patients (n=34),group B-cirrhotic patients with prolonged severe intrahepatic cholestasis(n=13),group C- cirrhotic patients with hepatocellular carcinoma(n=15).We excluded from the study group patients with recent procoagulant therapy and retransplant procedures.Preoperative standard coagulation tests (SCT),platelet number and rotation thrombelastometry(ROTEM) were performed.Intraoperative bleeding and number of units transfused were recorded.
For statistical analysis we used one way ANOVA (SPSS Statistics v.19.1).A p-value under 0.05 was considered significant.
Results and Discussion: Demographic characteristics of patients in the three groups were similar.INR,PT,aPTT revealed significant differences between groups(p=0.0001,p=0.001 and p=0.0001).Intraoperative bleeding or transfusional requirements were not statistically different between groups.ROTEM showed significant differences between groups for CT in EXTEM(p=0.032),INTEM (p=0.005) and for derived parameters from the ROTEM curve MAXV and AUC (p=0.016 and p=0.033).Group C patients were more hypercoagulable than the others.Group B patients were the most hypocoagulable based on both SCT and ROTEM parameters.
Conclusion(s): In our study prolonged severe cholestasis was not associated with hypercoagulability as described in literature for patients with cholestatic aetiology of liver disease.
Despite the fact that patients in group C were more hypercoagulable, intraoperative bleeding and blood derivates requirements were not statistically different between the groups,suggesting that bleeding tendency is not due to cirrhotic coagulopathy,but rather to portal hypertension and surgical technique.

10AP7-7

Hepatoprotective effects of levosimendan

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Background and Goal of Study: Levosimendan does not reduce splanchnic circulation and it has anti ischemic properties, which could indirectly ameliorate liver function. We tested direct liver protective effects in a rat models of liver damage.
Materials and Methods: Liver fibrosis was induced by bile duct ligation (BDL) in male Wistar rats that were subjected to repetitive blood sampling for determination of AST, ALT and bilirubin, cerebral and hepatic microdialysis before sacrifice. Liver fibrosis was classified according to Scheuer's staging system: no fibrosis (stage 0); fibrosis limited to the portal tracts (stage 1); periportal fibrosis (stage 2); septal fibrosis with structural distortion (stage 3); cirrhosis (stage 4).
Results and Discussion: Results are shown in the tables below

	PREOPERATIVE	BDL	LEVOSIMENDAN
AST (UI/L)	56.125 ± 11.39	320 ± 47.58	304 ± 60.19
ALT (UI/L)	36 ± 9.45	67.166 ± 25.81	60 ± 19.05
Bilirubin (mg/dl)	0.137 ± 0.07	6.416 ± 1.37	3.9 ± 2.47

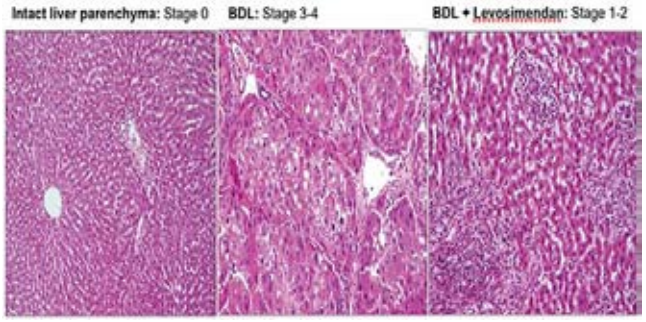
[Bilirubin, AST, ALT serum levels]

	Glucose (mM)	Lactate (mM)	Glycerol (µM)
Intact liver	1.11 ± 0.38	0.45 ± 0.18	1.83 ± 0.70
BDL	0.95 ± 0.41	0.52 ± 0.21	1.00 ± 0.70
BDL + levosimendan	1.6 ± 0.09	0.35 ± 0.09	3.4 ± 0.69

[Liver microdialysis]

	Glucose (mM)	Lactate (mM)	Piruvate (µM)	Glycerol (µM)	Glutamate (µM)
Intact liver	0.6 ± 0.4	0.7 ± 0.5	7.5 ± 3.5	11 ± 5	15.1 ± 2.4
BDL	0.13 ± 0.04	0.37 ± 0.12	16.25 ± 4.9	15.72 ± 2.86	15.8 ± 1.59
BDL + levosimendan	0.25 ± 0.05	0.31 ± 0.03	6.3 ± 2.98	13.66 ± 4.38	11.15 ± 0.62

[Cerebral microdialysis]



[Histological analysis]

Conclusion(s): Levosimendan shows hepatoprotective potential which has to be investigated further.

10AP7-8

Multiresistant microrganisms colonization in liver transplant patients

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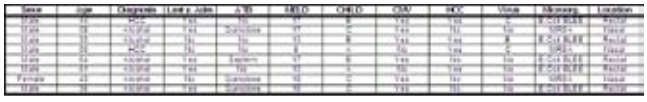
Background and Goal of Study: The patients waiting for a liver transplant in many occasions need of hospital admissions due to different reasons. One of the main reasons is the infection especially multi-drug resistant bacteria (MDR).
The goal of our study is to determinate the incidence of MDR bacteria in the liver transplant recipients, investigate the different risk factors for this colonization and if there is any relation with postsurgical complications.
Materials and Methods: Prospective study of all patients with liver transplant procedure in Hospital General de Alicante between september 2012 and April 2014. We systematically obtained urine culture and rectal, nasal and pharynx smear.
We compared patients colonizated with MRD bacteria with those without.
We analysed different risk fatctors in the colonizated group.
Results and Discussion: We studied 188 samples of 47 patients and we oberved a 19% incidence of MRD in liver transplant patients.
There is not a significant MELD difference between both groups (colonization 15±4 vs non colonization 14±5) and not age difference (colonization 44±17 vs non colonization 56±14).
There is a significative postsurgical infection complications difference, which were more common in the colonization group (p= 0,019). The postsurgical complications in the colonization group were Acinobacter and E.fecalis sepsis, lung infection due to Aspergillus flavus and E.Coli pyelonephritis with septic shock (3 patients of 9). In the non colonization group there was one patient with Klebsiella non BLEE septic shock (1 patient of 38)
We show the results of liver transplant patients which have a MDR colonitation and we mix them with different risk factors.



[Risk factors]

We observed that there is not relation between these risk factors and a MDR colonization in our area.
Conclusion(s): There is a high incidence of MDR bacteria colonization in liver transplant patients. There are more postsurgical infectious complications in the MRD bacteria colonization group.
More studies are needed to evaluate if we should investigate the MDR colonization during the preoperative evaluation and the need of a different anatibiotherapy prophylaxis.

10AP7-9

The role of transcription factor Bach1 in a rat model of acute liver injury induced by experimental endotoxemia

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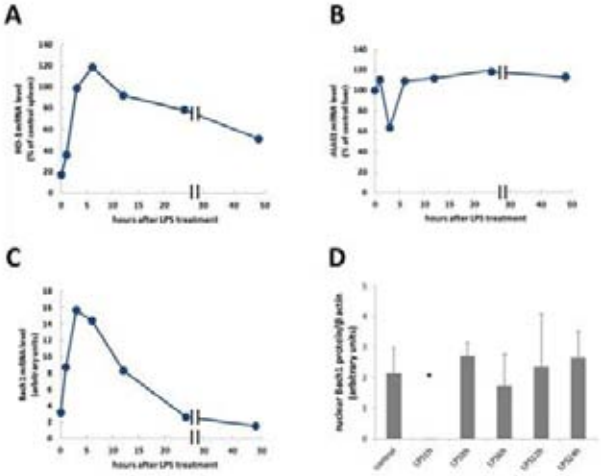
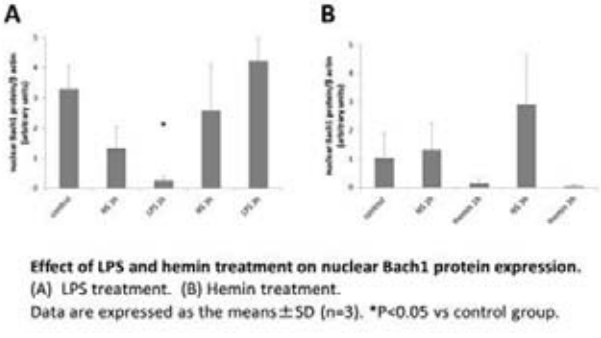
Background: We previously demonstrated that gene expression of heme oxygenase 1 (HO-1), the rate-limiting enzyme in the heme catabolism, is upregulated and gene expression of δ-aminolevulinate synthase (ALAS1), the heme biosynthesis enzyme, is downregulated in rat liver following intraperitoneal administration of lipopolysaccharide (LPS), and suggested that free heme released from hepatic heme proteins may enhance oxidative stress and exacerbate hepatic injury. The transcription factor Bach1 normally represses expression of HO-1, but is exported from nucleus to allow transcriptional activation of the HO-1 gene in the presence of excess free heme. In this study, to further elucidate the involvement of heme in hepatic injury during sepsis we evaluated the gene and nuclear protein expression of Bach1 after LPS treatment in association with heme metabolism.

Methods: Male Sprague-Dawley rats were administered intravenously (i.v.) with LPS (10mg/kg) to develop a septic model. Rats were also administered with hemin (50mg/kg, i.v.) to elevate hepatic free heme concentration. Blood was collected to measure serum AST and ALT activity, and the livers were excised. Hepatic mRNA levels were examined by Northern blot analysis. Hepatic protein levels were examined by Western blot analysis. For statistical evaluation, multiple group comparisons were made by ANOVA followed by Bonferroni correction post hoc tests. $P < 0.05$ was considered statistically significant.
Results: Serum AST and ALT were significantly elevated after LPS treatment, indicating heptic injury. HO-1 mRNA was upregulated and ALAS1 mRNA was downregulated after LPS treatment. Bach1 mRNA was strongly induced after LPS injection. On the other hand, nuclear Bach1 protein showed transient significant decline after LPS treatment. Nuclear Bach1 protein also declined after hemin treatment.
Conclusions: The reciprocal responses of the HO-1 and ALAS1 genes strongly suggest an increase in hepatic free heme concentration after LPS treatment. Moreover, similar decline in nuclear Bach1 protein after LPS and hemin treatment supports nuclear export of Bach1 protein and compensatory Bach1 mRNA induction following LPS administration.



Effect of LPS treatment on HO-1, ALAS1 and Bach1 gene expression and timecourse of nuclear Bach1 protein expression after LPS treatment.
(A) HO-1 mRNA. (B) ALAS1 mRNA. (C) Bach1 mRNA. (D) Nuclear Bach1 protein. Data are expressed as the means ± SD (n=3-4). *P<0.05 vs control group.



Effect of LPS and hemin treatment on nuclear Bach1 protein expression.
(A) LPS treatment. (B) Hemin treatment.
Data are expressed as the means ± SD (n=3). *P<0.05 vs control group.

[Effect of LPS and hemin treatment]

10AP7-10

Effects of levosimendan treatment on lipopolysaccharide-stimulated human endothelial cells

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Background and Goal of Study: Levosimendan is an inodilatory drug with complex mechanisms of action. It is a myocardial calcium sensitizer and vasodilator that has been approved for the treatment of acute decompensated heart failure. In addition to studied effects in cardiac tissue, levosimendan could also play a role in organ protection in the response to infection, influencing other cellular mechanisms beyond hemodynamic changes. Using an *in vitro* approach with endothelial cells, our study pretends to explore how levosimendan administration influences cell response to lipopolysaccharide (LPS).
Materials and Methods: Primary human endothelial cells (HUVECs) were stimulated with LPS from *E. coli* at 1 μg/mL. Three hours after stimulation with LPS, cells were treated with levosimendan (0: control group, 0.1, 1 or 10 μM) and samples were taken 24 hours after treatment to measure cell necrosis (lactate dehydrogenase release), apoptosis (caspase-3 activity), pro-inflammatory mediators (IL-6) and oxidative stress (total reactive oxygen species/reactive nitrogen species (ROS/RNS). After the normality of data were assessed by Kolmogorov-Smirnov test, statistical analysis was performed with ANOVA followed by *post hoc* test when appropriate using statistical software Prism 5 (GraphPad). A $p<0.05$ was considered statistically significant.
Results and Discussion: Levosimendan at doses of 1 and 10 μM protected against LPS-induced endothelial cell necrosis and apoptosis (all $p<0.05$), whereas the lowest tested dose (0.1 μM) did not (both $p\geq0.05$). All levosimendan doses reduced levels of the pro-inflammatory cytokine IL-6 (all $p<0.05$) as well as oxidative stress response measured by total ROS/RNS (all $p<0.05$). Maximum reduction of IL-6 and total ROS/RNS levels was observed in the groups treated with 1 μM, without differences respect to results observed with 10 μM group (both $p\geq0.05$).
Conclusions: Levosimendan has shown protective effects against both necrotic and apoptotic endothelial cell death induced by LPS. Our results also suggest that this effect might be related to an attenuation of inflammation and oxidative stress pathways in this model. Future studies might explore the potential benefitial role of levosimendan in modulating molecular mechanisms triggered by infection.

10AP7-11

Early postoperative respiratory complications in patients undergoing orthotopic liver transplant

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Background and Goal of Study: Orthotopic liver transplantation (OLT) is the treatment of choice for patients with acute liver failure and end-stage liver disease. Poor clinical conditions, high comorbidity of those patients, extensive surgical fields and lengthy procedures increase the risk of complications. Respiratory complications are very common and increase morbidity and mortality.
The aim of our study was to analyze the frequency and type of respiratory complications at our center in the immediate postoperative period after liver transplantation. We have also evaluated the possible risk factors associated.
Materials and Methods: We conducted a retrospective study collecting all cases of OLT performed in our hospital from January 2002 to December 2013. A multivariate analysis was performed using those variables with clinical relevance or statistical association with respiratory complications in the univariate study.
Results and Discussion: Four hundred and eleven patients were included. Early respiratory complications were developed in 115 of them(28%). Simultaneous complications appeared in 25 patients. Overall complication rate was 34%. Infectious complications are the most prevalent (61 cases of pneumonia (43.57 %)). The non- infectious complications were: distress (9.28 %) , pleural effusion (36.43 %) , pneumothorax (3.57 %), acute pulmonary edema (2,85 %) and other noninfectious complications (4.28 %).
In the multivariate analysis the significant risk factors for developing respira-

tory complications were: reperfusion syndrome (OR 1,850 (IC 1,133-3,022)), cold ischemia time (OR 1,002 (IC 1,000-1,004)), marginal donor (OR 0,675 (IC 0,414-1,101)), MELD (OR 1,034 (IC 1,004-1,065)) and BMI (OR 0,948 (IC 0,899-0,999)).
A sub-analysis of early pneumonia was also done, finding that reperfusion syndrome (OR 1,776 (IC 0,097-3,250))and the number of red blood concentrates transfused (OR 1,051 (IC 1,014-1,088))were the significant risk factors.
Conclusion(s): Reperfusion syndrome, cold ischemia time, marginal donor, MELD and BMI are risk factors associated with respiratory complications in our population. Pneumonia is associated with the number of red blood cells transfused and the presence of reperfusion syndrome for patients undergoing OLT at our center.
Reference: Pirat A, Özgur S, Torgay A, Candan S, Zeyneloglu P, Arslan G. Risk factors for postoperative respiratory complications in adult liver transplant recipients. Transplant Proc 2004; 36: 218-220.

10AP8-1

Correlation of the bispectral index with the Glasgow Coma Scale and the intracranial pressure in patients with severe brain injury

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Background and Goal of Study: There have been some studies suggesting that the bispectral index (BIS) can reflect the level of consciousness in brain-injured patients, as assessed by the Glasgow Coma Scale (GCS). However, the correlation degrees are very wide depending on the study groups and the software version of the BIS. Whilst the level of consciousness is assessed by the GCS, changes in the intracranial pressure (ICP) can allow for early diagnosis of mental status alteration as it precedes clinical deterioration.
This prospective and observational study was performed with the aim of determining if there is any correlation between the BIS and two commonly used brain monitoring measures (GCS and ICP) in the patients with severe brain injury.
Materials and Methods: Thirty patients with a focal neurological injury or a more global injury, who had been admitted to the neuro-intensive care unit and had not received any sedative medication for over 24 hours, were prospectively evaluated for the GCS every hour for 5 hours by a blinded observer. Meanwhile, an investigator noted the patient's BIS and ICP simultaneously. The BIS was measured with a BIS monitor, Model A-3000 vista™ (Aspect Medical Systems, Norwood, USA) and the ICP with Spiegelberg™ Brain Pressure Monitor (Spiegelberg GmbH & Co. KG, Hamburg, Germany). The correlation of the BIS with the GCS and the ICP was determined using Spearman's rank correlation coefficient and Pearson's correlation coefficient, respectively.
Results and Discussion: In spite of statistical significance ($p < 0.01$), the BIS was moderately correlated with the GCS ($r = 0.423$) and poorly correlated with the ICP ($r = 0.212$). There was a wide range of the BIS values for any level of the GCS and the ICP. Two reasonable explanations for this poor correlation between the BIS and the ICP can be proposed. First, the ICPs of patients recruited in this study were relatively well maintained in the range of 8-13 mmHg. Second, each value of the ICPs had already been reflected in the BIS and the GCS.
Conclusion(s): Judging from the moderate correlation between the BIS and the GCS, and wide variability, the BIS may carefully be used for assessing the level of consciousness in brain-injured patients, as assessed by the Glasgow Coma Scale (GCS).
Reference: 1. Deogaonkar A, Gupta R, degeorgia M, et al. Bispectral Index monitoring correlates with sedation scales in brain-injured patients. Crit Care Med 2004; 32(12): 2403-6.

10AP8-2

Comparison of NeuroSENSE™ versus BIS™ for monitoring depth of sedation in critically ill patients

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Background and Goal of Study: Measuring depth of sedation in ICU patients remains challenging. The NeuroSENSE™ monitor (NeuroWave Systems Inc) is a new brain monitor providing the clinician with a bilateral Wavelet Anesthetic Value (WAV), indicating depth of sedation. No data on the use of this monitor in ICU patients have been published so far. In contrast, numerous studies have reported data on the use of the Bispectral Index™ (BIS™) monitor (Covidien) in the ICU population, starting with the first publication on this topic in 1998 (1). The current study was designed to compare the bilateral WAV signal with the bilateral BIS™ signal in sedated ICU patients.
Materials and Methods: Inclusion criteria were mechanical ventilation and an anticipated need for sedation ≥ 48 hours. Patients with acute or pre-existing brain pathology were excluded. A total of 20 patients were included. Both BIS™ and NeuroSENSE™ senors were applied *bilaterally* to the forehead. The signals were collected during a 1 h period free of medical or nursing activities. During the observation period, a painful stimulus (pressure on the nail of the right index finger) was applied and the change of the WAV and BIS™ signal pre and post stimulus was compared for the right and left hemisphere separately. Data are reported as mean±SD. The paired student *t*-test or the Wilcoxon matched-pairs signed rank test was used as applicable.
Results and Discussion: A first analysis of the collected data showed that some patients had been over-sedated, as their suppression ratio was ≥ 10. After exclusion of these patients and exclusion of patients with incomplete data, 12 data sets were analyzed for the BIS™ signal and 9 data sets for the WAV signal. After the painful stimulus, the right BIS™ signal decreased from 57±16 to 56±16 ($p = 0,18$) and the right WAV signal decreased from 60±22 to 59±22 ($p = 0,43$). For the left hemisphere the BIS™ signal was 53±13 and 53±15 ($p = 0,78$) pre and post stimulus. whereas the WAV signal was 62±17 and 62±18 ($p = 0,82$) respectively.
Conclusion: In sedated ICU patients with a BIS™ value around 60, no reaction to a painful stimulus could be detected with the BIS™ or the NeuroSENSE™ monitor. Under these circumstances, both signals therefore behave similarly.
Reference: 1. De Deyne C, Struys M, Decruyenaere J, et al. Use of continuous bispectral EEG monitoring to assess depth of sedation in ICU patients. Intensive Care Med1998; 24(12):1294-8.

10AP8-3

The usefulness of the EV 1000 system in improving outcomes for patient with septic shock

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Background and Goal of Study: The optimization of fluid status remains a challenge in septic patients. In this trial, we aim to assess whether the management algorithm using data obtained with an EV 1000 system can improve clinical outcomes in patients with septic shock. We hypothesize that a management algorithm based on the EV 1000 system/ Volume View will benefit in terms of mortality, length of stay in an ICU, days of vasoactive agent support.
Materials and Methods: The study was designed as a prospective randomized controlled trial in the mixed ICU. The study was approved by the ethics committees. Written informed consent was obtained from the patients relatives. Hemodynamic monitoring was performed with a new calibrated pulse wave analysis method (VolumeView/EV1000, Edwards Lifesciences) in 37 pts (group EV 1000). The system was used within 2 hours of enrollment. Central venous access is created for the injection of cold water and measurement of central venous pressure (CVP). The preferred insertion site was the jugular or subclavian position. A thermistor-tipped arterial catheter was inserted into the femoral artery. The calibration was performed at least every 6 hours. We had 40 patients in the control arm, with a central venous catheter and arterial catheter routinely inserted. The endpoints were 30-day mortality, ICU length of stay, days of vasoactive agent support, SOFA score variation (difference between maximum SOFA score and initial SOFA score; DSOFA).
Results and Discussion: No significant difference in term of mortality- 39% in the EV 1000 group vs 40.7% in the control group or ICU length of stay.

Day of noradrenaline in EV 1000 group 5,43±4,182 vs 6,78±6,065 in the control group (p=0.037). Maximum SOFA score was 11,47±2,6 in the EV 1000 group, respectively 13,29±2,898 in the control group (p< 0.05); DSOFA was 1,62±2,239 in the EV 1000 group and 1,78±2,215 in the control group (p-0.141).
Conclusion(s): Hemodynamic monitoring with a transpulmonary thermodilution technique can improve outcome in septic patients.
References: Bendjelid K et al. BJA apr 26: 2-7, 2013
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10AP8-4

Blood lactate is a useful indicator for the medical emergency team

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Background and Goal of Study: Lactate is thoroughly studied in patients with infections, in the intensive care unit (ICU) and in trauma settings. However, little is known about lactate as a risk-stratification marker in the patient subject to a medical emergency team (MET) call. Therefore we wanted to study whether an increased blood lactate level at the time of a MET call is associated with an increased risk of death and transfer to the ICU.
Materials and Methods: This was a prospective, observational study set in a regional-, secondary referral hospital with 20,00 annual visits. All patients who were subject to a call for the medical emergency team from March 2012 to March 2014 were eligible for inclusion. Patients with no blood lactate obtained were excluded.
Results and Discussion: There were 227 MET calls eligible for inclusion. Among the 211 included, there were 64 deaths (30.3%). The median lactate concentration at the occasion of the MET call was 1.82 mmol/l (IQR 1.16-2.7). We found a statistically significant difference between survivors and non-survivors for the parameters lactate and oxygen saturation, a trend for age but no significant correlation for systolic blood pressure, respiratory rate and heart rate. When excluding patients, who were not considered eligible for intensive care and studying the remaining cohort of 179 patients, we found a statistically significant difference for age only, trends for lactate, respiratory rate, saturation and heart rate but no correlation for systolic blood pressure between the admitted and not admitted to the ICU.
Conclusion(s): In the present cohort of patients subject to a medical emergency team call, our results support that the measurement of blood lactate is a helpful tool in the judgement of illness severity.

10AP8-5

Histidine-rich glycoprotein as a novel prognostic biomarker in critically ill patients

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Background: Sepsis is a systemic illness and represents one of the most severe diseases in ICU. There are many biomarkers and therapies for sepsis used in clinical practices, but few become the standard.
Histidine-rich glycoprotein (HRG) is a plasma glycoprotein produced in the liver. Our group reported that plasma HRG levels decreased in mice with sepsis and supplemental HRG infusion significantly improved survival rate in mice model of sepsis.
In this study, we assessed the HRG levels in critically ill patients and relationship between HRG levels and mortality in these patients.
Methods: We prospectively studied the ICU patients fulfilled at least two of the diagnostic criteria for SIRS. We collected blood samples within 24 hours of ICU admission, and HRG levels were determined with a quantitative ELISA. For comparison, blood samples from healthy volunteers were also collected and analyzed. Data were expressed as means ± standard deviations. We used Student t-test and ANOVA for comparisons between the groups. We also applied logistic regression models and Cox proportional hazard model to analyze relationship between HRG levels and mortality.
Results and Discussion: The HRG levels in SIRS patients (n=66) were significantly lower compared to the healthy volunteers (n=13) (28.53 ± 16.30 vs. 60.41 ± 7.82 μg/ml; p< 0.01). The HRG levels in SIRS patients with infection (n=20) were significantly lower than those in SIRS patients without infection (n=46) (11.21 ± 6.35 vs. 36.06 ± 13.24 μg/ml; p< 0.01). Moreover, the HRG levels in non-survivors (n=8) were significantly lower than those in survivors (n=58) (11.40 ± 8.70 vs. 30.89 ± 15.71 μg/ml; p< 0.01). In univariate analysis, the HRG levels were correlated with mortality (Odd ratio 0.86; p< 0.01). The receiver operator characteristics curve analysis of HRG levels for mortality revealed that cutoff value was 16.01μg/ml and the areas under the curve (AUC) were 0.88. Furthermore, when patients were divided into two groups according to HRG level using the cutoff value of 16.01μg/ml, lower HRG group represented significantly higher mortality (Hazard ratio 8.44; p<0.01).
Conclusion: We demonstrated that the HRG levels in SIRS patients were significantly low, and that the HRG levels in septic patients were still lower than those in non-septic SIRS patients. We also found that the HRG levels were correlated with mortality. These results suggested that HRG could be a novel prognostic biomarker in septic patients.

10AP8-6

Prognostic significance of circadian hemodynamic rhythms in severe pneumonia at breastfed age

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Background and Goal of Study: In the spectrum of a number of biorhythms which regulate a lot of vital activity processes, the most essential role in the norm and pathology belongs to circadian biorhythms with the period of 24 hours. The given states were enough explained in children's pathology and physiology, however, informative significance of hemodynamic circadian rhythm deviation in evaluating condition dynamics were not studied enough in terms of severe pneumonia in breastfed age.
Purpose: Evaluating the changes in the hemodynamic circadian rhythms structures in the aspect of control and early revealing condition dynamics in children with severe pneumonia in breastfed age.
Materials and Methods: Phase analysis of circadian hemodynamic rhythms in breast-fed aged children was conducted using ongoing monitoring method in the duration of 20 days in 63 children at the age of 6+-3 months. There were 33 boys, and 30 girls. The main illnesses were severe pneumonia complicated with sepsis (15), toxic carditis (60), hepatitis (45), DVS-syndrome (20), multi organ failure syndrome (25).
Results and Discussion: As the criteria of early signs of negative condition dynamics, we can imagine changes in the amplitudes of daily beats of Arterial Pressure in circadian rhythms(the more swings in the AP value, the more there is risk of unpleasant outcome), shift in the pike of acrophase (from morning to evening and night hours), batiphase (from physiological night hours to daily hours) up to circadian rhythm inversion. Revelation of amplitudes of daily beats of Arterial pressure in the first days of treatment more than 20 mm PT st., it is important to consider evidence about unpleasant prognosis.
Conclusion(s): Refractory tachycardia, inclination to rise in amplitudal dynamics beats of heart rate in a day in the process of intensive therapy are the signs of adverse prognosis of severe pneumonia in children at the breast-fed age.

10AP8-7

The possibility of changes in the heart rate variability and the level of pituitary-adrenal axis hormones in the evaluation of prognosis in patients with severe traumatic brain injury: pilot study

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The Purpose of our Study: To determine the dynamics of changes in heart rate variability (HRV) and stress hormones in patients with different outcomes after severe traumatic brain injury (TBI).
Materials and Methods: 46 patients with TBI (35 men and 11 women) with an initial assessment of the level of consciousness by GCS ≤8 points received by the intensive care unit were included in a prospective study. The average age of the patients was 34.7 ± 8.2 years. All patients were divided into 2 groups: I group - 12 died patients, II group - 34 survivors. All patients were mechanically ventilated and received intensive therapy according to the protocol. Recorded heart rate variability (HRV). Performed invasive monitoring of intracranial pressure (ICP). The content of cortisol, adrenocorticotropic hormone (ACTH) in serum in the 1st, 3rd, 7th and 14th days.
Results and Discussion: Hemodynamic parameters did not differ between groups. In 1st group was severe intracranial hypertension. The day after the injury showed a significant difference in parameters of HRV in patients who died with progressive brain edema regarding survivors. In the dead patients had more severe sympathicotonia and depression parasympathetic effects in the analysis of HRV parameters. Starting from 5th day they noted a significant increase in parasympathetic tone. In the group who died there was a significant parasympathetic efferent hyperactivity and a tendency to decrease throughout the HRV. On the first day showed signs of surge pituitary-adrenal system. Then noted a sharp decline in cortisol and ACTH in the peripheral blood. Have died on the 1st day revealed growth of ACTH in the blood 1530.2%, and in the group of survivors, he grew only 625.4%. Cortisol levels in the 1st day after trauma increased to 329% in survivors, have died - 227%. Surviving patients ACTH level on day 3 remained elevated by 130% and only 7th days to come to normal values. Serum cortisol 3rd and 7th days, respectively, remained elevated at 149.1% and 134.4% and normalized to the 14th day.
Conclusion(s): Changes in HRV and dynamic assessment of the pituitary-adrenal axis can help in predicting outcomes TBI. Reduced heart rate variability is associated with a worse clinical outcome. In severe TBI secretion of ACTH and cortisol increases significantly from the dead. Expressed adrenocorticotropic stimulation does not lead to an increase in serum cortisol and causes the development of adrenal insufficiency.

10AP8-9

The repeatability of blood gas parameters, PCO2 gap, and PCO2 gap to arterial-to-venous oxygen content difference in critically ill adult patients

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Background and Goal of Study: To examine the repeatability of blood gas parameters and its derived variables such as the central venous-to-arterial carbon dioxide tension difference (ΔPCO_2) and the ratio of ΔPCO_2 over the central arteriovenous oxygen content difference ($\Delta PCO_2/C(a\text{-}cv)O_2$) and to determine the smallest detectable changes in individual patients.
Materials and Methods: After ethical committee approval, a total of 192 critically ill patients with arterial and central venous catheters, hospitalized in a intensive care unit of a general teaching hospital, were included in a prospective observational study.Two subsequent arterial and central venous blood samples were collected at 10-minute interval and analyzed using the same point-of-care blood gas analyzer.The samples were analyzed for arterial and venous blood gas parameters, ΔPCO_2, and $\Delta PCO_2/C(a\text{-}cv)O_2$ ratio with careful attention to the method of collection and measurement. Repeatability was expressed as the smallest detectable difference (SDD), within-subject coefficient of variation (CV_w). In repeated measurements, a change in the value of these parameters exceeding $1.96\sqrt{2}\ CV_w$, the last significant change (LSC), or the SDD should be regarded as significant.
Results: The mean of the difference for each measured and calculated variable approached zero, reflecting no bias between measurements. The SDDs for $PaCO_2$, SaO_2, $ScvO_2$ and ΔPCO_2 were small: ± 2.06 mmHg, ± 1.23%, 2.92%, and ± 1.98 mmHg, respectively, whereas the SDDs for PaO_2 and $\Delta PCO_2/C(a\text{-}cv)O_2$ were high: ± 9.09 mmHg and ± 0.57 mmHg/mL, respectively. The LSCs (%) for these variables were 5.06, 1.27, 4.44, 32.4, 9.51, and 38.5, respectively.
Conclusions: The repeatability of all these variables was good except for PaO_2 and $\Delta PCO_2/C(a\text{-}cv)O_2$ ratio for which we observed an important spontaneous variability. Use of SDD is preferable to CV_w and LSC (%) because of its independence from variable levels and its expression in absolute units. Expressed as SDD, a ΔPCO_2 change value of at least ± 2 mmHg should be significant. The clinician must be aware that an apparent change in these variables in an individual patient might represent only an inherent variation.

10AP8-10

Esophageal pressure measurements: the effect of balloon position and lung volume

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Background and Goal of Study: Esophageal pressure (Pes) measurements allow the partitioning of respiratory system mechanics into pulmonary and chest wall components and estimation of work of breathing.
The most widely used method for recording Pes employs air-containing latex balloon placed in the middle 3° of the esophagus. In spontaneous breathing patients the correct balloon position is assessed with the dynamic occlusion test (Baydur) consisting of measuring the ratio of change in Pes to the change in airway opening pressure (ΔPes/ΔPaw) during 3-5 spontaneous respiratory efforts against a closed airway.
In sedated, paralyzed patients the occlusion test is performed by applying manual compression on the chest during airway occlusion. A ΔPes/ΔPaw ratio close to unity indicates that the balloon provides a valid measure of ΔPes. Factors influencing the ΔPes/ΔPaw ratio during the occlusion tests include the amount of air injected into the balloon, the patient's and the balloon's position and lung volume.
Our aim is to compare the accuracy of the Baydur test in spontaneous breathing patients and the thoracic compressions in mechanically ventilated patients at 2 different PEEP levels and at 2 different esophageal positions.
Materials and Methods: We enrolled sedated and paralyzed patients admitted in Intensive Care Unit. The measurement of ΔPes/ΔPaw were recorded by a Vyasis esophageal balloon filled with1.5 ml of air placed at 25-30cm (Low) and at 40-35cm from the mouth (High) at PEEP 0 or 10 cmH_2O, performing 4 thoracic compressions in each condition in a random fashion. The same meausurements were collected after the administration of reversal neuromuscolar blockers performing 4 different occlusion tests in the same 4 conditions in a random fashion. Patients were in supine position.
Results and Discussion: 19 patients (age 66.4±14; BMI 25±4 Kg/m^2; P/F 305±108) were enrolled. Changes in Pes correspond closely to changes in Paw in each studied condition (Table 1).
Conclusion(s): The validity of Baydur test in spontaneous breathing patients and of the thoracic compression in mechanically ventilated patients is not influenced by balloon position and lung volume.

		Mechanical Ventilation		Spontaneous Breathing	
PEEP	Balloon Position	R2	p	R2	p
0 cmH2O	Low	0.816	<0.001	0.974	<0.001
0 cmH2O	High	0.828	<0.001	0.961	<0.001
10 cmH2O	Low	0.796	<0.001	0.978	<0.001
10 cmH2O	High	0.814	<0.001	0.983	<0.001

[Table 1]

10AP8-11

Capnography use in critical care units across Greater Manchester

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Background and Goal of Study: Precipitated by NAP4[1], this regional re-audit examined the use of canography across Greater Manchester CCUs. Failure to use capnography in ventilated patients contributed to more than 70% of ICU related deaths in NAP4. Capnography use was identified as the single change with greatest potential to prevent these deaths. Recommendations from the ICS[2] are that continuous capnography be used in all patients mechanically ventilated in a critical care setting. Adherence to this was audited in July 2013 as part of the work of RiCON Airway Group. Results originally showed improvement was required in level 2 areas, particularly with tracheostomies. With local and regional interventions on-going, we hoped to see a higher proportion of patients with continuous capnography in all levels of care and airway type in 2014.
Materials and Methods: 9 hospitals took part from a possible 10 contacted. Data was collected prospectively by local auditors over a two week period in March 2014 via a standard proforma. Data collected included level/place of care, day of admission, type of airway device, presence of bedhead airway signs, mode of ventilation, presence of continuous capnography, use of capnography alarms and reason for disablement of alarms.
Results and Discussion: 465 patient episodes were recorded involving 178 patients over 44 days. 97% of the episodes we captured were in ICU vs 84% in 2013. Greater representation of level 2 areas were found in 2014. As a result most episodes involved endotracheal tubes (57% vs 43% in 2013). The audit showed an overall increase in rate of capnography use from 89% in 2013 to 94% in 2014. However, there was a drop in capnography alarm use from 97% to 92%. Factors associated with low capnography use were tracheostomy, length of stay and reduced ventilatory support.
Conclusion(s): There has been an improvement in capnography use overall from 89% to 94% which likely represents an improvement in patient safety. However, our audit shows there is scope for improvement in HDU and tracheostomy patients who remain vulnerable to critical airway events.
References:
1. Royal College of Anaesthetists and the Difficult Airway Society. 4th National Audit Project (March 2011): Major complications of airway management in the United Kingdom.
2. The Intensive Care Society. Capnography Guidelines (modified 2011).
Acknowledgements: **Consultant Anaesthetist and ICM, Royal Bolton Hospital.RiCON Critical Care Network Group.

10AP8-12

Issues of the futile treatment in the ICU

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Background: Although the contemporary intensive treatment is becoming more and more complex and sophisticated, the promise of Hippocrates: "not to treat patients who were "overmastered by their disease", remains actual in a specific category of patients.
Aim of this presentation is to evaluate the situation of futile treatment in a polyvalent ICU activity.
Material and method: Conducted in an adult polyvalent ICU of the UHC "Mother Theresa" in Tirana during the period February 2013- February 2014, this study's objective is to evaluate the mean Length of Stay in ICU of the non-survivor patients under futile treatment. This study included all death cases which occurred 10 days or more after admittance in ICU. For this group, *futile treatment* is considered the therapeutical management of patients with malignant pathologies in the terminal stage, massive cerebrovascular accidents and incompatible-with-life traumas
Evaluation (APACHE) II score was recorded on admission for the non-cardiac surgery and other medical patients.
Results: 860 patients were admitted in the 14 bed ICU service during the above mentioned period. From the medical team, 21 cases were classified as futile treatment. Mean time of the length of stay (LOS) was:
Mean LOS of all admitted patients 5.6 ±8.7 days ± standard deviation (SD)
Mean LOS of overall deaths 5.26 ±8.4 days ± standard deviation (SD)
Mean LOS of Deaths >10 days 23.34 ±16.33 days ± standard deviation (SD)
Mean LOS of Futile deaths >10 days 27.29 ±22.43 days ± standard deviation(SD)
Conclusion: Based in a multivariate analysis of the factors contributing to futility, especially in the issue of allocating intensive care beds and costs, an ICU culture would not only promote aggressive treatment but also help patients and their families make wise decisions about managing the end of life.
Reference: David J. Rothman, Ph.D. Where We Die N Engl J Med 2014; 370:2457-2460June 26, 2014DOI: 10.1056/NEJMp1404427

10AP9-1

Atelectrauma yields lower pulmonary [18F] fluorodeoxyglucose uptake than volutrauma at comparable tidal volumes during experimental lung injury

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Rationale: The pulmonary uptake of [18F]FDG is highly correlated with neutrophil activation, representing a valuable tool to investigate regional distribution of inflammation in vivo. The purpose of the study was to assess the effects of atelectrauma and volutrauma on the regional pulmonary uptake of [18F] fluorodeoxyglucose ([18F]FDG) in experimental ARDS in pigs.
Methods: After approval by the animal care committee, ten juvenile pigs were anesthetized, intubated and mechanically ventilated. ARDS was induced by means of saline lung lavage. After lung injury was established, lungs were separated placing a double lumen endotracheal tube. Following a decremental PEEP trial, animals were randomly assigned to one of two groups:
1) in volutrauma, high PEEP above the level where dynamic compliance had increased by more than 5% during PEEP trial was selected, or
2) in atelectrauma, low PEEP to achieve a driving pressure comparable to volutrauma at identical tidal volumes was (V_T) was chosen.
While CPAP was maintained in the right lung, volu- or atelectrauma were applied during low V_T ventilation of the left lung (3 mL/kg) during 4h. Regional uptake of [18F]FDG was assessed by positron emission tomography (PET), lung aeration by computed tomography. The fractional blood and gas volumes and the specific net uptake rate of [^{18}F]FDG (K_{iS}) were determined using the Sokoloff model. Regional perfusion was measured using ^{68}Ga-labeled microspheres and PET.
Results: Volutrauma was associated with higher K_{iS} in midventral, central and middorsal lung regions compared to atelectrauma and CPAP and increased the amounts of normally and hyper aerated lung compartments as well as tidal hyperaeration. Atelectrauma led to higher fractional blood volume but showed similar regional perfusion compared to volutrauma. Compared to volutrauma, atelectrauma was associated with higher non-aerated and poorly aerated lung compartments as well as tidal reaeration, but kept K_{iS} comparable to CPAP.
Conclusions: In this model of ARDS in pigs, volutrauma increased the specific [18F]FDG uptake and consequently aggravated neutrophil activation in the lung compared to atelectrauma, suggesting permissive atelectasis might yield superior protection during low V_T strategies.

10AP9-2

Effect of high tidal volume on the histopathological and radiological findings in the experimental animals lungs during mechanical ventilation

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Background and Goal of Study: Mechanical lung ventilation has become necessary in the general anesthesia and supporting vital procedure in seriously ill patients. Several potential deficiencies and complications of mechanical ventilation are opposed to its beneficial effects. The aim of the study is to determine the degree of sensitivity of intact and previously damaged lungs

with some pathological process on violating effect of applied volume controlled mechanical lung ventilation with high values of tidal volume in experimental conditions.
Materials and Methods: Experimental animals (pigs) were divided into two groups. The control group consisted of experimental animals with healthy lungs and study group, the experimental animals where previously induced acute lung injury by injecting 2 ml/kg body weight gastric contents through endotracheal tube in pulmonary parenchyma and then the same is applied volume controlled ventilation. Applied ventilation is with high tidal volume (25 ml/kg), with a respiratory rate of 12 breaths per minute, O_2 Fi 0.4 and PEEP zero. Duration of mechanical lung ventilation was 240 min. or 4 hours. Monitoring is included, among other things, monitoring of tidal volume (Vt), peak and intermediate pressure in the airway. The second phase entailed taking samples of lung tissue of experimental animals (pigs) at the end of the four-hour duration of mechanical ventilation and send them to histopathological changes examination.
Results: The research results indicated significant changes in the histopathologic findings of ventilated lung (perivascular, interstitial and alveolar edema, distension and rupture of alveoli, tears in the lung tissue, bleeding, bronchodilation, small atelectasis and the existence of cellular infiltration of alveolar, interstitial and perivascular spaces). Radiological findings included the presence of interstitial and alveolar edema, air cyst, expanded intercostal space. Histopathological and radiological changes were more pronounced in animals from the test group compared to the control group.
Conclusion(s): Previously damaged lungs showed much greater sensitivity to the violating effect of applied volume controlled mechanical ventilation compared to organic and functionally intact lung. Occasional radiological control of ventilated lung indirectly may indicate the emergence of new or worsening of existing pathological changes in the lung caused by mechanical ventilation.

10AP9-3

Long-term sedation with sevoflurane dramatically improves oxygenation in an *in-vivo* model of acute lung injury

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Background: Acute lung injury (ALI) requiring mechanical ventilation for respiratory failure remains a significant source of morbidity and mortality in intensive care units. While propofol represents first choice for sustained sedation in the critically ill, volatile anesthetics seem to be an attractive alternative. In preclinical and clinical studies volatile anesthetics have shown to positively influence inflammatory processes, most often in settings of short-term exposure. In this study we assessed the effects of sevoflurane in a long-term in-vivo model of ALI. We hypothesize that long-term sedation with sevoflurane improves oxygenation and attenuates inflammatory response in ALI.
Materials and Methods: Adult male Wistar rats were assigned to the following groups: phosphate buffered saline (PBS) or lipopolysaccharides (LPS), sedation with sevoflurane or propofol and ventilation for 6, 12, 18 or 24h. LPS (0.3 μg/g BW) or PBS was instilled intratracheally. Animals were monitored with an arterial and venous line, vital parameters were recorded and blood gases were analyzed every 3h. After euthanasia bronchoalveolar lavage (BAL) was performed, inflammatory cells (cell count) and mediators in BAL (IL-6, CINC-1, MCP-1 and IL-10) were determined. Integrity of the alveolo-capillary barrier was evaluated determining wet-to-dry ratio as well as measuring albumin and total protein content in BAL.
Results: Oxygenation index was significantly higher in the sevoflurane/LPS compared to the propofol/LPS group from 15h (455mmHg vs. 360mmHg, $p=0.014$) up to 24h (420mmHg vs. 247mmHg, $p< 0.001$). Cell count in BAL was lower in the sevoflurane/LPS group with significant differences after 18h ($p=0.0013$) and 24h ($p< 0.0001$). IL-6 and CINC-1 concentrations, peaking within the first 12h, were less accentuated in the sevoflurane/LPS group (both $p< 0.0001$), while IL-10 and MCP-1 did not differ. Albumin and total protein content in BAL was similarly augmented in both LPS groups, while wet-to-dry ratio was lower in LPS-animals, sedated with sevoflurane ($p=0.016$).
Conclusion: Long-term sedation with sevoflurane improves oxygenation, in parallel to an attenuation of the inflammatory response in LPS-induced lung injury in rats. This improvement is most likely due to a less accentuated increase of alveolo-capillary permeability and/or improved repair mechanisms induced by sevoflurane. These findings support the use of sevoflurane for long-term use in ICU, especially in the context of ALI.

10AP9-4

Comparative analysis of measurements of regional lung perfusion using 68Ga-labeled and fluorescence-labeled microspheres in experimental lung injury

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Background: Systematic sampling of lung volume elements previously labeled with fluorescent microspheres is an established method to study regional pulmonary blood flow (PBF), but it is time-consuming, has low resolution and involves ex-vivo manipulation of lungs causing lung distortion. The aim of this study was to compare regional PBF measurements in an experimental model of ARDS, using fluorescent-labeled microspheres and ^{68}Ga-labeled microspheres and PET.
Methods: We used data of animals included in a previously published study [1]. Lung injury was induced in 3 mechanically ventilated pigs. ^{68}Ga-labeled microspheres were injected and their distribution assessed *in-vivo* by PET scan ($Perf_{PET}$), while the distribution of injected fluorescent-labeled microspheres was analyzed post-mortem by cutting the lungs in cubes and measuring fluorescence intensity ($Perf_{Fluor}$). Correlation between $Perf_{PET}$ and $Perf_{Fluor}$ was assessed for each cube (r^2_{CUBES}). Subsequently, we calculated the mean perfusion dividing left and right lung in 3 cranio-caudal and 3 ventro-dorsal blocks, obtaining 9 regions of interest (ROIs) for each lung. Correlation between the two methods was assessed at ROI level (r^2_{ROI}). Consistency of the methods was compared using r^2 of the regression of the perfusion gradient along the ventro-dorsal axis (DV). Inhomogeneity (I) was calculated as mean perfusion ratio of a cube to its 6 nearest neighbors. Mean I-values of lungs and ROIs were compared.
Results: Correlation between $Perf_{PET}$ and $Perf_{Fluor}$ was stronger when compared ROI-wise instead of cube-wise ($r^2_{CUBES}=0.64$; $r^2_{ROI}= 0.78$). An increase in perfusion from ventral to dorsal was observed with fluorescence ($Perf_{Fluor\_Ventral}=0.76$; $Perf_{Fluor\_Dorsal}=1.15$; $p=0.043$) and with PET ($Perf_{PET\_Ventral}=0.22$; $Perf_{PET\_Dorsal}=1.69$; $p=0.043$). Distribution of $Perf_{Fluor}$ was less consistent ($r^2_{Fluor\_DV}=0.67$, $r^2_{PET\_DV}=1.0$, $p=0.043$). Perfusion inhomogeneity was higher in $Perf_{Fluor}$ compared to $Perf_{PET}$ ($I_{Fluor\_Lung}=1.28$, $I_{PET\_Lung}=1.13$, $p=0.0022$; $I_{Fluor\_ROI}=1.26$, $I_{PET\_ROI}=1.13$, $p< 0.0001$).
Conclusion: Comparisons of anatomically matched ROIs improved the correlation of PBF measurements between ^{68}Ga-labeled microspheres detected in-vivo using PET and fluorescent-labeled microspheres analyzed ex-vivo. Both methods consistently showed an increase in PBF towards gravitational dependent regions. PET measurements were more consistent and showed less inhomogeneity.
Reference:
1. *Güldner et al.,Anesthesiology 2014,V120*

10AP9-5

Melanocortin receptor agonist BMS-470539 attenuates lipopolysaccharide-induced neutrophil activation and acute lung injury

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Background and Goal of Study: Despite advances in the management of sepsis and acute respiratory distress syndrome, the mortality rate remains high. Over-activation of inflammatory cells involving neutrophils are associated with multiple organ failure under those conditions. Thus, nontoxic molecules that regulate inflammatory cells may provide a novel therapeutic strategy. This study was performed to evaluate the effects of melanocortin -1 receptor (MC-1R) agonist BMS-470539 on LPS-induced neutrophil activation and acute lung injury.
Materials and Methods: To assess the anti-inflammatory effect of BMS-470539 on LPS induced inflammatory cells activation, Neutrophils from mouse bone marrow were incubated with various concentrations of BMS-470539 (0, 1, 10 and 100 nM) and LPS (100 ng/ml). The protein levels for MIP-2 and TNF-α were measured using ELISA 4 hr after incubation period. To elucidate the intracellular signaling pathway, We measured the levels of phosphorylation of MAPKs (p38, ERK1/2, JNK) with western blot analysis and

NF-κB with EMSA 0.5 hr after incubation period. We also examined the effect of BMS-470539 (20mg/kg, IP) on acute lung injury and mortality of mouse treated with LPS(20 mg/kg, IP) to determine whether these effects of BMS-470539 also have in vivo significance.
Results and Discussion: BMS-470539 inhibited the production of TNF-α and attenuated phosphorylation levels of ERK1/2 and p38 but not JNK in neutrophils stimulated with LPS. BMS-470539 also attenuated the production of TNF-α and the phosphorylation of ERK1/2 in the lungs of mice administered LPS. BMS-470539 reduced the wet/dry weight ratio, histological severity, and neutrophil accumulation in the lungs and improved mortality after LPS treatment.
Conclusion(s): BMS-470539 attenuated LPS-induced lung injury by suppressing TNF-α production as well as ERK1/2 and p38 activation in neutrophils stimulated with LPS.

10AP9-6

Soluble RAGE predicts impaired alveolar fluid clearance in acute respiratory distress syndrome

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Background: Levels of the soluble form of the receptor for advanced glycation endproducts (sRAGE) are elevated during acute respiratory distress syndrome (ARDS) and correlate with severity and prognosis [1,2]. Alveolar fluid clearance (AFC) is necessary for the resolution of ARDS, but no reliable marker of such a process has been investigated to date.
Objectives: To verify whether sRAGE could predict AFC during ARDS.
Materials and Methods: Anesthetized CD1 mice underwent orotracheal instillation of hydrochloric acid. At specified timepoints, lung injury was assessed by analysis of blood gases, alveolar permeability, lung histology, alveolar fluid clearance and plasma/bronchoalveolar fluid measurements of proinflammatory cytokines and sRAGE. Plasma sRAGE and AFC rates were also prospectively assessed in thirty patients with ARDS.
Results and Discussion: The rate of AFC was inversely correlated with sRAGE levels in the plasma and the bronchoalveolar fluid of both acid injured mice (Spearman's rho = 0.73 and 0.69 , respectively, P< 103), and plasma sRAGE correlated with AFC in patients with ARDS (Spearman's rho = 0.59, P< 103). Similarly, sRAGE levels were significantly associated with lung injury severity, and decreased over time in mice while AFC was restored and lung injury resolved.
Conclusion(s): Our results indicate that sRAGE levels could be a reliable predictor of impaired AFC during ARDS, and should stimulate further studies on the pathophysiologic implications of RAGE axis in the mechanisms leading to edema resolution. They may also stimulate further research on the interest of monitoring plasma sRAGE during mechanical ventilation in ARDS patients.
References:
1. Uchida et al, Am J Respir Crit Care Med 2006 ; (173) : 1008-1015
2. Jabaudon et al, Crit Care Med 2011 ; (39) : 480-488

10AP9-7

Reactive oxygen molecules in developing acute respiratory distress syndrome

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Background and Goal of Study: The reactive oxygen molecules can be produced by all cells in the organism due to enzymatic and non-enzymatic processes. Lists of oxidative stress markers associated with development of many disorders. Reactive oxygen species initiate cellular tissue death by lipid peroxidation, and as a result also modulation of proteins and DNA. The main goal of this study was to investigate the dynamic changes in the level of reactive oxygen molecules in patients with acute respiratory distress syndrome (ARDS). The secondary goal was to determine the relationship of the level of oxidative stress markers to the outcome in patients with ARDS.
Materials and Methods: This prospective study was conducted in the ICU of Pauls Stradiņš Clinical University hospital during year 2014 according to the inclusion criteria: mechanical lung ventilation 24 hours in patients over 18 years of age and acute severe pneumonia, pancreatitis, sepsis or massive blood component transfusion. Patients with ARDS were monitored for seven days. The ARDS was diagnosed according to the Berlin definition criteria. Blood samples we took at the first- T1 and fourth- T4 after inclusion. Products of non-enzymatic reactions like MDA (malondialdechyde), 4-HNE (4-hydroxinonenal) were determined spectrophotometrically using a Microplate reader Infinity 2000 (Tecan Ltd.). Antioxidative biomarkers — SOD (superoxiddismutase), GPx (glutathionperoxidase) were determined spectrophotometrically using a clinical biochemistry analyser RX Daytona (Randox lab., Ltd).
Results and Discussion: Forty patients were observed, including 17 ARDS patients with acute severe pneumonia, pancreatitis, sepsis and different stages of ARDS. Statistically significant dynamic changes were shown for MDA, from median value of 2[2-3] μM in the 1st day and 2[1-2] μM on the 4th day (p=0.05, Wilcoxon Signed Rank Test). Among antioxidants- GPx significantly decreased from 4749[4026-5568] U/L on the 1st day to 4034[3797-4784] U/L on the 4th day (p = 0.03, Wilcoxon Signed Rank Test). Six patients of 17 included died. The activity of antioxidant GPx at the 1st day was higher in non-survivors 5179[4638-6365] μM if compare with survivors 4585[3728-5023] μM (p = 0.019, Mann-Whitney U Test).
Conclusions:
1. There are dynamic changes in the level of malondialdechyde and glutathionperoxidase in patients with ARDS.
2. Increased level of GPx at the first day after inclusion related with the poor outcome in ARDS patients.

10AP9-8

Activation of coagulation and fibrinolysis in association with development of ARDS

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Background and Goal of Study: Acute respiratory distress syndrome (ARDS) still has a high mortality rate of 30 - 50 %. Many aspects concerning the early diagnostic markers of ARDS are still obscure. The crosstalk between lung inflammation and coagulation/fibrinolytic pathways is described. Inflammation modulates blood coagulation by C-reactive protein which stimulates cells to produce tissue factor (TF) and plasminogen activator inhibitor-1 (PAI-1). Early detected changes in coagulation/fibrinolytic state could predict development of ARDS in mechanically ventilated patients. The main objective was to find coagulation/fibrinolysis markers as early prognostic and diagnostic tools for ARDS.
Materials and Methods: Plasma samples were prospectively collected from 24 patients with ARDS risk diagnosis requiring mechanical ventilation at least for 24 hours (h). Plasma biomarkers of coagulation/fibrinolysis (TF, t-PA, PAI-1) were measured with ELISA in three time points: at inclusion-T_0, at the third-T_3 and seventh day-T_7. Biomarker levels were compared between those with and without developing ARDS during the first 7 days after inclusion based on Berlin definition.
Results and Discussion: After ethical approval, 24 critically ill patients with a mean age 54 ± 17 years
(7 (29%) sepsis, 11 (46%) pneumonia, 3 (21%) pancreatitis, 1 (4%) with massive transfusions) on mechanical ventilation at least for 24 hours due to respiratory failure were studied. ARDS developed for 14 patients (6 (25%) mild, 4 (17%) moderate, 4 (17%) severe). Mean values of studied markers were consistent between patients with and without developing ARDS, excepting, TF at T_3 and PAI-1 at T_3 198 ± 116 vs. 89 ± 31 pg/ml; p = 0.009 and 141 ± 93 vs. 45 ± 30 ng/ml; p = 0.005, respectively. Moreover, comparing not survivors (n = 6) vs. survivors significantly higher values were noticed for TF at T_3 234 ± 124 vs 126 ± 85; p = 0.025 in all studied patients and for t-PA at T_2 516 ± 160 vs. 295 ± 85 ng/ml; p = 0.01 in ARDS group. TF at T_3 demonstrated the highest predictive value for developing ARDS with AUC 0.8; p = 0.02.
Conclusion(s): Activation of coagulation and fibrinolytic systems induced by inflammatory cytokines occurs early in patients on mechanical ventilation. TF and PAI-1 could be useful as early diagnostic markers, additionally, TF and t-PA as prognostic tolls for ARDS.

10AP9-9

Pulmonary consequences of blood replacement in rats: effects of different crystalloid volumes

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Background and aims: Although crystalloids are commonly used to treat blood loss, there is a lack of consensus about their optimal volume to restore circulation. Characterization of the potential adverse pulmonary consequences of fluid resuscitation with different crystalloid-to-blood ratios is particularly important regarding to the relatively narrow spectrum of colloids. Therefore we aimed at examining the pulmonary effects of fluid replacement therapy of moderate blood loss with different amounts of a crystalloid.
Materials and Methods: Anaesthetized, ventilated rats were exsanguinated in 7 steps, each time aiming for a blood loss of 5% of total blood volume. Following the second removal manoeuvre, the lost blood was replaced stepwise by either 1:1 (Group 1, n=5) or 3:1 (Group 3, n=6) amounts of Ringer's acetate. At baseline and after each step of blood withdrawal and replacement, airway resistance (Raw) and tissue elastance (H) were determined by forced oscillations. Blood gas measurements were performed from the 1st, 4th and 6th removed arterial blood samples. The extent of pulmonary oedema at the end of the protocol was assessed from wet-to-dry lung weight ratios.
Results and Discussion: Blood withdrawal lowered Raw in both groups equally, while fluid replacement restored its original values. Similar trends were observed in H until the 4th replacement manoeuvres. However, following the 5th withdrawal, H was elevated more markedly in Group 3 (5419±260[SE] vs 6776±774 cmH_2O/l, $p < 0.05$). This excessive stiffening in the respiratory tissues was associated with a significantly higher wet-to-dry lung weight ratio in the animals receiving more crystalloid (4.33±0.1 vs 4.67±0.07, $p < 0.03$). From the 4th withdrawal, the greater administered crystalloid volumes in Group 3 resulted in more severe decreases in haematocrit levels than in Group 1 (27.8±1.2% vs 31.9±1.1%, $p < 0.03$).
Conclusions: Fluid replacement of moderate haemorrhage with 1:1 or 3:1 amount of Ringer's acetate causes no difference in the slight temporal changes in airway resistance. The greater elevation of tissue elastance and wet-to-dry lung weight ratio in Group 3 suggests an increased rate of oedema formation following fluid replacement of moderate blood loss with 3:1 amount. These findings suggest the need for an increased attention for pulmonary oedema formation if fluid resuscitation is performed with high crystalloid-to-blood ratio.
Acknowledgement: TÁMOP 4.2.4.B/2-11/1-2012-0001

10AP9-10

The effects of hypertonic albumin administration on extra vascular lung water and global end-diastolic volume may vary depending on the days after surgery

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Background and Goal of Study: Many clinicians expect that hypertonic albumin increases the intravascular volume and reduces the extravascular tissue water such as that in the lung. Because such beneficial effects depend on intact permeability of the vascular beds, and surgery causes inflammation and thereby changes vascular permeability, we hypothesized that the effects of hypertonic albumin on the intravascular volume and extravascular lung water volume may be different depending on the days after major surgery as the severity of inflammation changes.
Materials and Methods: After institutional ethical approval and informed consent, we enrolled 20 patients (18 males, mean age 65.7) who were to undergo oropharyngeal tumor resection with skin flap reconstruction followed by 72-hour long sedation and mechanical ventilation in our intensive care unit. In each patient, inflammatory markers and the fluid balance were recorded every day for 4 days after surgery. From post operative day (POD) 1 to 3, 50ml of 25% albumin were administrated over 1 hour once a day. The extra vascular lung water (EVLW) and global end-diastolic index (GEDI, an index reflecting intravascular volume) were measured before, immediately after, 3 hours after, and 6 hours after administration of albumin by the transpulmonary thermodilution technique using EV1000 Clinical Platform (Edward Lifesciences). Two-way ANOVA was performed with the days after surgery and the time elapsed after albumin administration as the main effects.
Results and Discussion: Inflammatory markers (white blood cells and CRP) peaked on POD 2 and 3, and the fluid balance turned negative on POD 3. Albumin produced no apparent changes in ELWI or GEDI on POD 1 and 2, whereas ELWI tended to decrease and GEDI tended to increase on POD 3. The maximum percentage changes of ELWI and GEDI after albumin administration compared to pre-albumin values were ELWI: -2.0, -1.5, -3.1, GEDI: 4.9, 1.3, 6.8, respectively on POD 1, 2, and 3. These effects lasted for no more than 6 hours after albumin administration. None of these effects reached statistical significance by two-way ANOVA.
Conclusion(s): The effects of hypertonic albumin on the lung tissue water and intravascular volume appear to vary depending on the days after major surgery that accompanies prolonged inflammation. However, we cannot draw firm conclusions at present due to lack of statistical power.

10AP9-11

Fluid management in an intensive care unit (ICU) and the impact in the critical ill patients

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Background and Goal: For many years the cornerstone in the treatment of patients in shock was intravenous fluid therapy. In the last decade, there has been an increasing use of fluids in the early treatment of critically ill patients. However, fluid accumulation is not an innocuous procedure and has adverse impact on the prognosis of patients. With this study we evaluated the management of fluid balance (FB) in the ICUs of our hospital and the impact in the respiratory, cardiovascular and renal systems.
Material and methods: A retrospective observational study was conducted and included 112 patients. We studied several variables during the first 8 days in the ICU: demographic characteristics, total amount of fluids administered and excreted, blood creatinine and urea, need and dose of administered vasopressors, PaO2, FiO2, MAP. SPSS and Microsoft Excel were used for statistical analysis.
Results and Discussion: In the daily evolution of managed and disposed fluids, there was an increase from the 1st to the 2nd day. From the 2nd day there was a progressive decrease until the 8th day in the ICU. The average daily FB in the 8 days was 520.3±1549.3 ml. There was a higher daily FB in patients who died compared to those who didn't (p=0.005). The cumulative fluid balance (cFB) difference between dead/not dead was significant to the 8th day of ICU ($p=0.037$). Regarding the cFB and the respiratory system, patients with a ratio PO2/FiO2≤200 had a higher cFB between the 4th and 8th day ($p=0.017$; $p=0.044$; $p=0.009$; $p=0.04$, $p=0.001$). This indicates that fluid overload often leads to increased hydrostatic pressure in the pulmonary capillary with leakage of fluids. In the group of patients who required vasopressor support, cFB was higher in the 2nd and 3rd days ($p=0.04$ e $p=0.036$, respectively), indicating that more severe patients may need higher volume as well as higher dose of vasopressor. The group of patients with glomerular filtration rate (GFR) < 75ml/min/1.73m2 presented cFB slightly higher than the group with higher GFR (2nd and 4th days $p=0.049$ e $p=0.041$, respectively).
Conclusions: We concluded that the cFB was higher in patients who had more severe dysfunctions of the systems reviewed, which are associated with a higher probability of death. Studies are necessary for assessing whether a more restrictive fluid administration could result in better prognosis.
Reference: N Engl J Med. 2001;345(19):1368-77; Critical care research and practice. 2013;2013:79283

10AP10-1

Epidemiology and predictors of mortality in cases of Candida bloodstream infection: experience of a Spanish hospital

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Background and Goal of Study: To analyse the clinical features, epidemiology, treatment and mortality of candidemia in a tertiary care hospital.
Materials and Methods: From June 2007 to March 2014, patients with candidemia were identified at a hospital of Spain. The medical records of all patients with bloodstream infections due to Candida species were retrospectively reviewed. We used the independent t-test and the chi-square to analyse the paired data. Multivariate logistic regression analysis was performed to assess the relationships between risk factors of candidemia and mortality.
Results and Discussion: During this period, a total of 102 episodes of candidemia were identified, 70 men (68%) and 32 women (31%), with a mean age of 65 years (range 16-83). Risk factors of candidemia were: neoplasms (50%), hypertension (44%) and renal failure (18%). Candidemia were associated with the presence of invasive devices such as central venous catheter (66%), urinary catheter (71%), the presence of previous antibiotic treatment (66%) and abdominal surgery (47%).
The most frequent clinical presentation was sepsis in 67 patients (66%) and 21 patients had septic shock (20%). C. albicans (47%) was the most common pathogen, followed by C. Parapsilosis (23%) and C. Glabrata (18%).
Only 25 (24%) received empirical antifungal therapy and in 98% of these cases the treatment was seen to be appropriate. Antifungal administered in order of frequency were: fluconazole 64 patients, caspofungin 12, amphotericin B 6, and voriconazole 5. Mortality in the first 30 days following the candidemia was 45%. Risk factors that were associated with mortality were age >60 years (p=0.03), septic shock (p=0.05), abdominal focus (p=0.04) and parenteral nutrition (p=0.04).
Conclusion(s): The mortality of candidemia in our country is high and appropriate treatment is the only factor for improved prognosis. A high index of suspicion is essential for diagnosis. It is mandatory to know the different antifungal susceptibility patients in order to reduce the morbidity and mortality rate in critically ill patients. The existence of protocols and practice guidelines are necessary to improve the management of infection and prognosis.
References: Zaoutis T et al. Risk factors and predictors for candidemia in pediatric intensive care unit patients: implications for prevention. Clin infect dis 2010;51:e38-e45.

10AP10-2

Micafungin achieves an adequate Cmax/MIC ratio in plasma and peritoneal fluid in patients with secondary nosocomial peritonitis

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Introduction: Isolated *Candida spp.* in nosocomial intra-abdominal infections accounts for 27% of all pathogens. Although *C. Albicans* is the most frequent isolated strain (56%), non *C. Albicans* isolations have been increasing recently. Last ESCMID guidelines warrant equinocandines as first line treatment of invasive candidiasis (IC).
Micafungin (MFG) has a broad antifungal spectrum and a high efficacy for treating IC. A value of total Cmax/MIC ratio for C. Albicans in plasma (P) ≥10 has been related to a maximum killing effect for MFG. No studies evaluate the penetration into the abdominal cavity and the achievement of this PK/PD ratio in peritoneal fluid (PF).
The aim of this study was to assess the Cmax/MIC ratio of MFG in P and PF in patients with secondary nosocomial peritonitis (SNP) after the 1st and 3rd administrated doses.
Methods: IA prospective, observational, PK/PD study was performed in a postsurgical recovery unit of a 450-bed universitary hospital during the year 2013. The study included patients with SNP diagnosis after abdominal surgery who underwent an intra-abdominal drainage. All patients received 100 mg/day of MFG infused intravenously over 1h for at least three days. P and PF samples of micafungin were obtained on day 1 and 3 of treatment and they were measured by HPLC. Cmax/MIC ratio was calculated using MFG MIC values against *Candida spp*. isolates in our hospital (ranged from 0.08 to 0.008mg/L, excluding *C. parapsilosis*).
Results: I10 patients included. 5 of them have 3rd day P and PF samples available. All data expressed as mean-SD, t-test applied.
Descriptive data: age 67.1 years(15.06), males 60%, Body Mass Index 23.3Kg/m²(2.5), APACHE II score 17.4(8.69), Candida spp. 40%, crude mortality 1(14.3%), Penetration range Cmax PF/P day 1: 0.20(0.13); day 3: 0.41(0.13).

	DAY 1	DAY 3	p
Cmax P mg/L	5.9(1.38)	5.5(2.43)	0.63
Cmax PF mg/dl	1.18(0.44)	1.46(0.90)	0.60

[Table 1. 1st day Cmax vs. 3rd day Cmax (P and PF)]

	DAY 1	p	DAY3	p
Cmax/MIC P	73.40(17.22)	0.001	68.28(13.77)	0.01
Cmax/MIC PF	14.75(1.75)	0.02	18.25(5.02)	0.17

[Table 2. Study Cmax/MIC vs. literature Cmax/MIC =10 (MIC 0.08mg/L)]

Conclusions: MFG (100mg/24h) achieves an adequate Cmax/MIC value in P and PF since the first dose to treat *Candida* peritonitis. There are not differences in P and PF concentration between 1st and 3rd day, indicating no need of loading dose.

10AP10-3

Multidrug-resistant Candida parapsilosis in a postoperative intensive care unit. A retrospective review of twelve cases

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Background: Candida parapsilosis is a fungal species of the yeast family frequently isolated from skin and nails of health care professionals as a normal flora component and from medical equipment as intravenous catheters and parenteral nutrition lines among others[1].
It's the only Candida species usually susceptible to fluconazole and resistant to echinocandins, main antifungals currently used for the treatment of disseminated candidaemia, and exceptionally has shown in vitro resistance to both families.
Cases report: From April 2013 to October 2014 we registered 12 cases of septic shock with invasive candidiasis due to C. parapsilosis in our postoperative intensive care unit, who received vasoactive drugs to maintain adequate arterial blood pressure levels, broad spectrum antibiotics to treat underlying bacterial infections and parenteral nutrition as a part of integral management. The patients origin service areas were Digestive Surgery: 9, Thoracic Surgery: 2 and Urologic surgery: 1. The mean unit stay was 49 days.
We observed multiple focus of infection in 3 patients and calculated APACHE II and SAPS III scores to determine severity and mortality estimation, and Candida Score to identify risk for developing invasive candidiasis for all patients.
Discussion: All were treated with antifungal therapy, including azoles, echinocandins or amphotericin B, depending on culture and susceptibility outcomes[2]. Cross-resistance between azoles and echinocandins was remarkable: 6 out of 12 showed resistance to both families. 3 out of 12 showed dose-dependent resistance to tested antifungals and 3 showed no in vitro antifungal resistance. All cases were highly sensitives to amphotericin B.
Terminal cleansing was considered as a key step on infection control, but new cases appeared once it has been performed.
Given the clinical and epidemiological characteristics of C. parapsilosis, the outcome of this epidemic outbreak is still a challenge, revealing the necessity of an improved infection control program, and development of new therapeutic strategies.
References:
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2. Pappas et al, Guías de práctica clínica para el manejo de la candidiasis: actualización de 2009. Clinical Infectious Diseases 2009;48:T1-T35
Learning points:
Cross-resistance between antifungal families
High-level adaptability of Candida species
High positive predictive value of Candida Score

10AP10-4

New approach to intensive therapy of ventilator-associated pneumonia in neurosurgical patients

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Background and Objective: According to various authors the rate of ventilator-associated pneumonia (VAP) is 21.3% up to 100%. And 20.1% of lethal cases are due to VAP. We aimed to analyze the management of neurosurgical patients with VAP by applying high-frequency ventilation (HFV).
Materials and Methods: The study was retrospective. Choice criterion was mechanical ventilation more than 48 hours. We analyzed 506 medical cases of Neurosurgery Department registered in 2013 (n=321) and 2014 (n=185). The average age was 33±5. All patients took antibacterial therapy by scheme. 1st scheme - cefoperazone/sulbactam (4 g/day)+amikacin (1.5-2 g/day) and 2nd scheme - cefoperazone/sulbactam (4 g/day)+levofloxacin (1 g/day). Later antibacterial therapy was continued according to the results of bacteriologic tests. Patients were divided into 2 groups:
1st group (n=321) was ventilated with conventional mechanical ventilation modes (CMV, SIMV, BiPAP) and the average duration of ventilation was 10.9 days.
2nd group was ventilated with combination of conventional mechanical ventilation and HFV (HFV parameters: f=100 min^{-1}, V_E=18-19 L, I:E=1:2 or 1:3), and duration was 1-6 hours every 1-3 days depending on individual features and pathology, the average duration was 8.3 days. Ventilation parameters were set individually in all groups.
Results: The schemes of antibacterial therapy used in intensive care units was determining factor in decrease in mortality by 8%. Parameters of cerebral hemodynamics were significant different in various modes of respiratory support (Table 1).

	Vm cm/sec	Pi	Overshoot coefficient
CMV	51.1±1.4	1.84±0.1	1.28±0.01
SIMV	52.6±4.1	1.60±0.1	1.23±0.02
BiPAP	54.4±2.1	1.62±0.1	1.23±0.02
HFV	57.8±7.1	1.39±0.2	1.36±0.01

[Table 1]

During HFV parameters of respiratory mechanics and gas exchange improved in the 1st day (PaO_2/FiO_2=538.2, PaO_2=269.1 mmHg), intracranial pressure was lower and cerebral perfusion pressure was higher, and $AVDO_2$ increased.
Conclusions: Adherence to antibacterial schemes and application of HFV significantly reduce respiratory complications. And advantages of HFV over other modes of mechanical ventilation in complex therapy of intracranial hypertension are clearly seen.
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10AP10-5

Pan-drug resistant acinetobacter ventilator acquired pneumonia; a growing problem in critically ill patients in Egypt

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Background and Goal of Study: Ventilator-associated pneumonia (VAP) is associated with prolonged mechanical ventilation, increased intensive care unit (ICU) length of stay, and substantially increased mortality[1]. Pan-drug resistant (PDR) pathogens are increasing in ICU[2]. One of the most virulent PDR is Acinetobacter baumannii. Little is known regarding the pathogenesis of Acinetobacter infection [3].
Our objective is to find out the prevalence, possible risk factors, outcome, and antimicrobial suscebtibility of (PDR) Acinetobacter VAP.
Materials and methods: A Prospective observational study was performed in Cairo University hospital surgical ICU admitting trauma and emergency postoperative patients over 16 months period. All consecutive patients who were clinically suspected of developing VAP were included.
Data Collected included all possible risk factors as well as final outcome. Susceptibility testing was performed using inhibitory concentrations (MICs) for tigecycline, colistin, Imipenem.
Results and discussion: PDR Acinetobacter VAP prevalence was 54.3% (25 isolates out of 46). As regards risk factors, no statistically significant risk factors for acquisition of PDR Acinetobacter VAP were reported in our patients. As regards outcome; There was no significant difference in mortality between patients developing PDR Acinetobacter-VAP and those developing Non PDR Acinetobacter VAP (44% versus 53.3% respectively P value=0.4).
As regards in-vitro sensitivity; One-hundred percent of *Acinetobacter* spp. were carbapenem-resistant MIC> 32 mg/L. Tigecyline showed moderate activity against acinetobacter spp. MIC of 11 isolates was less 2.0 mg/L. while 9 isolates were resistant (MIC range 4-12 mg/L). Colistin showed excellent activity against all Acinetobacter species (MIC range 0.016-1 mg/L).
Conclusion(s): PDR Acintobacter VAP is highly prevalent in our patients with no clear risk factors. Colistin is the only antimicrobial that showed excellent activity against Acinetobacter species.
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10AP10-6

Bacteriology of late postoperative pneumonia: a retrospective cohort analysis

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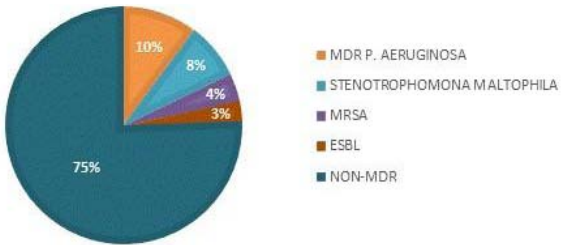
Background and Goal of Study: Late-onset postoperative pneumonia (occurring after 4 days of hospitalization) involves a high risk of mortality and morbidity partially related to multidrug-resistant (MDR) pathogens. The aim of the study was to describe the microbiology of late postoperative pneumonia (LPP) in a surgical intensive care unit (SICU) focusing in MDR pathogens.
Materials and Methods: We retrospectively (January/11-December/14) reviewed those patients affected by clinical LPP. Variables analysed were: age, sex, type of anaesthesia and surgery, hours of mechanic ventilation in the SICU, method for obtaining respiratory tract cultures and microbiology. The empirical antibiotic policy consisted in: antipseudomonal cephalosporin or carbapenem or beta-lactam/beta-lactamase inhibitor + antipseudomonal fluoroquinolone or aminoglycoside as is suggested by guidelines[1].
Results and Discussion: 56 patients (31% male, 69% female) with an average age of 71(18-93) years old were included. The most frequent surgery was abdominal (54%) followed by thoracic surgery (15%). 100% of respiratory tract cultures were obtained through bronchoscopic method. 96% of patients underwent general anaesthesia but only the 43% were ventilated at the time of the LPP diagnosis. We obtained 78 bacterial isolations, 24% of those were MDR pathogens. *P.Aeruginosa* (the vast majority only sensible to colistin and aminoglicosides) represents 10% of total isolations. *S. maltophilia* was the second most frequent MDR pathogen isolated. Interestingly, MSRA was identified only in 4% of total cultures and ESBL reached the 3%. Microbiology is described in the graphic.



[Microbiology]

Conclusions: According to our local flora, empiric antibiotic therapy for late postoperative pneumonia could probably include two antipseudomonal drugs, one of them colistin (also frequently effective against *Stenotrophomonas*) and a carbapenem that also should be effective against ESBL. Empirical treatment for MRSA should not be considered.

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10AP10-7

Correlation between incidence of VAP and use of antimicrobial agents in ICU patients

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Background and Goal of Study: Ventilator Associated Pneumonia (VAP) is one of the most frequently seen infections in ICU setting. Prevention and infection control may require the use of and line antimicrobial agents.
The aim of our observation retrospective study was to test the hypothesis that a correlation exists between the incidence of VAP and the use of main end line antimicrobial agents in order to treat infections caused to multi resistant bacteria, n our both medical and surgical ICU served in community hospital.
Materials and Methods: From 2008 to 2012 admitted to our ICU 384 patients, mean age 65.1 years, mean length of ICU stay (LOS) 13.8 days, mean mechanical ventilation duration per ventilated patient (V. Days) 11.75 days, mean APACHE II score on addition 20.9, From our database we looked for incidence of VAP (‰ ventilation days) as well as the use of the following agents as items per ventilation day per ventilated patient: Imipenem / cilastatin (vial 500 + 500 mg), Meropenem (vial 1000 mg), Tigecyclin (vial 50 mg), Linezoline (bag, 2 mg / ml x 300 ml), Colistin IV (vial 10^6 IU). Using linear correlation method, we looked for linear slope, correlation coefficient (r), and coefficient of determination (r^2), and by linear regression method using ANOVA test we looked for p value, according incidence of VAP and use of antimicrobial agents.
Results and Discussion:

	2008	2009	2010	2011	2012
Inc VAP	5.54	9.91	8.58	6.06	9.37
Imipenem	0.70	0.36	0.31	0.29	0.43
Meropenem	0.11	1.20	0.52	0.77	0.69
Tigecyclin	0.07	0.33	0.45	0.32	0.89
Linezoline	0.17	0.21	0.25	0.20	0.14
Colistin	0.53	2.27	1.29	1.47	2.94

[Incidence of VAP and use of antimicrobial agents]

	Slope	St Error	r	r2	L CI	U. CI	p value
Imipenem	-0.038	0.043	-0.457	0.209	-0.176	0.099	0.438
Meropenem	0.136	0.084	0.680	0.463	-0.133	0.405	0.205
Tigecyclin	0.099	0.067	0.644	0.418	-0.116	0.315	0.237
Linezoline	0.002	0.012	0.110	0.012	-0.361	0.040	0.859
Colistin	0.376	0.162	0.800	0.639	-0.142	0.894	0.104

[Correlation between incidence of VAP and use of]

Conclusion(s): According to our data, there was no statistically significant correlation detected between incidence of VAP and use of any of the end line antimicrobial agents studied. Our data suggest that use of these antimicrobial agents is independent from the incidence of VAP.This may be due to use these agents to treat other infections, or to overuse avoiding de-escalation or to use to prevent spreading and colonization.

10AP10-8

Bacteriology of postoperative early-onset pneumonia: changes over time?

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Background and Goal of Study: Time onset of pneumonia is an important risk factor for specific pathogens and empiric antibiotic strategy. Early-onset pneumonia (occurring before 5 days of hospitalization) is commonly caused by antibiotic-sensitive bacteria.
However, local flora must be frequently reviewed and antibiotic policy adjusted to the most recent microbiology.
The aims of the study were:
1. to describe the microbiology of early postoperative pneumonia (EPP) on the last 4 years, and;
2. to evaluate our results related to immediate previous data after antibiotic protocol adjustment (ceftacidime + levofloxacin).
Materials and Methods: We retrospectively analysed a cohort of 99 patients (January/11-December/14) with clinical suspect of postoperative pneumonia and only those with EPP were included. Variables analysed: age, sex, comorbidities, type of anaesthesia and surgery, method for obtaining respiratory tract cultures, pathogens and risk factors for multidrug-resistant (MDR) pathogens. Microbiology and demographic was compared with our immediate previous data (January/08-December/10).
Results and Discussion: 58 patients with EPP were included. Variables evaluated did not change between periods except for the method for obtaining respiratory tract cultures (bronchoscopic method: 63% in previous data *vs* 95% in actual period). Remarkably, all MDR germens were isolated in patients at risk for them. Microbiology is shown in the tables.

Non-MDR,n (%)	2008-2010	2011-2014
P.aeruginosa	6 (7%)	9 (12%)
E.coli	6 (7%)	4 (5%)
Klebsiella species	10 (13%)	9 (12%)
Other enterobacteriaceae	11 (14%)	14 (18%)
Haemophilus species	6 (7%)	6 (8%)
Gram-positive cocci	12 (15%)	13 (17%)
Other pathogens	26 (33%)	9 (12%)
TOTAL ISOLATIONS	77	64

[Non-MDR]

MDR,n (%)	2008-2010	2011-2014
P.aeruginosa	2 (2,5%)	4 (5%)
E.coli	1 (1,5%)	2 (3%)
MRSA	0	2 (3%)
S.maltophilia	0	5 (6%)
TOTAL ISOLATIONS	3	13

[MDR]

Conclusions: We observed an increase of MDR pathogens isolations in patients with EPP, all of them at risk for MDR, probably related to the type of population treated. In relation to sensitive bacteria there are no substantial changes to justify an antibiotic regimen readjustment.

10AP10-9

Correlation between incidence of VAP and nursing severity and outcome indexes in ICU patients

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Background and Goal of Study: Ventilator Associated Pneumonia (VAP) may have an impact to the length of ICU stay, and to ICU outcome.
The aim of our observation retrospective study was to test the hypothesis that a correlation exists between the incidence of VAP and the main nursing, severity and outcome indexes in our both medical and surgical ICU served in community hospital.
Materials and Methods: From January 2006 to June 2014 admitted to our ICU 620 patients, mean age 64.8 years, mean length of ICU stay (LOS) 14.2 days, mean mechanical ventilation duration per ventilated patient (V. Days) 12.23 days, mean APACHE II score on addition 21.2, predicted mortality 38.9 %, actual mortality 31.45 %, Standardized Mortality Ratio (SMR) 0.80. From our database we looked for incidence of VAP (‰ ventilation days) as well as the above nursing and severity indexes per year from 2006 to 2013 and per six months period for the latest year 2014.
Using linear correlation method, we looked for linear slope, correlation coefficient (r), and coefficient of determination (r^2), and by linear regression method using ANOVA test we looked for p value, according incidence of VAP and nursing (LOS, VD), severity (age, APACHE, Predicted mortality) and outcome (Actual mortality, SMR) indexes.

Results and Discussion:

	Slope	St. Error	r	r2	L. CI	U. CI	p value
Age	-0.994	0.78	-0.434	0.188	-2.83	0.85	0.243
LOS	-0.303	0.29	-0.365	0.133	-0.99	0.38	0.333
V. Days	0.395	0.266	0.489	0.239	-0.235	1.02	0.181
APACHE	-0.128	0.64	-0.07	0.005	-1.64	1.39	0.847
Pr. Mortality	-0.363	1.907	-0.07	0.005	-4.87	4.14	0.853
Act. Mortality	2.29	1.82	0.426	0.183	-2.031	6.614	0.250
SMR	0.063	0.024	0.693	0.483	0.004	0.122	0.037

[Correlation between incidence of VAP and indexes]

Conclusion(s): According to our data, there was no statistically significant correlation detected between incidence of VAP and Age, LOS, VD, APACHE II score, Predicted Mortality nor Actual Mortality. On the other hand, there was statistical significant, strong positive linear correlation found between incidence of VAP and Standardized Mortality Ratio. Our data suggest that incidence of VAP did not correlate with the severity of illness on ICU admission and did not have any statistically significant impact on the nursing ICU indexes. Nevertheless, incidence of VAP, although did not correlate with the actual mortality, impairing heavily the physiological status, had a strong and statistically significant impact on outcome in ICU patients.

10AP10-10

Ventilator associated pneumonia: do silver-coated endotracheal tubes really work?

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Background and Goal of Study: Ventilator-associated pneumonia (VAP) is an important matter in patients careed in Intensive Care Units, having an increased burden[1]. The silver-coated endotracheal tubes (ETTs) have been designed to prevent bacterial colonization and to reduce VAP, but their efficacy, benefits and disadvantages available data are still full of controversy[2]. The objective was to determine whether VAP incidence can be influenced using silver-coated ETTs.
Material and methods: A comparative prospective and randomized study was conducted in Critical Care Toxicology Unit, in Bucharest Clinical Emergency Hospital between January-December 2013. We enrolled all intubated patients for longer than 24 hours, admitted for coma due to drug poisoning, considering the profile of the clinic; preadmission contaminated patients and patients with co-morbidities were excluded. All patients were assigned to undergo either normal ETTs or silver-coated ETTs. Primary outcome was VAP incidence while duration of antibiotic use and hospitalisation were secondary outcomes.
Results and Discussion: One hundred patients were enrolled, 50 on each group. Baseline characteristics were similar for both groups. When compared with silver-coated ETTs, non-coated ETTs patients showed a higher incidence of VAP at 5 days from intubation (OR=3.42, 95% CI 0.65 to 17.90, p=0.144). In silver-coated ETTs group the most frequent bacteria isolated were: Acinetobacter (1 case), Staphylococcus aureus (1 case), while in the normal ETT group were: Staphylococcus aureus (2 cases), Acinetobacter baumanii (1 case), Pseudomonas Aeruginosa (2 cases), Klebsiella pneumonia (1 case). Need for antibiotic use for VAP treatment was shorter (counted in days) for subjects using silver-coated ETTs (OR=0.3, 95% CI 0.23 to 2.24, p=0.05), but no difference was registered regarding duration of hospitalization (mean 18.5 vs. 16.3 days).
Conclusions: Our findings suggest that silver-coated ETTs use is associated with a lower incidence of VAP. More studies need to be developed in order to evaluate cost-effectiveness of these devices.
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10AP10-11

Effects of safflower yellow on the treatment to severe sepsis and septic shock: a randomized controlled clinical trial

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Objective: Treatments to severe sepsis and septic shock have not gained a magic bullet until present. Safflor yellow is a platelet activating factor inhibitor that can inhibit the aggregation of platelet and Improve microcirculation. This study was to evaluate the clinical effect of safflor yellow on the treatment of severe sepsis and septic shock.
Methods: 63 patients with the diagnosis of severe sepsis and septic shock were single blind randomly allocated to receive either conventional therapy only according to International guidelines for management of severe sepsis and septic shock (the Surviving Sepsis Campaign 2012) (control group, n=33) or conventional therapy and safflower yellow (study group, n=30), with intravenous infusion of 100mg Safflor yellow once every 12 hours within 72 hours. The 28-day mortality, days of ICU hospitalization and mechanical ventilation, and 28-day survival rate were observed and compared. Respiratory frequency (F), heart rate (HR), arterial partial pressure of oxygen (PaO_2), urinary production per 1 hour, and leucocyte counts of patients in two groups were also compared before and 72 hours after treatment.
Results: Compared with the control group, 72 hours after treatment, F, HR, and leucocyte counts of patients in the study group decreased significantly (P=0.019, P=0.042 and P=0.013, respectively), while PaO_2 and urinary production per 1 hour increased significantly (P=0.015 and P=0.002, respectively). Although the 28-day mortality decreased from 79% in the control group to 57% in the study group, there was no statistical significance about the 28-day mortality (P=0.060) and the 28-day survival rate (P=0.066 Log Rank) between the two groups. There were also no significant differences in the days of mechanical ventilation and ICU hospitalization between the two groups.
Conclusion: With the intervention of safflor yellow in severe sepsis and septic shock, some intermediate indexes such as heart rate, PaO_2, urinary production per 1 hour and leucocyte counts were improved. The 28-day mortality decreased 22% with no statistical difference. This result suggests that we should increase the patient pool to further verify the outcome of patients with severe sepsis and septic shock by safflor yellow intervention.

Resuscitation, Emergency Medicine and Trauma

11AP1-1

Automated chest compression device is useful to maintain circulation during advanced diagnostic of in-hospital cardiac arrest - a case report

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Background: Computed tomography (CT) may be used to determine the reversible causes of in-hospital cardiac arrest (IHCA) (1). The automated chest compression devices (ACCD) may be helpful to maintain sufficient circulation in X-ray environment during CT (2).
Case report: A 82-year old man underwent elective aortic stenting with percutaneous transluminal angioplasty of left renal artery because of infrarenal aortic aneurysm. Five hours later during postinterventional monitoring at intermediate care unit his circulation rapidly deteriorated and cardiac arrest occurred. Manual chest compression was started followed by bedside ultrasound examination of the abdomen and thorax without valuable findings. In order to find the cause of IHCA whole body computed tomography (CT) was performed. To maintain sufficient chest compression during CT procedure, the load-distributing band ACCD AutoPulse was installed. CT scan revealed a large retroperitoneal hematoma. Bleeding could be stopped by vascular embolisation of renal segment arteries. The patient returned to spontaneous circulation after massive fluid infusion and transfusion about 25 minutes after cardiac arrest.
Discussion and conclusion: The quality of CT imaging was sufficient for clinical decision under ACCD resuscitation. Application of ACCD enabled diagnostics and interventional therapy of internal bleeding as a reversible cause of IHCA in this case. ACCD should be routinely used in patients undergoing CT diagnostics of IHCA.
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Learning Points: IHCA allows using comprehensive types of diagnostic procedures. These should be used to find treatable causes. ACCD assure sufficient circulation during the procedures.

11AP1-2

Increase in cerebral saturation during pre-hospital advanced life support in a multicenter setting

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Background and Goal of Study: During out-of hospital cardiac arrest (OHCA) monitoring possibilities are limited. Recently, the role of cerebral oximetry, using near infrared spectroscopy, during ALS was investigated. In this study we determined whether the magnitude of increase in cerebral saturation (rSO2) during pre-hospital ALS could be associated with return of spontaneous circulation (ROSC).
Materials and Methods: With IRB approval, we prospectively measured rSO2 during ALS in consecutive OHCA patients in two hospitals. One sensor of the Equanox™ 7600 or SenSmart (NONIN) was applied on the right side of the patient's forehead when the medical emergency team arrived in an out-hospital resuscitation setting. Monitoring was continued until the patient arrived at the ICU or when resuscitation attempts were discontinued. ROSC was defined as ROSC >20 min.
Results and Discussion: Between December 2011 and October 2014, we included 115 patients of which 44 achieved ROSC. There were 25 male patients (57%) in the ROSC group compared to 53 (75%) in the no-ROSC group (p=0.047). Mean age in the ROSC group was 72.5 year (56-83) compared to 72 year (58-79) in the no-ROSC group (p = 0.544). There was no significant difference between both groups in initial rhythm (asystole p=0.417; ventricular fibrillation p=0.391; pulseless electrical activity p=0.898). Witnessed arrest occurred significant more in the ROSC group (77%) compared to the no-ROSC group (52%) (p=0.007). The frequency of initiation of bystander basic life support was the same in both groups (p=0.323). We could not observe a significant difference in time between emergency call and start ALS (p=0.945). Though a significant difference in duration of ALS was found between both groups, median duration of ALS in the no-ROSC group was 22 min (17-33) compared to 12.5 min (9-21) (p<0.001). The mean rSO_2 until one min before ROSC was 34% (22-41) in the no-ROSC group compared to 42% (33-48) (p=0.002). We also observed a significant difference in increase from start measurement until one min before ROSC or until the end of ALS between the no-ROSC group and the ROSC group with respectively an increase of 9% (4-14) and 22% (11-42) (p<0.001).
Conclusion(s): The results of this observational multicenter study showed a significant difference in increase of rSO_2 even before ROSC was achieved. This finding suggest a possible role for rSO_2 during pre-hospital ALS as monitor and as predictor of ROSC.

11AP1-3

Injuries associated with the use of automated chest compression devices vs. manual compression for cardiopulmonary resuscitation - an audit at the university hospital

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Background and Goal of Study: The effectiveness of automated chest compression devices (ACCD) in cardiopulmonary resuscitation (CPR) is indisputable, however the data about ACCD-associated injuries of CPR are controversial (1,2). The aim was to evaluate the incidence of injuries in patients after CPR using the load-distributing band ACCD Autopulse in comparison with manual CPR.
Materials and Methods: The data of consecutive patients, who were admitted to the university hospital of Greifswald after out of hospital cardiac arrest (OHCA) in 2008-2010 was analysed. Other inclusion criteria were age >18 years, OHCA with cardiopulmonary resuscitation provided by emergency medical service (EMS) personnel, with or without use of Autopulse. Exclusion criteria were death before hospital admission and return of spontaneous circulation (ROSC) before EMS arrival. Hospital discharge and confirmation of thoracic injuries were defined as primary endpoints. Routine chest x-ray or CT-scan images were analysed to detect thoracic injuries.
Results and Discussion: 102 out of 167 patients with OHCA were admitted to hospital. In 42 patients (11 CPR with Autopulse) thorax imaging was available. From 31 patients with manual CPR, 2 revealed rib fractures and 1 pneumothorax; no injuries were registered among patients after CPR with Autopulse. 61% (19/31) of patients with manual CPR survived and were discharged from the hospital in comparison with 27% (3/11) patients, where Autopulse was used for CPR (P=0.08; Fisher's exact test).
Conclusions: The overall incidence of CPR-associated complications in patients with OHCA in our audit was low, the use of ACCD Autopulse did not increase the incidence of thoracic injuries.
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11AP1-4

Percutaneous transtracheal jet ventilation in a CPR-setting; a life saving rescue-technique

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Background: Airwaymanagement is a key factor for safety in anaesthesia. We describe a CPR setting due to a supraglottic obstruction in which we performed an emergency percutaneous transtracheal jet ventilation (PTJV).
Case report: A 62 year old female underwent an elective panendoscopy. The medical history included multiple malignancies of the oropharynx followed by multiple surgeries and radiotherapy. An uncomplicated awake fiberoptic intubation due to a mouth opening of 2 cm was performed initially; subsequently a small intraoral biopsy was taken. The patient was extubated after regaining full consciousness.
One hour postoperatively, the patient had difficulties in breathing despite nebulizer therapy. Progressive dyspnoea occurred followed by cyanosis and collapse. The monitor showed a bradycardia of 12 bpm without output and CPR was initiated. Bag-mask ventilation was inadequate due to severe fibrotic tissue. The oro- and hypopharynx were oedematous and swollen on fiberoptic scopy. Emergency needle cricothyroidotomy was performed and PTJV was initiated. After a CPR time of 6-8 minutes ROSC was achieved and adequate oxygenation and ventilation was confirmed (first bloodgas: $PaCO_2$ 63 mmHg, PaO_2 577 mmHg). A secured airway was established through fiberoptic intubation guided by the bubbles created with PTJV. After stabilisation, a surgical tracheostomy was performed.
The patient recovered without neurological deficits. Chest X-ray revealed minimal signs of barotraumas which resolved with conservative therapy. The cause of the upper airway obstruction remains unclear.
Discussion / Learning Points: PTJV has been shown to be a method for temporary oxygenation and ventilation in emergency settings of unanticipated difficult airway.[1] PTJV has been described in anticipated and unanticipated difficult airway settings but to our knowledge this is the first report in a CPR setting. Emergency percutaneous airway is uncommon with an incidence of 1 in 12.500 - 50.000 general anaesthetics.[2] Therefore, skills of airway rescue techniques are likely to be unfamiliar. Training of airway rescue-techniques are important to improve patient safety.[3]
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11AP1-5

The "Biblical Method" of ventilation and resuscitation - rather a genuine "myth" than a historical fact: feeding the "sobering" results of recent historical research to the wider communities of anaesthesia, intensive care and rescue medicine

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Background: Within the wider Communities of Anaesthesia, Intensive Care and Rescue Medicine, the "Biblical Method" is commonly referred to as the earliest form of artificial (emergency) ventilation and resuscitation, allegedly dating back to pre-historic times. This still quite commonly held notion, however, ignores a growing body of re-appraised historical evidence [1].
Results: The available sources cited to support the claim of a "Biblical Method" refer to the Old Testament of the Bible, the Torah, various myths of ancient Egyptian, Mesopotamian or Greco-Roman origin and later commentaries. All are religious in nature. In practical / technical terms the "Biblical Method" is - and in a few cases can be - "interpreted" as comprising two main methods. These could have been used individually or in combination:
Either a simple form of positive- and / or alternate pressure ventilation [administered mouth-to-mouth or -nose ("kiss of life")], and / or a "blow-thrust-", or "suction manoeuvre" to clear an obstructed airway.
Sources aim to educate and spread believes, mystics and spirituality. They symbolize the "making of man", his "animation" (being given a soul), acts of sustaining life by nourishment, social and spiritual bonding, rites of passage around death, rebirth and miracles. In wider cultural and historical terms there is no evidence that these manoeuvres were contemporarily put in context with human anatomy, physiology and general health care.
Discussion / Learning Points: On the base of the available evidence, the existence of an in any way significant "Biblical Method" of emergency ventilation / resuscitation is pure speculation. Until well beyond medieval times it is - on balance - rather unlikely. From a historiographical viewpoint the alleged "evidence" for early forms of artificial ventilation should in the future be presented in considerably more "relative terms". The term "Biblical Method" itself is misleading and should be avoided. Also historical research or theories are in constant flux: They should not be uncritically perpetuated. The phenomenon highlights the importance of trans-disciplinary co-operation in historic research and the interpretation of its findings: History matters!
Reference: 1. Strätling MWM, Grösch S, Niggebrügge C. The "Biblical Method" of Ventilation - Fact or fiction ?. In Print: Proceedings of the 8th International Conference for the History of Anaesthesia (ISHA), Sydney, Australia, 22nd - 25th January 2013.

11AP1-6

The use of the apparatus for external compression of the thorax (LUCAS 2) in the treatment of cardiac arrest in hospital conditions-our experience

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Background and Goal of Study: With randomised prospective study we followed systolic blood pressure, the occurrence of complications, survival, neurological recovery after application LUCAS 2 (maschine for external compression of the thorax) in the treatment of cardiac arrest patients in the Surgery Department, department of cardiology patients and in all other departments of our hospital (CHC"Bezaniska Kosa") in course of seven months (June 2013 - December 2013).
Materials and Methods: All patients began the resuscitation with conventional CPR. If after 5 minutes of resuscitation, there has been no spontaneous circulation (ROSC), patients were divided into two groups, group (C) in which the resuscitation was continued with conventional CPR and group (L2) in which resuscitation was continued by using the apparatus LUCAS 2. In this period there were 33 calls for reanimation. Total of 23 patients were analyzed. In 9 patients the Lucas2 device was applied and in 14 patients conventional CPR was continued.
Results and Discussion: The analysis excluded 10 patients: 5 patients in whom the spontaneous circulation (ROSC) was established during the first 5 minutes of resuscitation, in 1 patient because of the enormous obesity was not possible to apply LUCAS 2 and in 4 patients there were not enough data. Analyzed 23 patients from both groups had similar time establishing circulation (ROSC) in the L2 group of 53.62% in group C 43.34%. In 5 patients (35.71%) of group C in the course of resuscitation, there was a fracture of one or more ribs, while the L2 group there were no such complications. Systolic blood pressure in a group of L2 was 79 ± 5 mm Hg in C group 77 ± 3 mmHg. All 3 patients (13.04%) were discharged from the hospital, 1pacijent (4.34%) from the L2 group and 2 patients (8.69%) from group C had a good neurological recovery.
Conclusion(s): In our study setup and use LUCAS 2 showed that there were no differences in the achievement of systolic blood pressure during resuscitation, survival and neurological recovery in patients who survived cardiac arrest. Significantly, there were fewer complications in the group of patients with ongoing resuscitation used LUCAS 2.

11AP1-7

An observational near-infrared spectroscopy study on cerebral autoregulation in post-cardiac arrest patients: time to drop 'one-size-fits-all' hemodynamic targets?

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Background and Goal of Study: A subgroup of post-cardiac arrest (CA) patients with disturbed cerebral autoregulation might benefit from higher mean arterial pressures (MAP). We aimed to
1. phenotype patients with disturbed autoregulation,
2. investigate whether these patients have a worse prognosis,
3. define an individual optimal MAP per patient and
4. investigate whether time under this individual optimal MAP is associated with outcome.
Materials and Methods: In a prospective observational study in a tertiary care hospital, we included all consecutive CA patients. Cerebral oxygenation (SctO2) was monitored by Near InfraRed Spectroscopy (FORE-SIGHT technology; CAS Medical systems, Branford, CT, USA). COX index of autoregulation was calculated as the moving linear correlation coefficient between 10 seconds averaged values of SctO2 and MAP over moving 5 minute time windows during the 24 hours postCA study period.
Results and Discussion: 51 post-CA patients were included.
1. 18/51 patients (35%) had disturbed autoregulation. Phenotypically, a higher proportion of patients with disturbed autoregulation had pre-CA hypertension (31±47 vs 65±49%,p=0.02) suggesting that right shifting of autoregulation is caused by chronic adaptation of cerebral blood flow to higher blood pressures.
2. In multivariate analysis, patients with preserved autoregulation (n=33,65%) had a significant higher 180-days survival rate (OR4.62, 95%CI[1.06:20.06],p=0.04]. Based on an index of autoregulation (COX), the average COX-predicted optimal MAP was 85mmHg in patients with preserved and 100mmHg in patients with disturbed autoregulation.
3. An individual optimal MAP could be determined in 33/51 patients.
4. The time under the individual optimal MAP was negatively associated with survival (OR0.97, 95% CI[0.96:0.99],p=0.02). The time under previously proposed fixed targets (65,70,75,80mmHg) was not associated with a differential survival rate.
Conclusion(s): Cerebral autoregulation showed to be disturbed in 35% of post-CA patients of which a majority had pre-CA hypertension. Disturbed cerebral autoregulation within the first 24hrs after CA is associated with a worse outcome. In contrast to uniform MAP goals, the time spent under a patient tailored optimal MAP, based on an index of autoregulation, was negatively associated with survival.

11AP1-8

Prehospital hypothermia - effects on transfusion requirements and the patients outcome

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Background and Goal of Study: Prehospital hypothermia remains a problem in emergency medicine. One of the questions in context of the patient blood management project, a joint initiative to improve current blood transfusion management, is to explore if the temperature of patients at admission to the emergency room has consequences for subsequent in-hospital transfusion requirements and the patient mortality rate. Prehospital hypothermia, defined as a core temperature below 36.0°C, is a risk factor for early death of trauma patients (1). Between the years 2005 and 2009 an estimated 45% of patients were admitted to hospital with hypothermia in the United States (2).
Materials and Methods: In a retrospective study at the University Hospital Bonn, conducted between January 2012 and December 2013, out of 54732 patients admitted to the emergency department 15895 patients were included. Patients were classified by their admission temperature and the transfusion rate. Statistical analysis was performed using chi^2 test, Kaplan Meier, binary logistic regression.
Results and Discussion: A total of 3348 patients presented with hypothermia (22.85%). Hypothermic patients died earlier than non-hypothermic ($p < 0.001$). A total of 8.1% received packed red blood cells (PRBC). Transfused patients had an increased risk of death ($p<0.001$). The mortality rate increased to 37.8% for patients with massive transfusion (>12 PRBC). The results of the binary logistic regression model showed that prehospital hypothermia is a risk factor for transfusion of PRBC (AOR, 1.765; p=0.46) and mortality (AOR 8.521; p=0.001).
Conclusion: Prehospital hypothermia is a serious subject in resuscitation and emergency medicine. Low admission temperatures are associated with a higher risk of transfusion and death. Hypothermia is a condition that we can prevent. Therefore, a greater awareness for a prehospital temperature management should be established.
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No conflict of interest declared.

11AP1-9

Relationship between experience of prehospital healthcare providers and mortality in patients with severe traumatic brain injury undergoing endotracheal intubation in the field: a meta-analysis and meta-regression

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Background and Goal of Study: Severe traumatic brain injury (TBI) is associated with high mortality. Prehospital management focuses on prevention of secondary risk factors such as hypoxia and hypercapnia. In this context, prehospital endotracheal intubation is commonly advocated, however the available evidence is contradictory. Potential benefits may be reversed by adverse effects such as prolonged intubation attempts, hemodynamic and autonomic responses, or inadequate ventilation. The risk for such adverse effects, and hence the risk for mortality after prehospital intubation in TBI patients, might be associated with the Emergency Medical Service (EMS) provider's experience.
Materials and Methods: PubMed was searched using pertinent search terms, the search was last updated in December 2014. Studies reporting original data of adult TBI patients with Glasgow Coma Scale ≤ 9 and/or Head Abbreviated Injury Score ≥ 3 were assessed for eligibility. Articles of sufficient quality to compare mortality in intubated versus non-intubated patients were selected for random-effects meta-analysis (STATA 13). The analysis was stratified by EMS-experience: limited experience (paramedics with standard training) and extended experience (emergency physicians or paramedics with additional training in airway management). Random effects meta-regression with EMS-provider experience as covariate was used to assess differences between experience groups. Relative Risk (RR): mortality risk of intubated versus non-intubated patients.
Results and Discussion: The search yielded 331 articles, 106 full-text articles were assessed for eligibility and 5 articles with a total of 1826 patients were selected for meta-analysis and meta-regression. Overall, prehospital intubation was associated with a higher mortality risk compared to non-invasive airway management (RR 1.17; 95%CI 1.03-1.34, p=0.017). When stratified by experience, this increased mortality risk was observed only in the limited experience group (RR 1.26; 95%CI 1.12-1.43, p< 0.001) but not in the extended experience group (RR 0.92; 95%CI 0.72-1.18, p=0.526). Meta regression confirmed a significant (p = 0.025) effect of experience on mortality.
Conclusion(s): Prehospital intubation of TBI patients by EMS providers with limited experience is associated with increased mortality and should be avoided. Such increased mortality was not observed when intubation was performed by experienced personnel.

11AP1-10

Role of the H_2S-producing enzyme cystathionine-γ-lyase during blunt chest trauma in cigarette smoke-exposed mice

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Background and Goal of Study: Blunt chest trauma is a frequent observation in multiple injured patients, independently contributing to mortality if acute respiratory distress syndrome (ARDS) develops. Chronic cigarette smoke (CS) exposure is associated with an increased risk to develop ARDS after blunt chest trauma [1]. Since the H_2S-producing enzyme cystathionine-γ-lyase (CSE) exerted protective effects in models of CS-induced chronic obstructive pulmonary disease [2], we tested the hypothesis whether genetic deletion of CSE would aggravate pulmonary dysfunction after blunt chest trauma in CS-exposed mice.
Materials and Methods: After 3-4 weeks of CS-exposure, blunt chest trauma was induced by a blast wave injury [3] in anesthetized C57BL/6 (nonCS: n=8, CS: n=8) and $CSE^{-/-}$ mice (nonCS: n=8, CS: n=8). Immediately after trauma, mice were instrumented and mechanically ventilated (FiO_2=0.21). Lung mechanics (quasi-static compliance) and gas exchange (PaO_2/FiO_2 ratio, PaCO2) were assessed at the beginning and after 4 hrs of pressure-controlled, $PaCO_2$-titrated, lung-protective mechanical ventilation. Blood and lung tissue were harvested for cytokine concentrations (multiplex ELISA), cleaved caspase 3 (immunoblotting), nitrotyrosine (immunohistochemistry), and lung histology (hematoxylin-eosin staining).
Results and Discussion: Whereas PaO_2/FiO_2 ratios did not differ between groups at the end of the experiment, CS-exposed $CSE^{-/-}$ mice showed a significantly higher static compliance compared to both CS-exposed and nonCS-exposed wild type animals. Mean arterial pressure was also significantly higher in the CS-exposed $CSE^{-/-}$ group. The lacking effect on PaO_2/FiO_2 despite higher compliance in CS-exposed $CSE^{-/-}$ mice may be explained by the well-titrated intensity of the chest trauma and CS-exposure.
Conclusion: In a model of acute-on-chronic pulmonary disease, genetic deletion of CSE did not alter gas exchange after murine blunt chest trauma, however, significantly increased static compliance in CS-exposed mice, most likely as a mirror of CS-induced emphysematous over-distension. Further studies will have to elucidate a potential therapeutic role of exogenous H_2S after blunt chest trauma in CS-exposed mice.
References:
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2. Chen et al: *Cytokine* 2011;53:334;
3. Wagner et al: *J Trauma* 2011;71:1659
Acknowledgements: Supported by the Land Baden-Württemberg (Perspektivförderung Innovationsfond Medizin)

11AP1-11

Rotational thrombelastometry (ROTEM) in early identification of coagulation profile in multiple trauma patients with burn injuries

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Background:The hemorrhage is one of the most frequent causes of early deaths in multiple traumas, through coagulopathy or surgical bleeding. The management of the hemorrhage is lifesaving, time representing one of the most important factors taken into consideration. ROTEM is rapid and easy to obtain, therefore it can be used in diagnosis of posttraumatic coagulopathy and in the assessment of outcomes. Most of the polytrauma pts with similar injury severity score (ISS) may have different association of severe lesions with distinct coagulation profiles, therefore different therapeutic needs. The aim of this study is to prove the efficacy of ROTEM in early diagnosis of coagulation disorder in multiple trauma pts.
Materials and Methods: This is a prospective, observational, pilot study, realized in a level one trauma center, for a period of six months, on 51 pts with multiple trauma admitted in ICU. The study was approved by the ethics committees. Written informed consent was obtained from the pts' relatives. The coagulation was monitored in dynamic (at 7/12/24 hrs) through classical lab tests and ROTEM. We created an observation sheet to assay the coagulation (CT, CFT, MCF, a angle and a PTT, PT, INR, fibrinogen, D-dimeri, Hb, PLT, temperature and lactate).
Results and Discussion: 51 pts were studied with a mean age of 45.5±5.1, a mean ISS of 36,4±4,4 points;45,09%(23pts) of them associating severe brain injury, 35,29%(18pts) burn injuries and 33,33%(17pts) hemorrhagic shock. 28pts(54,90%) developed coagulopathy in the first 12h and 8pts(15,68%) developed hyperfibrinolysis in the first 7h. There were clear evidence of a hypocoagulation trend in pts with ISS>35 in the first 12 hours. 50% of polytrauma with associated burn lesions had hypercoagulation state in the first 24 hours, even at an ISS>35.
Conclusion(s): For the coagulation disorders, the absolute value of ISS is not that relevant, being rather determined by different lesions of the associations. Severe multiple trauma pts, especially with burned lesions can have either hyper- or hypocoagulation trend and a rapid diagnosis is necessary for further treatment. ROTEM is a reliable method of diagnosis. For a statistical relevance, larger enlisted pts are needed.
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11AP1-12

Blunt chest trauma in mice after cigarette smoke-exposure: effects of mechanical ventilation with 100% O2

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Background: Cigarette smoking (CS) aggravates post-traumatic acute lung injury [1] and increases ventilator-induced lung injury due to enhanced tissue inflammation and apoptosis. Hyper-inflammation after chest trauma is due to the physical damage, the drop in alveolar PO2, the consecutive hypoxemia and tissue hypoxia [2]. Therefore, we tested the hypothesis that hyperoxia may attenuate the CS exposure-induced aggravation of post-traumatic inflammation.
Methods: Immediately after blast wave-induced blunt chest trauma [3], mice (n=32) with or without 3-4 weeks of CS exposure underwent 4 hours of pressure-controlled, thoraco-pulmonary compliance-titrated, lung-protective mechanical ventilation with air or 100 % O2. Hemodynamics, lung mechanics, gas exchange, and acid-base status were measured together with blood and tissue cytokine and chemokine concentrations, heme oxygenase-1 (HO-1), activated caspase-3 and hypoxia-inducible factor 1-α(HIF-1α) expression, nuclear factor-κB (NF-κB) activation, nitrotyrosine formation, purinergic receptor 2X4 (P2XR4) and 2X7 (P2XR7) expression and histological scoring.
Results and Discussion: CS-exposure prior to chest trauma lead to higher pulmonary compliance and lower PaO2 and Horovitz-index, associated with increased tissue IL-18 and blood MCP-1 concentrations, a 2-4-fold higher inflammatory cell infiltration, and more pronounced alveolar membrane thickening. This effect coincided with increased activated caspase-3, nitrotyrosine, P2XR4, and P2XR7 expression, NF-κB activation, and reduced HIF-1α expression. Hyperoxia did not further affect lung mechanics, gas exchange, pulmonary and systemic cytokine and chemokine concentrations, or histological scoring, except for some patchy alveolar edema in CS-exposed mice. However, hyperoxia attenuated tissue HIF-1α, nitrotyrosine, P2XR7, and P2XR4 expression, while it markedly increased HO-1 formation in CS-exposed mice.
Conclusions: CS-exposure aggravated post-traumatic inflammation, nitrosative stress and thereby organ dysfunction and injury. Short-term, lung-protective, hyperoxic mechanical ventilation partially attenuated this effect, possibly by counteracting regional alveolar hypoxia and/or consecutive hypoxemia, resulting in down-regulation of HIF-1α expression.
References:
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2. Eltzschig et al: NEJM 2011;364:656;
3. Wagner et al: J Trauma 2011;71:1659
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11AP2-1

The impact of fluid's choice in early stage of hemorrhagic shock resuscitation on lung injury: experimental animal study

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Background and Goal of Study: In initial stage of hemorrhagic shock resuscitation, fluid therapy is frequently performed so as to maintain the circulatory blood volume. In this study, we examined the impact of fluid's choice in hemorrhagic shock resuscitation on lung injury using of rat hemorrhagic shock models.
Materials and Methods: Male Sprague-Dawley rats were subjected to hemorrhagic shock resuscitation under pentobarbital anesthesia. The animals were bled to a mean arterial blood pressure of 30 ± 5 mmHg, which was maintained for 60 min, followed by resuscitation with normal saline or hydroxyethyl starch 130000. We investigated amount of fluid, variation of heart rate, blood pressure, and blood gas data in shock and shock resuscitation period. Three hours after HSR, lung was excised and tissue injury was assessed by morphological study and wet/dry ratio.
Results and Discussion: The heart rate and mean arterial pressure in each group was not significantly different during the entire research period. Saline group required more fluid volume to resuscitate.(fluid volume/hemorrhage volume: saline group vs hydroxyethyl starch group, 3.61±0.76 vs 1.29±0.16, $p<0.05$) The levels of partial pressure of oxygen and carbon dioxide in each group were not significantly different. On the other hand, in the histological examination, lung injury of hydroxyethyl starch group was milder than that in saline group. Moreover, lung wet/dry ratio was significantly lower in hydroxyethyl starch group.(lung wet/dry ratio: saline group vs hydroxyethyl starch group, 5.26±0.07 vs 5.03±0.09, $p<0.05$)
Conclusion(s): Our study demonstrated that hydroxyethyl starch group had milder extent of lung injury than saline group. The fluid's choice in early stage of hemorrhagic shock resuscitation may have an impact on respiratory status.

11AP2-2

Well leg compartment syndrome fallowing massive transfusion

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Background: Well leg compartment syndrome (WLCS) is a term reserved forCS in a non-traumatic setting, usually resulting from inappropriate positioning of the extremity during surgery.
Although massive transfusion (MT) is lifesaving, complications may develop with high mortality rates associated with acidosis, hypothermia, coagulopathy, electrolyte abnormalities, citrate toxicity and the release of microaggrgate related kinin-like vasoactive mediators.
Kinins perform vasodilation in the artery bed and venoconstrction on the veins,which results in increased capillary permeability, causing tissue oedema via impaired microcirculation.
The case is presented here of the symmetrical WLCS after surgery in which MT was made for gross haemorrhage from an abdominal injury.
Case report: A17-year old ASAI male presented with serious hypovolemic shock and an abdominal injury from a hole-cutting tool. Surgery of distal pancreatectomy, splenectomy and hepatoraphy were performed. During the 4.5h operation in a supine position, 5500cc crystalloid, 1500cc colloid, 8U pRBC, 4U FFP, 1U apheresis platelet was administered. MAP was 45-60 mmHg with total bleeding of 3500cc and urine output of100cc. On postop Day1, the patient had severe lower extremity pain, gastrocnemius muscles were bilaterally hard, swollen and painful and no distal pulse could be obtained. Doppler USG and MRangio showed no circulation beyond the popliteal artery, so emergency fasciotomy and thrombectomy was applied. No thrombus was encountered.
On Day 2, patient had deteriorated with raised BUN, Crea, CPK, AST, ALT, LDH, K and was evaluated as CrushSynd. Despite hydration and diuresis, as high values remained of Crea, BUN, K, hemodiafiltration was started. On Day 13, patient was lost to respiratory failure associated with CrushSynd andARDS.
(Informed consent was obtained from family members)
Discussion: In literature, 7 cases have been reported of WLCS in a supine position and bilateral symmetrical involvment was observed in only 2 cases. In WLCS etiology; lengthy surgery, lengthy hypotension and extremity malpositioning have been held responsible. In our case, during the 4.5h operation, hypotension was only observed in the induction.
In this case, one of the factors with a role in the etiology may have been the tissue oedema and impaired microcirculation formed from the effect of vasoactive mediators expressed into the circulation associated with the MT.
Learning Points: Blood transfsion applied at the required time is life-saving but potential risks must always be considered.

11AP2-3

Should warm fresh whole blood be first choice in acute massive hemorrhage in emergency conditions?

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Background: Early management of rapid massive hemorrhage requires early administration of blood products and rapid surgical control of bleeding. Peripheral hospitals that have resource-limited conditions are similar to the military conditions. Warm fresh whole blood(WFWB) was used for three patients with massive bleeding in a peripheral hospital where did not have any blood products for emergency conditions.
Case report:
1. A 16 yr old female patient went through emergency cesarean section. The patient had massive bleeding from uterine due to atony. Her Hb value dropped to 3,5g/dl.6units of WFWB were transfused during the surgery. Hemodynamic parameters and complete blood count(CBC) reached to a stable level. She was transferred from the intensive care unit(ICU) to ward on day2 and was discharged on day7.
2. A 35 yr old female patient went through emergency cesarean section. The patient had massive bleeding due to uterine atony.Her Hb:2g/dL,Hct:5,4% dropped.9 units of WFWB was transfused.After the transfusion, her hemodynamic and laboratory parameters reached to a stable level.She was extubed the next day, transferred from ICU to ward on day3 and was discharged on day8.
3. A 36 yr old male patient with stab injuries who went through emergency surgery with a hemorrhagic shock.The patient had injuries in the right renal artery and kidney.9 units of WFWB were transfused due to continued hemorrhage during surgery. After surgical control of bleeding and blood transfusion,his hemodynamic parameters improved.He was transferred from ICU to ward on day5 and was discharged on day10.
Discussion: FWB transfusion almost disappeared from civilian medicine after blood was separated into components. Furthermore, FWB is not routinely available in blood banks. For these reasons, the use of FWB has decreased in civilian medicine.Warm FWB effectively replaces the red blood cells, platelets, plasma volume and coagulation factors and also prevents hypothermia, and dilutional coagulopathy,in massive transfusion.Blood components have gone through biochemical, biomechanical and immunological changes during long storage.The duration of storage affects both transfusion efficacy and the associated risks.In the future, FWB maybe the first choice for massive transfusion with the use of fast donor tests, fast ABO compatibility tests, platelet sparing leukocyte filters and new technologies decreasing pathogens. New studies will reveal new procedures for the future.
References: Shock.2014 May;41Suppl1:62-9

11AP2-4

Intraoperative blood transfusion in burn patients

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Background and Goal of Study: In burned patients, the amount of blood lost during surgery, is often extremely difficult to predict because the losses are coming both from burned area, as well as from the areas from which grafts are taken. The goal of our study was to determine the correlation between the surface and the depth of burns with intraoperative blood transfusion.
Materials and Methods: Single centre prospective study was caried out over a period of 2 years. Patients older than 18 years, with burn injury of II and III degree and different mechanism of injury, who were surgically treated, were included in the study. The influence of total body surface area (TBSA) and

depth of burn injury on intraoperative blood transfusion were investigated. We used t-test to compare the average values of the parametric features, while Pearson's chi-square test was used to compare the differences in frequency of categorical feature. Logistic regression analysis was used in order to determine predictors of intraoperative blood transfusion. P values < 0.05 were considered statistically significant.
Results and Discussion: The study included 116 patients, 87.8% male and 12.2% female, average age 47 ± 19 years. The average TBSA was 22.18% ± 17.08% (min 0.5%, max 60%). Even 65.4% of patients had a deep burn injury (of which 51% had combined burn IIb / III degree and 14.6% burn injury grade III), while 34.6% had second degree burn injury (29.3% IIb and 4.9% IIa). During the surgery, patients received an average of 2 units of blood (537.13 ml ± 266.26ml; min-250ml, max-1610ml). Blood transfusions were significantly more often administered to male patients (83.3% vs.0%; p<0.001), in patients with larger TBSA (27.8% vs. 6.8%, p<0.001), while there were no differences compared to the depth of the burn injury (p=0.100). Logistic regression analysis showed that only TBSA was an independent predictor of intraoperative blood transfusion RR = 1.165, CI (1.051-1.290), p=0.004. Despite numerous surgical hemostatic techniques, in patients with body surface area (TBSA) greater than 10%, blood transfusion is necessary.
Conclusion(s): TBSA is independent predictor of intraoperative blood transfusion, while depth of burn injury is not.

11AP2-5

Local application of nitric oxide or prostaglandin I2 improves gastric mucosal oxygenation during haemorrhagic shock in dogs

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Background and Goal of Study: Local drug application is used in a variety of organs to avoid systemic side effects, i.e. inhalative prostaglandins (PG) in pulmonary hypertension [1]. However, whether local drug application likewise improves gastrointestinal microcirculation, i.e. under conditions of reduced tissue perfusion like in sepsis or shock, has not been studied so far. The aim of this study was to analyse whether locally applied Iloprost (PGI2-analogue) or Nitroglycerin (NO-donor) influence gastric mucosal perfusion (μflow) and oxygenation (μHbO_2) during physiological and haemorrhagic conditions.
Material and methods: With approval of the local animal care and use committee five foxhounds were repeatedly anaesthetized (randomized cross-over design). The animals received either Nitroglycerin (25 μg/kg followed by 8.3 μg/kg/min) or Iloprost (100 μg/kg followed by 0.03 μg/kg/min) or NaCl (control) with or without haemorrhage (loss of 20% estimated blood volume, 60 min) followed by retransfusion of the shed blood. Infusion volume in all groups was 2 ml/kg initially, followed by 2 ml/kg/h. Systemic haemodynamic variables, μflow (laser doppler) and μHbO_2 (reflectance spectrophotometry) were recorded continuously. Arterial blood was sampled intermittently for blood gas analysis and calculation of systemic oxygen delivery (DO_2). Data are presented as means±SEM. 2-way ANOVA+Dunnett for multiple comparisons, p< 0.05.
Results and Discussion: Under physiological conditions, NO but not PGI2 increased gastric μflow from 95±12 to 141±24 aU without affecting μHbO_2 or systemic haemodynamic variables. Under haemorrhagic conditions, μHbO_2 decreased from 78±2 % to 37±3 %. This effect was attenuated by NO (decrease from 80±2 to 47±6 %) and PGI2 (from 82±1 to 54±4 %). In contrast, μflow decreased during haemorrhage without differences between the groups. These effects were independent of DO_2 and cardiac output, which were equally reduced in both groups.
Conclusion: Under physiological conditions only NO but not PGI2 induces a local vasodilation. During haemorrhagic shock locally applied NO and PGI2 improve regional oxygenation without affecting μflow. Thus, local drug application improves regional microcirculation of the gastric mucosa without compromising systemic haemodynamic variables.
Reference: 1. Olschewski H et al., N Engl J Med 2002; 347(5): 322-9

11AP2-6

Low storage temperature improves platelet function in whole blood as compared to reconstituted blood

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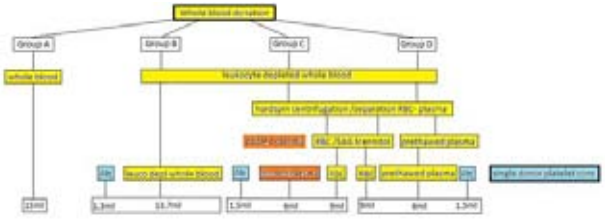
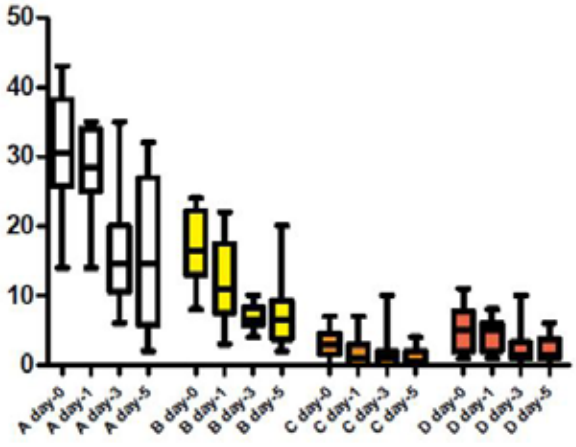
Background and Goal of Study: Platelets are an indispensable part of the coagulation process in the bleeding patient. Platelet storage for transfusion is usually performed at room temperature under constant gentle agitation. Increasing risk of infective contamination limits maximum storage time to 5 days. However, the bleeding patient is not only exposed to one single component of blood. The goal of the study was to investigate platelet function with regard to storage time and temperature in reconstituted and original whole blood (WB).
Materials and Methods:



[Sample assessment of Study groups]

On day 0, 1, 3, and day 5 apheresis platelet concentrates (PC) from 10 donors stored at 22°C were mixed in a 1:1:1 ratio with plasma and packed red blood cells (n=10). Secondly, platelets were mixed with leucocyte depleted WB. Reconstituted groups were compared to WB including original platelets stored at 4°C. Impedance aggregometry was performed on a platelet function analyser (Multiplate®) evaluating the area under the curve (AUC). Platelet stimulation was induced with ADP, ASPI, COL and TRAP.
Results and Discussion: Platelet function significantly declined over storage time. Platelet function was reduced in reconstituted blood groups and leukocyte depleted WB with PC compared to WB on day 0, 1 and 3 with ASPI, ADP and COL activation (all $p<0.01$). On day 5 platelet function was significantly reduced in reconstituted blood groups only with ADP and COL (all $p<0.05$). Platelets in original WB stored at 4°C demonstrated improved aggregation response as compared to PC stored at 22°C in reconstituted WB in a typical 1:1:1 ratio designated for transfusion.



[Within group Multiplate COL (AUC)]

Conclusion: Enhanced functionality of platelets in whole blood stored at 4°C should prompt to critically evaluate and revise currently established storage conditions of PC used for reconstituting whole blood for treatment of haemorrhage in bleeding patients.

11AP2-7

Effects of therapeutic hypothermia during resuscitation from porcine hemorrhagic shock

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Background: The "lethal triad" consisting of accidental hypothermia, acidosis, and coagulopathy is associated with increased mortality after trauma [1]. In contrast, therapeutic hypothermia may decrease mortality possibly due to hypometabolism and a reduced inflammatory response [2]. Furthermore, pretreatment hypothermia attenuated lactic acidosis and organ damage in a porcine model of hemorrhagic shock (HS) [3]. Therefore, we tested the hypothesis whether posttreatment hypothermia would also improve organ dysfunction and metabolic parameters in a long-term model of resuscitated porcine HS, reflecting the clinical situation of trauma patients.
Methods and Measurements: Up to now, 13 anaesthetized, mechanically ventilated, and instrumented pigs underwent a volume and pressure controlled HS of 3 hrs (withdrawal of 30% of the calculated blood volume and titration to mean arterial pressure (MAP) of 40 mmHg). Directly after HS resuscitation was started and pigs were randomized either to normothermia (38°C; n=7) or to hypothermia (34°C; n=6). Hypothermia was induced for 12 hrs with an extracorporeal heat exchanger, afterwards animals were rewarmed to 38°C. The resuscitation period of 23 hrs comprised retransfusion of shed blood, fluids, and noradrenaline to maintain MAP at pre-shock levels. Systemic hemodynamics and inflammation, coagulation, metabolic parameters, and parameters of visceral organ function were measured before and after shock, at 12 and 23 hrs of resuscitation. Markers of barrier dysfunction and oxidative/nitrosative stress were analyzed in postmortem kidney biopsies with immunohistochemistry.
Results and Discussion: Whereas there were no significant intergroup differences concerning hemodynamics, mean noradrenalin dose, and organ function (creatinine and creatinine clearance), hypothermic animals showed a significantly higher hemoglobin concentration and suffered from significantly aggravated acidosis (lower pH and base excess, higher lactate) at 12 hrs of resuscitation. One factor contributing to the negative effects of hypothermia might be increased barrier dysfunction.
Conclusion: Induced hypothermia after HS showed no benefit in this porcine model, however, it even worsened shock- and resuscitation-related acidosis.
References:
1. Martini *J Trauma* 2005;58:1002-10
2. Hildebrand *Intensive Care Med Exp* 2014;2:16
3. Gröger *Crit Care Med* 2013;41:e105-17
Acknowledgement: Supported by the German Department of Defense (AZ E/U2AD/CF523/DF556)

11AP2-8

Effects of ventilation with 100 % O_2 during resuscitation after porcine haemorrhagic shock

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Background and Goal of Study: Haemorrhagic shock accounts for 30-40% of trauma mortality [1], due to secondary multiple organ failure, which is triggered by hypoxaemia and tissue ischaemia [2]. Maintaining sufficient oxygen tension therefore seems vital, but stands in contrast to the toxic effects of long-term use of inspiratory pure oxygen, especially in the lung [3]. Therefore, we tested the hypothesis whether pure O_2 ventilation would attenuate systemic inflammation and thereby organ dysfunction after long-term porcine haemorrhage and resuscitation.
Materials and Methods: Anaesthetized and instrumented animals underwent 4 hrs of haemorrhage (removal of 30% of the blood volume and subsequent titration of mean arterial pressure (MAP) at 35mmHg). Thereafter, swine were randomly assigned to either standard resuscitation ("control" group, comprising of re-transfuion of shed blood, fluid resuscitation, and continuous i.v. noradrenaline titrated to maintain MAP at pre-shock values; n=9) or the hyperoxia group ("hyperoxia", standard resuscitation + FiO_2=1.0; n=9). Before, immediately at the end of, 12, and 22 hrs after haemorrhage, we measured systemic and regional haemodynamics, visceral organ function (creatinine clearance, neutrophil gelatinase-associated lipocalin (NGAL), troponin), and cytokine production. Immunohistochemistry allowed the analysis of kidney nitrotyrosine formation.
Results and Discussion: Animals in the hyperoxia group presented with significantly lower troponin levels after 12 and 22 hrs of resuscitation and showed a trend towards attenuated lactic acidosis and lower noradrenaline infusion rates needed to achieve haemodynamic targets. Hyperoxia was associated with significantly higher PaO_2/FiO_2 ratios and a trend towards higher kidney blood flow, higher diuresis, and higher creatinine clearance, as well as a significantly lower NGAL formation. This coincided with significantly lower pro-inflammatory blood cytokine levels and kidney tissue nitrotyrosine formation in the hyperoxia group.
Conclusion: During early resuscitation from severe hemorrhagic shock, pure O_2 ventilation attenuated systemic inflammation as well as oxidative and nitrosative stress, which may ultimately result in improved organ function.
References:
1. Angele et al: *Crit Care* 2008;12:218
2. Eltzschig et al: *NEJM* 2011;364:656
3. Carraway et al: *Respir Care Clin N Am* 1999;5:265
Acknowledgements: Supported by the Ministry of Defense (AZ E/U2AD/CF523/DF556)

11AP2-9

Hemorrhagic shock, importance of fibrinogen

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Background: It is of crucial importance to correct hemostatic parameters and replace the lost blood with blood and plasma products besides surgical repair when facing hemorrhagic shock situation. Human Recombinant Fibrinogen product (Haemocomplettan P/Riastap, CSL Behring, Marburg, Germany) have been used for this purpose recently. We aimed to present our surgical and medical approach to hemorrhagic shock condition in a young adult and emphasize the significance of fibrinogen product.
Case report: A 30 year-old male (BMI: 21.7 kg m^{-2}) presented with hemorrhagic shock after abdominal gunshot injury. He was scheduled for emergency operation with ASA-VE physical status. Blood analysis revealed: pH: 6.9, HCO_3: 10 mEq/L, Hb: 3 g/dL, Hct: 10%. With the collaborative work of General Surgery, Cardiovascular Surgery and Neurosurgery departments, at the end of 2.5 hours, the patients active bleeding was stopped. The patient experienced deep hypotension and intravenous dopamine
(30 μg kg^{-1} min^{-1}) and noradrenaline 20 (μg min^{-1}) was administered throughout the operation; with adrenaline (20 μg min^{-1}) during the last 1.5 hours. Bicarbonate treatment was made for metabolic acidosis. The patient received 4 units of erythrocyte suspension, 4 units of fresh frozen plasma, 1 g fibrinogen; and these supports continued throughout the Intensive Care Unit follow-up. Supplemental 3 g of fibrinogen was given in the early postoperative period until the fibrinogen values raised to desired levels. The patient was extubated on the 2nd, and discharged on the 6th postoperative days.
Discussion: We again emphasize the importance of fibrinogen product during acute hemorrhagic shock. Fibrinogen concentrate, applied 1 g intra- and 3 g postoperatively, provided hemostasis together with surgical repair. Fibrinogen was raised from 50 to 282 mg/dL after the treatment
(normal range is 200-400 mg/dL). Three inotropic agents and bicarbonate treatment was applied to the patient throughout the operation to treat deep hypotension and acidosis. For all that, the patient's mean arterial pressure was below 40 mmHg for 1.5 hours and brain edema was developed. Still the patient was successfully recovered and extubated on the 2nd postoperative day.
Learning points: Fibrinogen product is of quite importance for hemostasis management. Patients with long-term hypotension incompatible with life can sometimes recover completely.

11AP2-10

Hemostatic resuscitation in elective surgery causing massive transfusion and emergency surgery after traumatic massive bleeding: a computer simulation

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Background and Goal of Study: Coagulopathy leading to continued hemorrhage is a serious problem in massively transfused patient. Appropriate blood component therapy might be different between patients who receive elective surgery causing massive bleeding and patients who receive emergency surgery after traumatic massive bleeding, because trauma patients bleed undiluted blood at early stage and replacement typically lags behind blood loss. Best strategy for fresh frozen plasma (FFP) and platelet concentration(PC) administration is difficult to study and randomized controlled study is impossible. We compared them using computer simulation.
Materials and Methods: We modified multi-compartment dynamic model developed by Hirshberg[1], and implemented it using STELLA 9.0. In this model blood pressure changes as blood volume fluctuate, and bleeding rate, transcapillary refill rate is controlled by blood pressure. Using this simulation, we compared elective surgery case causing massive bleeding and emergency surgery case after traumatic massive bleeding.
In both cases, patients started to bleed at the rate of 50 ml/min. In elective surgery case, fluid was administered to maintain blood volume. But In trauma case, no fluid was supplied until 30 minutes and no blood was supplied until 50 minutes. Each unit of packed red blood cell (PRBC) was given when hematocrit decrease to 27%, FFP was transfused when plasma was diluted to 30%, and PC was transfused when platelet count became 50,000/cc.
Information of blood compartment was obtained in transfusion guideline 2011 by KCDC(Korea Centers of Disease, Control & Prevention).
Results and Discussion: Transfusion of FFP and PC was required at less bleeding volume in trauma case than elective surgery case. In both cases, appropriate PRBC: FFP ratio was 1: 0.47 until PC infusion was started, and PRBC: FFP: PC ratio was 1: 0.35 : 0.39 after PC infusion was started.
We assumed that the reason why transfusion started at less bleeding volume in trauma cases, would be because transcapillary refill dilutes bloods.
Conclusion(s): Coagulopathy may begin at less bleeding volume in trauma case. But it may not alter blood component ratio in both trauma and elective surgery cases.
Reference: 1. Hirshberg A, et al. Minimizing Dilutional Coagulopathy in Exsanguinating Hemorrhage : A Computer simulation. *J Trauma*. 2003 Mar;54(3):454-63.

11AP2-11

Impact of four different plasma preparations on haemostatic profile of reconstituted blood in a proposed 1:1:1 ratio including packed red blood cells and platelet concentrates

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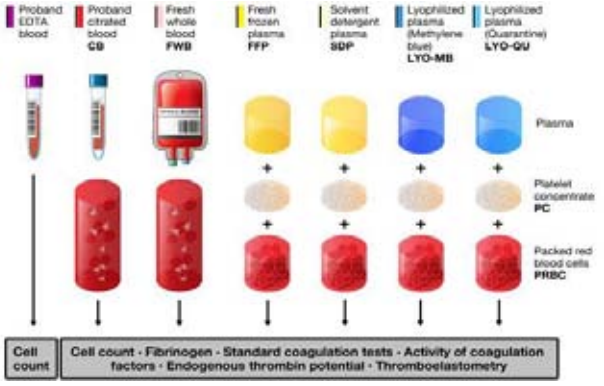
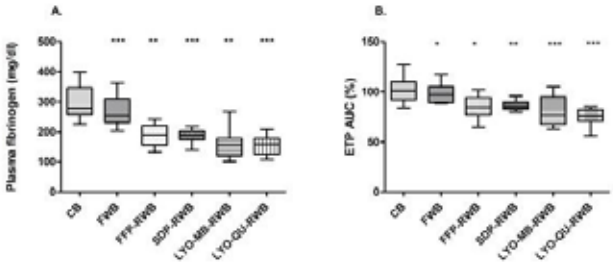
Background and Goal of Study: The concept of haemostatic resuscitation recommends early and high volume plasma transfusion. Most experts propose a 1:1:1 ratio of packed red blood cells (PRBCs), platelet concentrates (PCs) and plasma. Besides single donor fresh frozen plasma (FFP), pooled solvent-detergent treated plasma (SDP) is widely used. Another option for haemostatic resuscitation is lyophilized plasma, which can be stored easily and allows almost immediate transfusion. Haemostatic profiles of reconstituted whole blood (RWB) from three components, PRBCs, PCs and different plasma preparations, have not been investigated so far.

Materials and Methods:



[Preparation of Study groups]

Blood cell count, coagulation factor (CF) activity, endogenous thrombin potential (ETP), standard coagulation tests (SCT) and thromboelastometric parameters were investigated.
Results and Discussion: Haematocrit, platelet count, ETP and CF activity were significantly lower in RWB compared with CB (all $p < 0.01$). Fibrinogen concentrations in RWB variants were within 157-191 mg/dl. ROTEM parameters were within the normal range. FWB is diluted by 13% when using collection bags prefilled with citrate-phosphate-dextrose. RWB including the three components, PRBCs, PCs and plasma, exhibits dilution of approximately 32%. A clinically relevant dilution of CF, red blood cells and platelets is an inevitable result of a 1:1:1 transfusion strategy and results in haematocrit and platelet counts slightly above recommended transfusion triggers.



[Fibrinogen Content and ETP of Study Groups]

Conclusion: Fibrinogen content of RWB, independent of the plasma variants used, is within the limits where fibrinogen supplementation is recommended by current guidelines. Thus, in bleeding patients it is impossible to restore depleted fibrinogen above threshold levels using a 1:1:1 ratio of available blood products without further augmentation with cryoprecipitate or fibrinogen concentrate.

11AP3-2

Challenges in neurological prognostication after cardiac arrest

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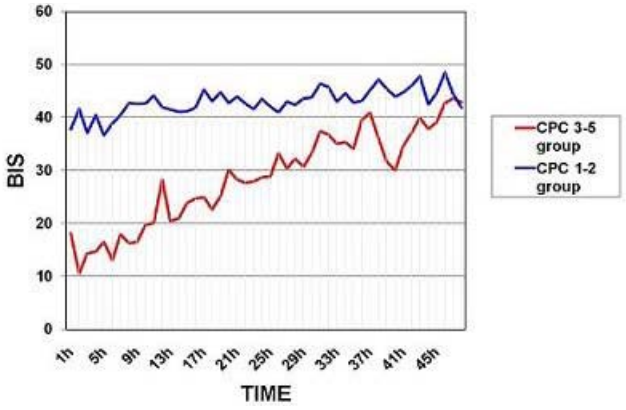
Background and Goal of Study: Prognostication of survival and neurologic function remains difficult during the post-arrest time period. Bispectral index (BIS) monitoring is increasingly being considered for post-arrest neurologic assessment and outcomes prediction.
The aim of our study is to assess if BIS values after resuscitation would correlate with neurological outcome and mortality at 6 months.
Patients and Methods: We prospectively collected BIS data in patients initially resuscitated from cardiac arrest and treated with therapeutic hypothermia (TH) in our center. All patients benefitted from the same sedation and target temperature regimen.
Data collected were demographic data, BIS values over the first 48 hours recorded every hour and neurological outcome using cerebral performance category (CPC) at 6 months. Mean BIS were analysed using T-student test. A receiver operating characteristic curve (AUC) at each point time was performed to evaluate prediction performances.

Results and Discussion: Data were collected in 69 patients, 81,1%male/18,8% female, with a mean age of 56,84 (SD 14,74) years.
The evolution of mean BIS during the first 48h showed that BIS values were higher in the good outcome group (CPC 1-2) compared to the poor outcome group (CPC 3-5) with statistically significant differences until the 26th hour (Figure 1).



[Figure 1. Mean BIS according to patient outcome]

Analysis of BIS recorded every 60 minutes has provided an optimal association with poor neurological outcome at 6 months after discharge with a sensitivity of 70%, a specifity of 83% and an area under the curve (ROC) of 0.74, being the cut-off value BIS<30 in the first 6 hours.
Conclusions: BIS monitoring values < 30 mantained during the first 6h post-resuscitation in patients undergoing TH treatment are correlated with poor neurological outcome or mortality at 6 months.
Continuous monitoring of BIS values and calculation of mean BIS in the first 2 days after cardiac arrest could allow an early and accurate prediction of outcome.
Further studies must be conducted to confirm these results.
Reference: Stammet P et al. Bispectral index to predict neurological outcome early after cardiac arrest. Resuscitation. 2014 Dec;85(12):1674-80.

11AP3-3

Conservative management of cardiac herniation as surgical complication at reanimation unit

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Background: Cardiac herniation defined as the protrusion of the heart through a pericardial defect is a rare complication after lung resection[1], (with pericardiectomy), and rapidly fatal injury if not immediately diagnosed and accurately managed[1,2]. The treatment of such a complex condition is a major challenge at the reanimation unit[1,2].
Case report: We present the case of a 23-year-old woman with clinical symptoms of cough and pleuritic pain. A chest radiograph showed a mediastinal mass, and then chest computed tomography (CT) and puncture aspiration of the mass made the final diagnosis of thymoma. During the surgical procedure infiltration of the pericardium and left lung were observed, so it was decided to perform a lumpectomy, left pneumonectomy, resection of the total pericardium and right pleurectomy.
During the postoperative recovery at the reanimation unit, the patient was extubated without incident. After 48 hours suddenly presents a severe hemodynamic instability at supine position with ventricular tachycardia and hypotension. After hemodynamic stabilization an urgent chest CT scan showed cardiac displacement to the left. Transthoracic echocardiography showed dilation of the right cavities, severe insufficiency of the tricuspid valve, pulmonary hypertension and collapse of the left atrium. Diagnosed with cardiac herniation, we proceed to conservative management, achieving hemodynamic stabilization.
Discussion: The differential diagnosis includes hypovolemia, cardiac tamponade, acute myocardial infarction, tension pneumothorax, pulmonary emboli, primary arrhythmias and anaphylaxis. These patients require immediate surgery, but in order to minimize hemodynamic instability, the patient should be kept on the lateral decubitus, with the operated lung in the nondependent position.
Furthermore must stop the suctioning of the chest tubes and the use of PEEP, the tidal volume should be decrease. Definitive treatment requires to repairs pericardial defect. In our case surgical treatment was not an option, so we had to manage conservatively for 30 days.
References:
1. Gaiser R.; et al. Obstetric, Thoracic and Cardiac Anesthesia. Elsevier Science; 2009.
2. Self R., Vaughan R. Acute cardiac herniation after radical pleuropneumonectomy, Case Report. Anaesthesia, 1999; 54: 564-74
Learning points: Clinicians should be aware of the symptoms and signs of cardiac herniation, which is lethal if unrecognized.

11AP3-4

Effects of helium pre- and postconditioning on the heart and brain in a rat resuscitation model

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Background and Goals: Neurological damage and myocardial dysfunction are leading causes of death after cardiopulmonary resuscitation[1]. The noble gas helium (He) has been shown to induce cardio- and neuroprotection by pre- and postconditioning, but the underlying molecular mechanisms are not fully understood[2]. Recent studies have identified caveolins as possible mediators of helium induced cardioprotection[3]. Here we aimed to investigate the effects of helium pre- and postconditioning on the brain and heart in a rat resuscitation model.
Materials and Methods: After approval by the Animal Care Committee, 98 male Wistar rats underwent cardiac arrest induced by ventricular fibrillation. The intervention groups received 70% He and 30% oxygen for 5 min before cardiac arrest and for 30 min after successful cardiopulmonary resuscitation. Control animals were ventilated with 70% nitrogen and 30% oxygen. Hearts and brains were excised after 2h, 4h or 7 days (d). Expression of caveolin-1 (Cav-1) was measured by infrared western blot in heart homogenate. Neurological degeneration was evaluated using TUNEL and Nissl staining in the hippocampal CA-1 sector. Cognitive function of the 7d group was detected at 4 timepoints using the tape removal test. For each timepoint the helium and control groups were compared using unpaired Student's t-test. Data are presented as mean ± SEM.
Results: The helium treatment significantly decreased neuronal damage (viable neurons/100pixel 0.865 ± 0.241 (He) vs. 0.335 ± 0.162 (controls), p=0.047) and decreased apoptosis (TUNEL positive cells/100pixel 71.48 ± 2.6 vs. 81.85 ± 3.1, p=0.014) in the hippocampal CA-1 sector in the 7d groups. Western Blot showed significantly decreased expression of Cav-1 after 2h (arbitray units 23.18 ± 1.23 vs. 28.3 ± 1.55, p=0.027) in the membrane fraction of helium treated animals.
Conclusion: Our data demonstrates a neuroprotective effect of helium treatment in this resuscitation model. Furthermore, differential expression levels of Cav-1 in the heart are found after helium based pre- and postconditioning.
References:
1. Annals of Intensive Care 1, 45 (2011).
2. Anesthesiology. 2010 Jun;112(6):1503-10.
3. European Journal of Anesthesiology; Volume 31. p. 210-211 Abstract nr. 13AP1-5.

11AP3-5

Effects of ventilation with 100% O2 on mitochondrial function and oxidative stress during resuscitation after porcine hemorrhagic shock

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Background and Goal of Study: Mortality after haemorrhage is mainly due to multiple organ failure (MOF) resulting from systemic hyper-inflammation triggered by reduced O2 delivery and tissue hypoxia [1] and subsequent oxidative stress and mitochondrial injury [2]. Pure O2 can counteract hypoxaemia and tissue hypoxia, but has been reported to exacerbate oxidative and ni-

trosative stress, and thereby cause mitochondrial dysfunction [3]. Therefore, we tested the hypothesis whether pure O2 breathing during resuscitation from hemorrhagic shock would decrease oxidative stress and, thereby, maintain mitochondrial respiration.
Materials and Methods: After 3 hrs of hemorrhage (removal of 30% of the blood volume titrated to a mean arterial pressure (MAP) of 35 mmHg), anesthetized and instrumented swine were randomized into either standard treatment ("control group", FiO2=0.3 for 22 hrs, standard resuscitation, comprising of re-transfusion of shed blood, fluid resuscitation, continuous i.v. noradrenaline titrated to maintain MAP at pre-shock values; n=7) or hyperoxia ("hyperoxia group", FiO2=1.0 for 12 hrs, then FiO2=0.3, standard resuscitation; n=7). After 22 hrs of resuscitation postmortem kidney and heart specimen were analyzed for nitrotyrosine, cystathionine-γ-lyase (CSE), peroxisome proliferator-activated receptor gamma coactivator-1α (PGC-1α), and hypoxia-inducible factor-1α (HIF-1α) expression (immunostaining). Mitochondrial respiration was assessed by High Resolution Respirometry.
Results and Discussion: Neither markers of O2-sensing (CSE, HIF-1α) nor nitrotyrosine showed any significant inter-group difference. However, hyperoxic animals showed a trend towards higher mitochondrial respiration (maximum oxidative phosphorylation) in heart tissue, and increased mitochondrial biogenesis (PGC-1α expression) in kidney tissue.
Conclusion: Despite the potentially dangerous effect of long-term O2 exposure, our study could demonstrate that short-term pure O2 ventilation during resuscitation from haemorrhagic shock does not lead to increased oxidative stress. On the contrary, it may possibly ameliorate mitochondrial respiration by improving cellular energy balance.
References:
1. Angele et al: Crit Care 2008;12:218;
2. Eltzschig et al: NEJM 2011;364:656;
3. Calzia et al: Crit Care Med 2010;38(10 Suppl):S559
Acknowledgements: Supported by the German Ministry of Defense (E/U2AD/CF523/DF556)

11AP3-7

Public access defibrillation: infrequent use despite great benefits

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Background and Goal of Study: A volunteer-based network with Automated External Defibrillators (AED) linked to the Emergency Medical Dispatch Centre (EMD) has provided a unique opportunity to assess the use and effects of Public Access Defibrillation (PAD) in Copenhagen.
We aimed to determine:
1. the proportion of AEDs applied to out-of-hospital cardiac arrest (OHCA) victims before arrival of the Emergency Medical Services (EMS); and
2. the proportion of AEDs referred to by the EMD. In addition we sought to assess 30-day survival and characteristics of OHCA-victims.
Materials and Methods: We identified 607 patients with OHCA from the Mobile Emergency Care Unit and the Danish Cardiac Arrest Registry between 2011 and 2013. We obtained Electrocardiogram-downloads from all applied AEDs. Information regarding AED-referral by the EMD was obtained from the nationwide AED Network.
Results and Discussion: An AED was applied to an OHCA-victim before EMS arrival in 27/607 (4.5%, 95% CI [2.0 to 6.4]) cases, and 19/607 (3.1%, 95% CI [1.9 to 4.9]) OHCA-victims were defibrillated by an AED.
Fourteen AEDs were referred to by the EMS and applied to an OHCA-victim corresponding to 2.3% (95% CI [1.3 to 3.8]) of all OHCA cases.
The 30-day survival for all-rhythm-OHCA was 50% for patients with an AED applied and 20% for patients without an AED applied, p=0.0004, OR 4.4 (95% CI [2.0 to 9.7]). For OHCA with an initial shockable rhythm 30-day survival was 79% with an AED applied vs. 45% without p=0.0066, OR 4.6 (95% CI [1.4 to 14.6]).

	AED applied before EMS arrival(n=27)*	No AED applied before EMS arrival(n=580)*	p Value
Age, median (IQR), y	71 (61-77)	68 (55-79)	0.65
Men, n (%)	18 (66.7)	349 (60.2)	0.55
Public Location, n (%) Φ	20 (80.0)	134 (32.1)	<.0001
Response Time, Mean±SD, min ω	5.4±1.7	6.1±3.7	0.45
Bystander CPR, n (%)	24 (96.0)	256 (61.2)	0.0002
Shockable Rhythm, n (%) ψ	19 (70.4)	130 (22.4)	<.0001

*Number of patients with missing value for the cardiac arrest-related variables:Bystander CPR and Public Location: n=2 (patients with AED applied before EMS arrival) and n=162 (patients without AED applied before EMS arrival).Φ Public Location defined as all areas accessible to the general public all hours all day. ω Interval between call to the EMS and ambulance arrival. ψ First recorded rhythm.

[Out-of-hospital cardiac arrest in Copenhagen]

	AED applied before EMS arrival	No AED applied before EMS arrival	p Value
ROSC λ at Hospital Admission, n (%) (n=25 and n=418)	18 (72.0)	163 (39.0)	0.0014
30-day survival, All-Rhythm Φ, n (%) (n=26 and n=569)	13 (50.0)	106 (19.6)	0.0004
30-day survival, Shockable Rhythm ψ, n (%) (n=19 and n=129)	15 (78.9)	58 (45)	0.0066

λ Return of Spontaneous Circulation Φ All-Rhythm: ventricular fibrillation, pulseless ventricular tachycardia, asystole or pulseless electrical activity. Twelve civil registration numbers were invalid or foreign and data could not be obtained. ψ Shockable Rhythm: ventricular fibrillation or pulseless ventricular tachycardia. One civil registration number was invalid and data could not be obtained

[Outcome after out-of-hospital cardiac arrest]

Conclusion(s): AEDs were referred to by the EMD in a minor proportion of OHCA, but there was a significantly higher survival in patients where an AED was applied before EMS arrival. This indicates the life-saving potential and need to further develop public access defibrillation networks.

11AP3-8

The association between global hemodynamics, cerebral oxygenation and survival in post-cardiac arrest patients

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Background and Goal of Study: The relationship between global hemodynamics, cerebral saturation and patient survival has been poorly investigated in post-cardiac arrest patients. In analogy with sepsis, current guidelines recommend to target mean arterial pressure (MAP) above 65mmHg and SVO2 above 70%. This is unsupported by mortality or cerebral perfusion data. Therefore the aims of the present study were to explore the relationships between MAP, SVO2, cerebral oxygenation (NIRS, ForeSight technology) and patient survival in post-cardiac arrest patients.
Materials and Methods: Prospective observational study in 82 post-cardiac arrest patients.
Results and Discussion: During the first 24 hours after ICU admission, the mean SVO2 was 67±9% and the mean MAP 76±8mmHg. Thirty-nine patients died and 43 survived (43/82 patients, 52%) until ICU discharge. The mean SVO2 range during the first 24 hours after admission associated with maximal survival was 67-72% (OR 8.23, 95% CI [2.07; 32.68], p=0.001). The mean MAP range associated with maximal survival was 76-86 mmHg (OR 2.63, 95% CI [1.01; 6.88], p=0.04). Achievement of the currently recommended MAP above 65mmHg or SVO2 above 70% was not associated with increased survival. Multivariate regression revealed early bystander CPR and a mean SVO2 in the optimal range (OR 6.30, 95% CI [1.12; 35.5], p=0.04) as independent factors associated with increased survival. Based on more than 1625000 data points, we found a strong linear relation between SVO2 (range 40-90%) and average cerebral saturation (R^2 0.86) and between MAP and average cerebral saturation for MAP's between 40-87 mmHg (R^2 0.70). The predicted optimal SVO2 (72%) and MAP (87mmHg) based on this hemodynamic model matched with the optimal SVO2 (67-72%) and MAP (76-86mmHg) associated with maximal survival.
Conclusion(s): We found an SVO2 between 67-72 % and a MAP between 76-86 mmHg during the first 24 hours after cardiac arrest to result in optimal cerebral oxygenation while being associated with maximal survival. Prospective intervention studies to reach or maintain these targets are needed to confirm these findings.

11AP3-9

Use of cerebral oxygenation monitoring to determine optimal carbon dioxide management in post-cardiac arrest patients

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Background and Goal of Study: The relationship between arterial carbon dioxide (CO_2), cerebral saturation ($SctO_2$) and patient survival has been poorly investigated in post-cardiac arrest patients. Current guidelines recommend to target CO_2 levels between 40-45 mmHg although some authors recommend higher CO_2 levels (permissive hypercapnia) based on the hypothesis that hypercapnia may lead to increased cerebral perfusion. Therefore the aims of the present study were (1) to determine the CO_2 interval associated with maximal patient survival and (2) to construct a physiological model on the relationship between CO_2 and $SctO_2$
Materials and Methods: Prospective observational study in 82 post-cardiac arrest patients treated with therapeutic hypothermia. Blood gasses were obtained with a 1 hour interval during the first 24 hours after admission. Cerebral saturation was monitored every 2 seconds with near infrared spectroscopy (NIRS)
Results and Discussion: The mean CO_2 was 40±5mmHg and the mean $SctO_2$ 65±4%. Thirty-nine patients died and 43 survived (43/82 patients, 52%) until ICU discharge. The mean CO_2 range during the first 24 hours after admission associated with maximal survival was 38-42mmHg (OR 2.84, 95% CI [1.15; 7.05], p=0.02). Subsequently, 2100 paired CO_2/$SctO_2$ measurements were analyzed. Based on our previous observation that the presumed ideal $SctO_2$ is around 67%, the CO_2/$SctO_2$ scatterplot can be divided in 3 sections:
1. Hypocapnic cerebral desaturation: we found a strong linear relationship between CO_2 and average $SctO_2$ when CO_2 was between 28-39mmHg ($SctO_2 = 0.50 \times CO_2 + 47$, R^2 0.76).
2. Normocapnic plateau phase: CO_2's between 40-45mmHg resulted in average $SctO_2$'s between 66.5 and 67.5%.
3. Hypercapnic cerebral hypersaturation: we found a linear relationship between CO_2 and average $SctO_2$ when CO_2 was between 46-62mmHg ($SctO_2 = 0.40 \times CO_2 + 47$, R^2 0.39). The predicted optimal CO_2 (40-45mmHg) based on this physiological model corresponding with a $SctO_2$ of 67% matched with the optimal CO_2 (38-42mmHg) associated with maximal survival.
Conclusion(s): Based on the relationship between CO_2 and $SctO_2$ and extensive survival analysis, the target CO_2 in post-cardiac arrest patients seems to be 40mmHg. Since all patients received fully controlled mechanical ventilation, it is likely that there is causal relationship between iatrogenic hyperventilation/hypocapnia, cerebral desaturation and increased mortality.

11AP3-10

Which cerebral oxygen saturation should we target in post-cardiac arrest patients?

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Background and Goal of Study: Current guidelines recommend targeting mean arterial pressure above 65mmHg and SVO2 above 70% in post-cardiac arrest patients. Blood pressure and SVO2 are only surrogate parameters for cerebral perfusion. Alternatively, cerebral oxygen saturation can be assessed directly and non-invasively with near infrared spectroscopy (NIRS), using the FORE-SIGHTTM technology (CAS Medical systems, Branford, CT, USA). Recent data revealed that cerebral saturation values are significantly lower in patients with poour outcome (1). It is however unclear which cerebral saturation we should target to maximize patient survival. The aim of the present study was to explore the association between $SctO_2$ and survival in out-hospital post-cardiac arrest patients.
Materials and Methods: Prospective observational study in 82 out-hospital post-cardiac arrest patients treated with therapeutic hypothermia (33° 24hrs). Cerebral saturation was measured every 2 seconds.
Results and Discussion: During the first 24 hours after ICU admission, the average $SctO_2$ was 65.5±4.5%. For each patient, the percentage of time was calculated per percentage cerebral saturation. Patients were stratified according to no (< 2%), low (2-12.5%), intermediate (12.5-25%) or high exposure (>25% of time) per 3 percentage cerebral saturation. Logistic regression revealed a maximal association between cumulative $SctO_2$ exposure and survival for the $SctO_2$ range between 66-68% (OR 1.58, 95%CI [1.00; 1.51], p=0.04]. Multivariate regression revealed that administration of early bystander CPR, presenting shockable rhythm and high cumulative $SctO_2$ exposure between 66-68% (OR 1.73, 95%CI [1.00; 3.01] were significant independent predictors of survival. ANOVA revealed that the percentage of early bystander CPR, presenting shockable rhythm, global hemodynamics (MAP, SVO2) and blood gasses (including pO2, pCO2) were comparable between patients with no, low, intermediate or high exposure to $SctO_2$ 66-68%.
Conclusion(s): The target $SctO_2$ for optimal survival in out-hospital post-cardiac arrest patients seems to be between 66-68%. Prospective intervention studies to reach or maintain this $SctO_2$ target are needed to confirm these findings.
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11AP3-11

One-year outcome after prehospital intubation

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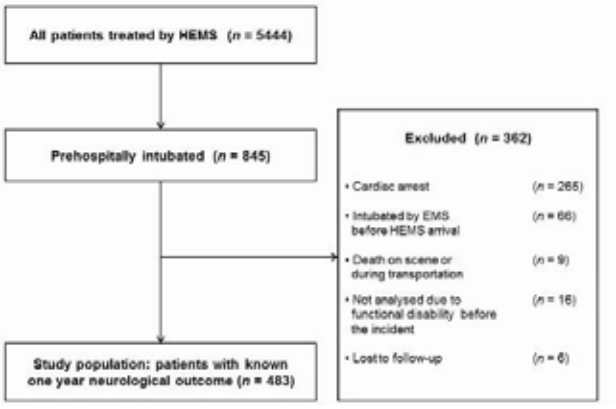
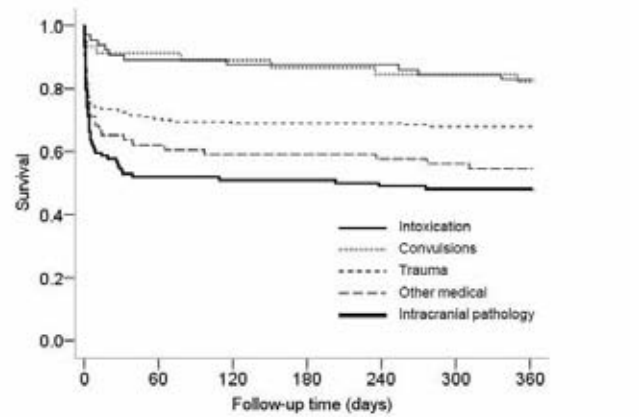
Background and Goal of Study: The aim of physician staffed emergency medical services (EMS) is to supplement other EMS units in the care of prehospital patients. The need for advanced airway in critical prehospital patients can be considered as one indicator of the severity of the patient's condition. Our aim was to study the long-term outcome of critical non-cardiac arrest patients who were intubated by an EMS physician.
Materials and Methods: Data of 845 patients during a 5-year (2007-2011) period were retrospectively evaluated. After exclusions (presented in Fig. 1), outcome of 483 patients was studied. Evaluation was based on hospital patient records one year after the incident. For assessment of neurological outcome, a modified Glasgow Outcome Score (GOS) was used.



[Fig. 1]

Results and Discussion: The median age of the study patients was 47.8 years (range 0.1-90.7 years); 66 % were male. Good neurological recovery (GOS 4-5; *i.e.*, ability to live an independent life) was found in 55.3 % of the patients. The overall one-year mortality (GOS 1) was 35.0 %, while poor neurological outcome (GOS 2-3) was documented in 9.7 % of the patients. Of all survivors, 85.0 % recovered well.
Of the study patients who died, 42.6 % died within the first 24 hours, with an additional 25.3 % in a week, and 81.7 % deaths occurred within the first 30 days after the incident. The probability to die increased by age, OR=1.05 (95 % CI 1.04-1.06). Patient survival in relation to prehospital diagnosis is presented in Fig. 2.



[Fig. 2]

Conclusion(s): The majority of the study patients had a favourable neurological recovery with independent life at one-year after the incident. More than eighty percent of all deaths occurred within 30 days of the incident, suggesting that the previous studies reporting 30-day mortality will give a reasonable, although not absolutely accurate estimate of the patient's long-term survival.

11AP4-2

Lipid emulsions increase left ventricular systolic pressure (LVSP) on the hanging heart at the Langendorff perfusion system via increase of intracellular calcium level

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Background and Goal of Study: The lipid emulsion has been used to treat a variety of drug toxicity such as psychotropic drugs or parasiticide, and used for total parenteral nutrition therapy. Recently, its usefulness is confirmed by the local anesthetic induced cardiac toxicity patients. Therefore, various studies associated with the lipid emulsion has been actively conducted. The purpose of this study is to observe the hemodynamic effect of lipid emulsion, the component effect of lipid emulsion, and the associated mechanisms.
Materials and Methods: First, the excised rat heart was quickly mounted onto the Langendorff perfusion system and perfused with modified Krebs-Henseleit solution, and pressure transducer was connected to a digital analysis system to measure left ventricular hemodynamic function. The hanging hearts were randomly assigned to the three groups in order to elucidate hemodynamic effect of lipid emulsion. Second, the intracellular Ca^{2+} mobilization was examined by measuring fluorescence increase of Fluo-3-loaded cells with confocal microscopy. The basal and intracellular Ca^{2+} mobilization was examined by measuring fluorescence increase of Fluo-3-loaded cells in the cytosol of H_9C_2 with confocal microscopy. The changes of intracellular calcium were detected component effect of lipid emulsion.
Results and Discussion: Hemodynamic function was checked at the baseline and the maximum response after various lipid emulsion infusion**.** The baseline hemodynamic function of each group was not significant difference between the groups. The LVSP after Intralipid® 20% infusion showed significant increase compared to the baseline LVSP. Infusion of Intralipid® 20% resulted in a significant increase of the LVSP in a dose-dependent pattern. Lipid emulsion increased intracellular calcium level at the H_9C_2 cell. Lipofundin® MCT/LCT 20% increase intracellular calcium level more than Intralipid® 20%.
Conclusion(s): Lipid emulsion resulted in a significant increase of the LVSP on the hanging heart at the Langendorff perfusion system. Maybe, the increase of the LVSP is associated with increase of intracellular calcium level.
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11AP4-3

N-acetylcysteine minimises hepatocyte injury in an *ex vivo* perfused rat liver model

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Background and Goal of Study: The nutritional status of the liver, i.e. fasting, contributes to the extent of tissue injury after different insults (1,2). Mitochondria from fasted livers presented a greater level of oxidised lipids and a lower content of ATP as compared with their fed counterpart (3). The aim of this study was to determine the role of N-acetylcysteine (NAC), an antioxidant agent, against starvation in rat livers.
Materials and Methods: Wistar rats were anesthetized**,** the portal vein cannulated, the liver removed and immediately perfused in a closed *ex vivo* system with HBSS without glucose and O_2 at 37°C at a flow rate of 5 ml/min for 135 min. Animals were divided into 3 groups, i.e. control fed and fasting groups and fasting group in which NAC 12 mM was added to perfusate (n = 5 in each group). Glucose, lactate and enzymes were analysed in perfusate samples at different time-points. The proportion of glycogen and energy charge (EC= [ATP]+1:2[ADP]/[ATP]+[ADP]+[AMP]) were determined in tissue samples. Glutathione (GSSH/GSH) concentration will be measured in biopsies. Mean ± SD or median (percentiles). ANOVA and Kruskal Wallis tests.
Results and Discussion: Feeding and NAC minimise enzymes release during perfusion of the ex vivo liver. Glycogen level in hepatocytes was higher in fed rats when compared to fasting. A high hepatic glycogen content and sustained glycolytic ATP formation are thought to explain the increased resistance of livers from fed rats (1,4). NAC, a cysteine precursor, is known to replenish depleted stores of GSH into hepatocytes (5). We are testing this hypothesis in our model (data to follow).

	Fasting	Fed	NAC	p-Value
Glucose (mg/dl)	7.0 (6.0-9.0)	108.5 (78.0-160.0)	30.0 (24.7-48)	<0.01
Lactate (mg/dl)	0.35 (0.25-0.50)	5.50 (2.65-9.10)	0.80 (0.77-1.17)	<0.01
GOT(IU/l)	442.5(155.0-1215.5)	24.0(19.5-28.0)	67.0(43.5-193.7)	0.032
GPT (IU/l)	500.0(121.0-1138.5)	9.5(8.5-100.5)	37.0(16.2-124.0)	0.016
LDH (IU/l)	5838.5(2766.0-6052.5)	279.5(214.0-341)	754.0(502.7-3004.5)	0.016
Glycogen (%)	7.6 ± 0.1	36.7± 0.2	9.2 ± 0.1	<0.01
EC	0.20 ± 0.08	0.30 ± 0.08	0.15 ± 0.03	0.01

[Table 1]

Conclusion(s): The results indicate the possibility that NAC could form part of a prevention strategy in conditions where energy-depleted livers are exposed to a stress situation.
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11AP4-4

On call activity records of the anaesthesiology team in a tertiary university hospital

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Background and Goal of Study: Physician activity on call is a mental and physical hard work that can be underestimated. The aims of this study were to collect and analyse the activity of the Anaesthesiology team on call in a tertiary university hospital.
Materials and Methods: This prospective, descriptive, observational study recorded the whole healthcare activity performed by an Anaesthesiology team on call (3 specialists and 2 residents) over a period of 1 year. Residents were asked at the end of the shift to fill in an anonymous and voluntary on-line questionnaire. Six key workload areas were identified: ICU (12 beds), obstetrics (O), 2 emergency operating rooms (OR), Pain treatment and manage-

ment (P), Trauma patients & Cardio-Pulmonary Resuscitation (CPR) (T) and anaesthesic activities outside of the OR (AO). Results are presented as absolute numbers, means or percentages per shift and area.
Results and Discussion: A total of 313 records were collected and 52 missing (response rate 85.7%). ICU: patients at the shift start 8.16; admission average 1.02 (318/yr); discharge average 0.73 (227/yr), 22 exitus/yr; critical patient's evaluations outside the ICU 0.66/shift (205/yr), consultations to the ICU team 1.34 (419/yr). O area: labour epidural anaesthesia 2.58 (808/yr), caesarean sections 0.69 (216/yr - 171 urgent, 13 emergent, 32 elective). OR: 1389 operations, mean operating time was 7.75 h/shift: 25.6% general surgery, 20.15% obstetrics, 19.79% orthopaedics, 11.23% urology, 7.19% neurologic, 6.76% vascular, 6.4 % paediatrics and 1.7% thoracic. P: consultations 0.84 (263/yr), Patient-Controlled Analgesia management 0.44 (138/yr). T: arrival of trauma patients 0.28 (87/yr), CPR 0.3 (94/yr). AO: body scan 0.42 (132/yr), electric cardioversions 39/yr, urgent vascular angiography 34/yr, central vein catheter insertions 254/yr, peripheral vein catheter insertions 77/yr, other procedures (lumbar punctions, etc.) 56/yr. A third part of the residents sleeps 3 h or less/shift, being interrupted in 62.9% of the cases.
Conclusion(s): The idea and participation of this study were most welcome among residents. In descending order, insertion of labour epidural catheters, general surgery urgent procedures in the OR and ICU admission/discharge reports generated the main activity for the staff on call in the last year. The resident's sleep deprivation was a common factor. It is crucial to register on call activities in order to ensure high quality patient care.

11AP4-5

Out-of-hospital airway management by physician-staffed helicopter emergency medical services in Japan

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Background and Goal of Study: A higher incidence of difficult airway management has been reported in out-of-hospital settings as compared to hospital environments. Since the introduction of physician-staffed helicopter emergency medical services (HEMS) in Japan in 2001, airway management is more frequently provided by physicians in the field. We conducted a survey of HEMS bases in Japan to analyze the current situation to aid further development of airway management in out-of-hospital settings.
Methods: A questionnaire was mailed to all 46 HEMS bases in Japan regarding airway management equipment routinely carried on board, as well as methods and drugs used for tracheal intubation, methods used for confirmation of tracheal tube position, and the specialty of the physicians on board.
Results: The response rate was 78% (36/46). In addition to a conventional Macintosh laryngoscope, 97% (35/36) reported alternative means available to secure the airway, including video-laryngoscopes at 86%, supraglottic airway (SGA) devices at 19%, and emergency surgical airway kits at 97% of the bases. As for intubation methods, that using a sedative with or without a muscle relaxant was most commonly employed (61%), followed by awake (25%) and rapid sequence (19%) intubation. Furthermore, 69% (25/36) used muscle relaxants routinely or at the time of need, with rocuronium bromide (50%) the most popular followed by vecuronium bromide (36%), while none used succinylcholine. As a sedative, midazolam was used in 75%, followed by propofol (25%). CO2 monitors or detection devices used for confirmation of tracheal tube position were available at 81% of the bases, of which 56% used capnography. Emergency medicine was the most common specialty of the physicians on board at 92%.
Conclusion: As compared to similar studies conducted in Europe, the availability of video-laryngoscopes was higher in HEMS in Japan, while that of SGA devices was lower.[1, 2] One reason may be the effectiveness of a video-laryngoscope in out-of-hospital settings, where a difficult airway situation such as c-spine injury or abnormal airway anatomy is frequently encountered. In addition, the majority of the physicians on board in Japan are not anesthesiologists. Additional studies are necessary to develop more effective airway management for HEMS.
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11AP4-6

Secondary emergency doctor requests - call for a steady improvement of qualification and training of all professions involved in the German emergency medicine system

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Background and Goal of Study: Depending on the severity the German medical system sends out either a paramedic team or an emergency doctor team to an accident or medical emergency. A secondary request of an emergency doctor by the paramedic team on site may lead to a critical delay in initiation of life saving therapy. Based on this observation, the frequency of secondary calls for an emergency doctor by the paramedic team on site can be interpreted as an indicator of quality in emergency medical treatment and outcome.
Aim of this study was to assess both the frequency and the major causes for secondary emergency doctor requests by paramedics on site in Ulm, Germany.
Materials and Methods: 6,980 emergency doctor reports and 11,906 paramedic team reports were reviewed and clustered for both the years of 2008 and 2009.
Results and Discussion: Data analysis revealed an absolute number of 1,684 secondary emergency doctor requests which amounts to a frequency of approximately 20% of all emergency doctor requests. When compared to the state average, this refers to a rather high frequency. The average delay until initiation of treatment by an emergency doctor on site following such a secondary request amounts to more than 25 minutes for Ulm. We were able to identify a number of reasons for secondary emergency doctor requests including resemblance of symptoms of frequent diseases as well as emergency operators and paramedics.
Moreover, the frequency of secondary emergency doctor requests depended on the experience and qualification of both emergency operators and paramedics.The present analysis shows that secondary emergency doctor requests are indeed associated with significant delays in evidence based medical treatment and that such secondary requests refer to a valid indicator of process and structure quality in need of improvement. The relatively high rate of secondary emergency doctor requests reflects the enormous pressure on the system and organization of emergency care in Ulm.
Conclusion: It is crucial to keep the frequency of secondary emergency doctor requests low in order to provide a high quality of outcome over the long term. Our observations call for a steady improvement of qualification and training of all professions involved in emergency medicine and the discussion of potential structural adjustments of emergency care, particularly when considering developments and challenges of our society and economy.

11AP4-7

Hemocomponent trazability in battlefield, retrospective analysis from 2008 to 2014. Spanish medical corps experience in Afghanistan war

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Background and Goal of Study: Hemorrhage is the leading cause of preventable death in combat. Therefore during Iraq and Afghanistan war the use of packed red blood cells (PRBC), fresh frozen plasma (FFP), platelets (P) and other hemostatic products are primordial.Support for supplying blood products from Spain to Afghanistan (aprox. 6000 Km) has been a logistical challenge for Spanish Medical Corps.
The aim of this study is to analyze the consumption of PRBC, FFP and P in Spanish Military Hospital (Herat -Afghanistan-) from January 2008 to March 2014.
Materials and Methods: Retrospective study between January 2008 to March 2014. The databases from Spanish Armed Forces Transfusion Center and Spanish Military Hospital (Herat -Afghanistan-) were used. PRBC, FFP and P shipped and consumed in Military Hospital were analyzed. Each blood product was divided based on serogroup (PRBC: A+, A-, B +, B-, 0+, 0-, AB+, AB-; FFP: A+, AB+, AB-, P: A +, 0+). For this purpose a computer database in Excel program was created. Mean percentages of these variables are used. To perform this study military authorization were obtained.

Results and Discussion: During the interval, 3582 PRBC units, 278 FFP units and 47 P units were sent by logistical flight (aprox. each 15/20 days) to Spanish Military Hospital (Herat -Afghanistan-). Of these, 565, 184 and 21 units respectively were used. This means that 15.7% PRBC, 66.1% FFP and 44.6% P shipped was used.
Conclusion(s): 15.7% PRBC, 66.1% FFP and 44.6% P sent to Afghanistan Operations Area from Spain were used. These data has an important economical and logistical impact. These results are similar to other allied medical corps deployed in battlefield.
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11AP4-9

Activity of a medical emergency team (MET): a prospective observational study of 795 MET calls

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Background and Goal of Study: Medical emergency teams (MET) have evolved over the last 15 years to meet the needs of deteriorating hospital patients. Numerous studies have analysed the efficacy of the MET but few have examined the specific causes and interventions undertaken by the MET. The objective of this study is to examine the characteristics of patients who require MET review, the reasons for such reviews and to determine how these patients were managed.
Methods: Prospective single-centre observational study based in Wellington Regional Hospital, New Zealand between 1 October 2012 and 30 September 2013.
Results and Discussion: 795 MET calls were generated for 630 patients. The mean patient age was 64. Medical patients were responsible for 60% of calls. There was a marked diurnal variation in the incidence of MET calls. A MET call was more likely during the 8-hour day shift compared to the 8-hour night shift (OR 1.47, CI: 1.2-1.8, p=0.002).
There were 883 triggers for 795 MET calls. The most common triggers were an unresponsive or fitting patient (23%), tachycardia (22%) and an Early Warning Score of 8 or more (20%).
Neurological causes (31%), cardiovascular failure (27%), respiratory failure (23%) and sepsis (19%) were the most common underlying conditions. One of the top four conditions was present in nearly all cases (99%).
The most common interventions used by the MET were ECG (52%), medications (43%), venous bloods (36%) and high-flow oxygen (31%). The most common medications used were antiarrhythmics (13%), analgesics (10%), beta-blockers (9%) and frusemide (9%).
Each trigger for MET calls was assessed separately to allow us to estimate its main associated underlying conditions and interventions used.
Conclusion(s): Our analysis supports findings from previous studies that the majority of MET calls are made for a relatively small number of underlying conditions and triggers and that a MET syndrome or syndromes exist.
We established the proportion of each trigger contributing to MET workload and specifically what the MET does at these calls. This can guide education and training of ward staff to improve detection of deteriorating patients and prevent or pre-emptively manage causes of such deterioration prior to MET criteria being reached.
We noted an association between time of day and crisis recognition in hospitals suggesting that hospital systems do not reliably find deteriorating patients.

11AP4-10

Anaesthesia in combat support hospital. Spanish/US experience in Herat (Afghanistan)

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Background and Goal of Study: Despite of the leading role of the improvised explosive devices (approx. 65% of all combat casualties), gunshot injuries (GSI) still contribute considerably to morbidity and mortality on modern battlefield. Anesthesia, critical care and pain management are primordial in casualties management. The aim of our study was to analyze our anesthesia experience in war zone.
Materials and Methods: We carried out a retrospective study of patients seen from march to may 2014. The population chosen for the study was all patients who were treated in the Spanish Military Hospital in Herat (Afghanistan). We grouped all surgical patients. Medical information was collected by military physicians during their deployment period in Herat. A computer database was employed to collect additional data: nationality, military/civilian, lesion mechanism: gunshot/explosive devices, anesthesia: general/regional/local, transfusion strategy, alternative airway devices and other clinical reports. This study was approved by Spanish Medical Corps.
Results and Discussion: From march to may 2014, in Spanish Forward Surgical Team deployed in Herat (Afghanistan), 745 patients were admitted (458 NATO members, 263 civilian and 24 Afghan soldiers). Ten of them were casualties (8 gunshot and 2 improvised explosive devices) and 14 were surgical patients (8 accidents and 6 casualties). We performed 12 general anesthesia (volatile), 11 regional anesthesia (3 spinal, 3 interscalene block, 1 axilar block and 4 femoral block) and 6 local anesthesia with sedation. One patient underwent anesthesia four times and another suffered massive bleeding in operating room. In all the cases we accomplished damage control resuscitation. We use Airtraq® once, ultrasound and regional catheter in all peripheral blocks, and red blood cells, plasma frozen platelets (1:1:1 transfusion strategy), fibrinogen, calcium and prothrombin complex concentrate in one casualty with massive hemorrhage. None of them died.
Conclusion(s): Our retrospective study describes that we have performed general, regional and local anesthesia in 14 surgical patients. We used Airtraq® like alternative airway device, 1:1:1 transfusion strategy and advanced pain control (regional catheter and ultrasound). Our experience could be useful in similar humanitarian or military deployments in the future.
Acknowledgements: United States 909 Foward Surgical Team.

11AP4-11

Bullet embolization and migration to the right renal vein

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Background: The bullet venous embolization is a rare complication of the gunshot injuries, resulting in diagnostic difficulties and controversial therapeutic options.
Case report: A 34 year man was brought to our trauma center for 6 thoracic-abdominal gunshot injuries and one in the left elbow. He was haemodynamically stable. The thoracic-abdominal CT confirmed the projectile location: 5 subcutaneous (3 thoracic, 1 gluteus, 1 left back) and 1 intra-abdominal inside the hepatic hilum. Laparotomy was decided, where was objectified an intestinal perforation which was resected, but finding that bullet resulted surgically impossible. After 36h a thoracic radiography showed a cranial bullet migration, suspecting it was located at the inferior cava vein. A posterior cavography informed of the right renal vein location. In front of the migration risk, an inferior cava vein filter was placed. An interdisciplinary evaluation was done about the endovascular bullet removal, but the final decision was not to extract the projectile because of the symptom absence, the low embolization probability once it was nestled into the vein, and the venous tear risk associated with the extraction trial.
Discussion: During the reported cases revised, diagnostic confusion and therapeutic dilemma are expressed in front of a intravascular projectile embolism. Venous embolisms generally remain haemodynamically stable and do not need initial surgically intervention. A 70% of cases stay asymptomatic. A discussion is generated about if this foreign body has to be removed. The

indication is backed with projectiles which affect the gastrointestinal tract, because they are contaminated and are able to generate a septic thrombophlebitis. Some authors emfathize the extraction to avoid lasted thromboembolic complications, being the transvenous percutany via the first therapeutic option.

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Learning Points: In front of the lack of evidence in the management of this kind of patients, we must individualize each case to offer the best assistance.

11AP4-12

A framework describing factors affecting health care providers' performance in patient resuscitation under the circumstances of limited personnel resources and family member presence

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Background: Professional societies' guidelines recommend that healthcare providers (HCP) allow family members (FM) to be present during resuscitation. But this FM presence may reduce the quality of HCPs' performance during medical codes as measured by adherence to resuscitation guidelines such as late onset or long interruptions of CPR. Recommendations for in-hospital resuscitations are to devote one person to focus on interacting with the FM. Problems arise when only a few personal are available, such as in the evening, during night or week-end shifts in the hospital.
Research question: Main: Which are the factors leading to altered HCP performance under the circumstance of FM presence during resuscitation scenarios with limited personnel resources? Secondary: What mechanisms may then be helpful managing the situation?
Methods: Subjects (HCP with more than 10 years of experience in advanced life support) were recruited for a face to face, structured interview. Two experts with more than 10 years of experience in in-and out-of-hospital resuscitation analyzed the interviews using comparative analysis associated with grounded theory: Themes were formulated by reaching consensus via discussion and then themes were used to analyze the remaining data. Then all subjects were contacted again and confronted with the results, asking whether they agree that all their reported experience is covered through that framework ("members check"). Demographic data included age group, gender, and profession.
Results: Sixteen interviews have been analyzed: 6 were male and 10 were female subjects, twelve were physicians and four were anesthesia nurses. Two participants were in the age group between 30 and 34, 4 between 35 and 39, 2 between 40 and 44, 5 between 45 and 49, and 3 between 50 and 59 years. Analysis revealed three themes: Organizational factors (OF), social factors (SF), and emotional factors (EF). All themes are further described by subthemes or facets: OF: physical factors and medical triage (FM as additional patient); SF: Source of information (positive if FM is the source, negative if HPC is the source), Patient-HCP relationship, respectful behavior, social correctness; EF: fear of (legal or social) consequences, empathy, "serious going" (atmosphere).
Discussion: A framework with three themes, summarized in few words, may help briefing and debriefing such events. For all themes pathways that may be helpful in managing the situation were identified.

11AP5-1

Airway management of patients with maxillofacial trauma

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Background and Goal of Study: Airway management in maxillo-facial trauma patients is especially difficult due to several factors. Preanesthesia evaluation being focused on airway assesment is essential in this patient population.
Materials and Methods: We retrospectively investigated anesthesia records of 175 patients whom underwent maxillofacial surgery with different aetiology. Age, gender, type of trauma, ASA score, Mallampaty scores, difficulty degree of intubation, end tidal CO_2 elevation were parameters that studied.
Results and Discussion: Significant correlation was found between fracture type (mandible fracture alone or combined with zigoma/maxilla fracture) and higher Mallampati score (p:0,001 respectively). Mandible fracture alone or combined with others was significantly associated with difficult intubation. End tidal CO2 elevation was correlated with higher Mallampati score.
Conclusion(s): During maxillo facial surgery anesthesia related complications are most frequently seen in anesthesia induction period (%67). Repetition of failed intubation attempts complicate airway management and increase complication frequency. However increased frequency of using laryngeal mask airway devices and fiberoptic intubation; complication ratios decreased at half at anesthesia induction period. Nevertheless complication ratios didnt change in perioperative, postoperative periods. According to our records no major complication (hypoxic cerebral injury, haemodynamic instability, cardiac arrythemias, death etc) was seen in our patients.

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11AP5-3

Collaboration and satisfaction of physicians versus nurses on the *'ad hoc'* trauma resuscitation team

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Background and Goal of Study: Risk-adjusted mortality, in-hospital complications, length of stay, and patient satisfaction are associated with better physician-nurse collaboration in intensive care units with *fixed* team members. We hypothesize that ‚*ad hoc'* trauma team members - who may not have worked together previously and only come together for a high-intensity, critical-incident resuscitation - will also report positive collaboration.
Materials and Methods: We performed an observational, quantitative survey with convenience sampling at two urban Level I trauma centers. Following a resuscitation, trauma team members completed the Collaboration and Satisfaction with Care Decisions (CSACD) survey tool. The CSACD measures critical attributes of collaboration (7 items) and satisfaction (2 items) with the decision-making process on a Likert scale. Survey respondents were eligible to complete the questionnaire on more than one occasion. The nonparametric Kruskall-Wallis test was used for analysis.
Results and Discussion: 209 respondents involved in 50 resuscitations participated: 119 physicians (134 male) and 64 nurses (19 male). Technician and student scores are not reported. Physicians rated both collaboration (cooperation, communication and coordination) and satisfaction with the decision-making process higher than nurses. Males also rated both elements higher than females. Both were statistically significant.
Conclusion(s): In ‚ad hoc' trauma teams, physicians report more satisfaction with physician-nurse interactions than their nursing colleagues. However, since gender was associated with nurse-physician occupations in our study, it is not possible to discern whether it is the influence of gender or the influence of occupation that explains the differences observed. Recruitment of subjects in ‚nontraditional' roles (female physicians and male nurses) may clarify these disparities.

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11AP5-4

Compare of fluid therapy safety in patients with severe concomitant injury by volumetric hemodynamic analysis

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Background and Goal of Study: Problem of safety of intensive fluid therapy in patients with severe concomitant injury remains actual.
Materials and Methods: After obtaining written informed consent and local ethic committee approval 23 adults patients with severe trauma were examined. Cases of transient azotemia, length of stay in ICU, duration of respiratory support and mortality were studied in patients with colloids (C-group) and crystalloids (CR-group) monitoring at the first week after trauma. Patients in both group were examined by transpulmonary thermodilution technique implemented in module PICCO of the Infinity Delta monitor (Draeger, Germany). *Data were processed unpaired t-test with Statistica 6.0 (StatSoft Inc., Tulsa, OK, USA); $p < 0.05$ significant. Data are means ±SD.*
Results and Discussion: The percentage of colloids in complex infusion therapy in patients with severe concomitant injury in the C-group was 26,8 ± 2,1%, the next day it had fallen to 19%. The incidence of transient azotemia in patients of C-group was 10,8%, whereas in CR-group was 5.2% ($p>0,05$). The duration of respiratory support was not significantly different in both groups and in the C-group it was 3,9±1,6 days, in the second group - 3,2±1,5 days ($p>0.05$). Length of stay in the ICU was more in the C-group (8,9 vs 8,1 days, respectively, $p>0,05$). Mortality in C-group was 13%, whereas in the CR-group - 10% ($p>0.05$).
Conclusion(s): When comparing the safety of colloids and crystalloids as part of infusion therapy in patients severe trauma was not significant difference.

11AP5-5

Effect of tranexamic acid measured by thromboelastography in the early phase of major trauma

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Background and Goal of Study: The control of the acute traumatic coagulopathy (ATC) is an important issue of major trauma.
The thromboelastography (TEG) plays now a prominent role in the screening and the follow-up of the haemostasis disorders, in major trauma, like hyperfibrinolysis recognizable as being an independent factor of mortality. CRASH II imposed us the early use of the tranexamic acid (TA) for reducing mortality.
The aim of our study was to analyse the effect of TA on coagulation measured by the TEG in the early phase of major trauma.
Materials and Methods: This was a single-center retrospective study, over 20 months, of severe injured patients admitted to intensive care unit of the emergency department, with or at risk of major bleeding, within the first 3 hours following the trauma.
We chose to select patients who had an analysis of the hemostasis with a TEG, on arrival and one hour after injection of 1g of TA.
The patients with pre-existent disorders of hemostasis to the trauma were excluded.
The statistical analysis compared the TEG before and after TA, by using the Student's t-test and Wilcoxon test.
The hyperfibrinolysis was defined in the TEG by an estimated percentage of clot lysis (EPL) > 15 % and a percentage of clot lysis at 30 min (LY30) > 7,5 %.
Results and Discussion: 72 patients were included in this study (72 % were men ; median ISS was 18 ; 28 % had a TQratio > 1,2 ; 25 % had a BE < 6 mEq/l ; 25 % had a lower fibrinogen in 1,5g/l).
Within the first 24 hours, 33 % of the patients received erythrocyte concentrates (on average 5) and 21 % received fibrinogen (on average 3,8g).
The univariate analysis before / after the TEG shows a decrease of the fibrinolysis after TA (EPL: $p=0,05$, LY30: $p=0,07$).
The multivariate analysis shows a higher reduction of the fibrinolysis after TA for the patients receiving TA within the first hour of the trauma.
8,3 % of the patients were identified as having a hyperfibrinolysis based on the criteria TEG (EPL and LY30) and all of them were corrected after the injection of AT.
Conclusion(s): The use of the TEG allows to detect patients presenting an early hyperfibrinolysis and above all to objectify biologically the in vivo effect of the tranexamic acid on the fibrinolysis correction, in the early phase of major trauma.
This study also shows, like CRASH II, the important role of the early TA injection (within the first hour) resulting in a most important reduction of fibrinolysis.

11AP5-6

Effect of ventilation with 100% O2 on glucose metabolism during resuscitation after hemorrhagic shock in swine

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Background and Goal of Study: Stress conditions cause impaired glucose metabolism [1]. During circulatory shock, hyperoxia (i.e. mechanical ventilation with 100 % O2) can improve organ glucose oxidation without affecting total glucose utilization [2], but may also aggravate oxidative stress due to enhanced formation of reactive oxygen species (ROS) [3]. Therefore, we explored the effect of pure O2 breathing on glucose metabolism during resuscitation after hemorrhagic shock.
Materials and Methods: Anesthetized and instrumented swine underwent 3 h of hemorrhage (removal of 30% of the calculated blood volume and titration of mean arterial blood pressure (MAP) of about 40 mmHg) and either standard resuscitation ("controls": re-transfusion of shed blood, fluid resuscitation and continuous i.v. noradrenaline titrated to pre-shock MAP values, inspiratory O2 fraction (FiO2) trated to maintain O2 saturation >95 %; n=7 over 23 h) or "hyperoxia" (standard treatment, but FiO2 of 1.0 during the first 12 h). Glucose metabolism was derived from the blood glucose and mixed expiratory 13CO2/12CO2 isotope enrichment, respectively, during continuous i.v. infusion of stable, non-radioactive labeled 13C6-glucose. From the tracer data glucose production and utilization rates were calculated using compartmental modeling.
Results and Discussion: In the resuscitation initial phase glucose metabolism was close to pre-shock values in the hyperoxia group, whereas control animals showed significantly higher glucose uptake and a tendency towards higher glucose production. Hence, pure O2 ventilation had only a transient effect on glucose metabolism, which well agrees with the comparable post mortem findings on markers of inflammation and oxidative stress.
Conclusion(s): Hyperoxia attenuated the initial hypermetabolism associated with immediate post-shock resuscitation.
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11AP5-7

Effects of combining hyperoxia and therapeutic hypothermia during resuscitation after porcine haemorrhagic shock

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Background and Goal of Study: Haemorrhagic shock accounts for 30-40% of trauma mortality [1], due to secondary multiple organ failure, which is triggered by hypoxaemia and tissue ischaemia [2]. Both therapeutic hypothermia and hyperoxia could possibly blunt organ damage as a result of reduced tissue O_2 demand and increased O_2 supply, respectively [3]. Therefore, we tested the hypothesis whether combining therapeutic hypothermia and pure O_2 ventilation would attenuate systemic inflammation and thereby organ dysfunction after long-term porcine haemorrhage and resuscitation.
Materials and Methods: Anaesthetized and instrumented animals underwent 4 hrs of haemorrhage (removal of 30% of the blood volume and subsequent titration of mean arterial pressure (MAP) at 35mmHg). Thereafter, animals were randomly assigned to either standard resuscitation ("control" group, comprising of re-transfusion of shed blood, fluid resuscitation, continuous i.v. noradrenaline titrated to maintain MAP at pre-shock values; n=9) or the combined

hyperoxia and hypothermia group ("combi" group, standard resuscitation + FiO_2=1.0 and T=34°C; n=9). Before, immediately at the end of, 12, and 22 hours after haemorrhage, we measured systemic and regional haemodynamics, visceral organ function, and cytokine production. Immunohistochemistry allowed the analysis of kidney nitrotyrosine formation.

Results and Discussion: Whereas MAP and noradrenaline infusion rates did not differ, animals in the combi group showed significantly lower cardiac output at 12 and 22 hours of resuscitation, which coincided with significantly higher haemoglobin content. Except for a significantly lower creatinine concentration at 12 and 22 hours of resuscitation in the combination group, parameters of cardiac and renal function did not differ either. Neither systemic cytokine profiles nor kidney nitrotyrosine formation showed any intergroup difference.

Conclusion: Combining therapeutic hypothermia and pure O_2 ventilation failed to attenuate organ dysfunction and inflammatory response after porcine haemorrhagic shock, possibly due to increased capillary leakage, subsequently reduced cardiac output, and impaired tissue perfusion.

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11AP5-8

Effects of stomach inflation on cardiopulmonary function and survival during hemorrhagic shock

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Background and Goal of Study: Ventilation of an unprotected airway may result in stomach inflation. The purpose of this study was to evaluate the effect of clinically realistic stomach inflation on cardiopulmonary function during hemorrhagic shock in a porcine model.

Materials and Methods: Pigs were randomized to a sham control group (n = 9), hemorrhagic shock
[35 $mLkg^{-1}$ over 15 min (n = 9)], and hemorrhagic shock combined with stomach inflation
[35$mLkg^{-1}$ over 15 min and 5 L of stomach inflation (n = 10)].

Results and Discussion: When compared with the control group, hemorrhagic shock (n=9) increased heart rate (103±11 vs. 146±37 beats min^{-1}; P=0.001), lactate (1.3±0.5 vs. 3.6±1.9; P< 0.001), and decreased mean arterial blood pressure (81±13 vs. 35±8mmHg; P< 0.001), stroke-volume index (38±6 vs. 14±5 $mLmin^{-1}m^{-2}$; P< 0.001), thigh near-infrared spectroscopy (60±4 vs. 45±4; P=0.001). Hemorrhagic shock combined with stomach inflation (n=10) vs. hemorrhagic shock only (n=9) increased intra-abdominal pressure (1.1±1.0 vs. 26.9±9.3mmHg; P< 0.001), and decreased stroke-volume index (20±9 vs. 10±6$mLmin^{-1}m^{-2}$; P=0.007), dynamic respiratory system compliance
(38±6 vs. 11±5$mLcmH_2O^{-1}$; P< 0.001), and thigh near infrared spectroscopy values (45±10 vs. 24±9; P=0.010). Before vs. after stomach evacuation during hemorrhagic shock, intra-abdominal pressure decreased (27±9 vs. 10±5mmHg; P=0.042). Survival in the sham control and hemorrhagic shock group was 9 of 9, respectively, and 3 of 10 after hemorrhagic shock and stomach inflation (P< 0.001).

Conclusion: During hemorrhagic shock stomach inflation caused an abdominal compartment syndrome and thereby impaired cardiopulmonary function and metabolism, and increased mortality. Subsequent stomach evacuation partly reversed adverse stomach-inflation triggered effects.

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11AP5-9

Emergency airway management: a survey of major trauma centres

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Background and Goal of Study: Unexpected difficult airway is a challenge to emergency physicians and the anaesthetists. The quoted incidence in emergency departments (ED) is 0.4-8.5% in anaesthetic literature and as high as 14.8% in emergency medicine literature. This is owing to the proportionately larger number of patients requiring airway support due to medical or surgical conditions contributing to the difficulties in an unpredictable and uncontrolled environment.

Unexpected airway emergencies compounded by major trauma, add to difficulty of managing these outside theatres. NAP4 looked at airway problems outside theatres and recommended a focused approach with the right person, in right place, with right equipment and preparation.

Materials and Methods: A telephone survey was done for all adult major trauma centres in UK.ED nurses, trauma co-ordinators, ED and anaesthetic consultants were surveyed. Answers were collated and analysed against the NAP4 recommendations to ascertain airway management strategies in place and whether we could develop our own practice further.

Results and Discussion: Only emergency airway management in the ED was considered for this survey. Anaesthetists were the first port of call for 73.9% (17/23) centres and 69.6% (16/23) have an ODP available for assistance. An ENT registrar was resident at 43.5% (10/23) of MTCs with one having only offsite consultant cover, although maxillofacial services could be sought. Other centres had a resident ENT trainee. All MTCs have a dedicated difficult airway trolley in ED, of which 73.9% (17/23) were standardised throughout the hospital. The range of adjuncts and equipment available varied greatly, however the Airtraq was found to be the most popular choice of videolaryngoscope. 2 hospitals had fibreoptic scopes available in ED. Shadow boards were used for intubation by 21.7% (5/23) centres with another 13% (3/23) using boxes or trays of previously prepared equipment.

Conclusion(s): The findings were considered in relation to NAP4 and on the whole, MTCs provide senior registrar led airway management service with designated, trained assistants. Just below 45% have the ability to summon immediate, senior ENT expertise.

There is a wide variation in equipment and procedural practices and further work on preparation, communication and shadow boards may impact on morbidity and mortality. The majority of MTCs had a noticeable enthusiasm to share information and wished to improve contact links.

11AP5-10

Long-term effects on labour market affiliation in trauma patients after implementation of a physician-manned helicopter

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Background and Goal of Study: To strengthen the emergency response in the eastern part of Denmark, the first Helicopter Emergency Medical Service (HEMS) was introduced May 1st 2010.

The implementation was associated with reduced transport times, fewer secondary transfers, and lower mortality in severely injured patients, but long-term effects have not been investigated.

The aim of this study was to assess the effect of HEMS on labour market affiliation of trauma patients.

Materials and Methods: Prospective, observational cohort study with a maximum follow-up time of 4.5 years. Trauma patients from a 5 month period prior to the implementation of HEMS (pre-HEMS) were compared with patients from the first 12 months after implementation (post-HEMS). All trauma patients between 18 and 60 years of age, treated by either Ground Emergency Medical Service or HEMS in HEMS catchment area from the 1st of December 2009 to the 30th of April 2011 were included. Follow-up period was until May 1st 2014.

Primary outcome was early retirement after trauma. Secondary outcomes were reduced work ability and proportion of time on social subsidy three

years after trauma. All analyses were adjusted for sex, age and Injury Severity Score (ISS).
Results and Discussion: We included 1212 patients (n=305 pre-HEMS and n=907 post-HEMS).
Patients pre-HEMS were older than patients post-HEMS (median 36 yrs vs. 33 yrs, p=0.03), but comparable with regard to sex and ISS.
The rate of premature exit from the labour market, defined as transition to involuntary early retirement, was 1.57 per 100 person-years pre-HEMS and 1.40 per 100 person-years post-HEMS, hazard ratio=0.79 (95% CI 0.44-1.43; p=0.43). The prevalence of reduced work ability at three years after trauma was 21.4% pre-HEMS and 17.7% post-HEMS, odds ratio=0.78 (95% CI 0.53-1.14; P=0.19). The percentage of time (median) on social subsidy during the first three years after trauma was 14.9% (IQR 1.3-67.3) pre-HEMS and 11.5% (IQR 0.0-48.7) post-HEMS, the odds ratio for receiving social subsidy for more than 50% of time was 0.68 (95 % CI 0.49-0.96; p=0.0261).
Conclusion(s): We found a reduced early retirement rate, increased work ability, and reduced time on subsidized income post-HEMS. Although only the latter was significant, all point towards better labour market affiliation. Thus, the previously reported reduced mortality post-HEMS seemed to also result in better long-term functional outcome.

11AP5-11

Physician based prehospital care in traumatic brain injuries: an 8 year overview

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Background: The University Medical Center Groningen has a physician anesthesiologist based helicopter emergency system (p-HEMS). Aim of the study was to evaluate the characteristics of patients with traumatic brain injury (TBI) treated by the p-HEMS and to determine whether the care provided was in compliance with the international Brain Trauma Foundation (BTF) guidelines.
Methods: Retrospective analysis of the records of all patients who suffered TBI, aged ≥ 16 at time of accident, treated by the p-HEMS and transported to the UMCG between January 2004 and December 2011. Extracted data comprised general patient characteristics, vital parameters recorded on arrival by the p-HEMS and the applied treatment. Differentiation was made between TBI related and non-TBI related causes of deterioration. Therapy in the acute phase included hyperosmolar treatment (HT) (mannitol or hyperhaes®) given if there was a clinical suspicion of raised intracranial pressure (ICP) or hyperhaes® for hypovolemic shock. TBI severity was defined by the first Glasgow Coma Scale (GCS) assessed at the scene.
Results: Among the 986 patients fulfilling the inclusion criteria, 416 (42%), 145 (15%) and 425 (43%) sustained mild, moderate and severe TBI respectively. The demographic characteristics of the patients did not show significant trends over the years. The male:female ratio was 3:1. Female patients were slightly older than male patients (mean age 48 versus 42, range 16-100). The intubation rate for severe TBI patients was 96%. Sixteen patients with an initial GCS ≤ 8 were not intubated.
Further analysis of these patients revealed a rapidly rising GCS above 8 in 12 patients at the scene leaving 4 patients who were not intubated prehospital despite a GCS ≤ 8. HT was given to 244 patients with severe TBI, among whom 49 were also hypotensive. Of the patients with severe TBI who were hypoxic, 146 of 154 (95%) were intubated.

	mild TBI GCS 13-15	Moderate TBI GCS 9-12	Severe TBI GCS 3-8
Hypoxia (sat ≤) 92%	45 (11%)	27 (19%)	154 (36%)
Hypotension (SABP≤90 mm Hg)	10 (2%)	6 (4%)	89 (20%)
Intubation	66 (16%)	96 (66%)	409 (96%)
Hyperosmolar treatment	28 (7%)	40 (28%)	244 (57%)

[Table: Vital parameters and treatment]

Conclusion: Raised ICP was a more common problem than hypotension. The intubation rate of 96% compares favorably with intubation rates of ~56% published in previous studies of non-physician emergency teams employing scoop and run strategies. This suggests that the availability of a p-HEMS can improve compliance with BTF guidelines.

Airway Management

12AP1-1

Emergency ventilation via central venous line catheter in a hypotroph preterm with pulmonary atresia (PA) and aortopulmonary shunt (APS)

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Background: Extra-thoracic airway obstruction after paediatric cardiac surgery is common. It is a potentially life-threatening postoperative complication leading to extubation failure in 2 to 4%. Vocal cord paralysis or subglottic stenosis leading to tracheostomy account for most of these cases[1].
Case report: An 8 week old hypotroph preterm (35weeks, birth weight 1860g) recovering after implementation of APS had respiratory failure after primarily successful extubation. The infant suffered from PA with ventricular septal defect. Intubation for surgery and primary extubation at day 7 after cardiac surgery had been uneventful. The infant developed inspiratory stridor and need for respiratory support 7 days after extubation. Bag mask ventilation and laryngoscopic view of the vocal cords was easy. Subglottic stenosis was pronounced. Tubes in size 3.0, 2.5 and 2.0 could not be inserted. As mask ventilation remained easy and hemodynamic profile was stable interdisciplinary decision was made for tracheostomy. For bridging transport time including an elevator ride to the operating theatre the trachea was intubated with a central venous line catheter (CVL, 7.5FF) and bag ventilation via tube connector was applied, s. picture. Tracheostomy was performed uneventfully.
Discussion: A ‚rescue strategy' for the management of the unexpected difficult pediatric airway was previously suggested in the form of emergency tracheal access[2]. The performance of a surgical cricothyroidotomy with passing of a tracheal tube is strongly discouraged in neonatal patients[3]. Therefore, in this infant with new APS and unexpected difficult intubation ventilation via CVL presented an option to gain time for optimal surgical tracheostomy.
References:
1. Green J et al (2014) Prevalence and Risk Factors for Upper Airway Obstruction after Pediatric Cardiac Surgery. J Pediatrics [epub ahead of print]
2. Engelhardt T et al (2012) A child with a difficult airway: what do I do next? Curr Op Anesthesiology 25:326-332
3. Navsa N et al (2005) Dimensions of the neonatal cricothyroid membrane - how feasible is a surgical cricothyroidotomy? Ped Anaesth 15: 402-406
Learning points:
- Paediatric airway management should include interdisciplinary algorithms
- Bag-mask ventilation is always fallback strategy to gain time for more elaborated procedures
- Consider your equipment for more than its anticipated use

12AP1-2

Anesthetic management using an i-gel™ supraglottic airway for a pediatric patient with Hunter syndrome

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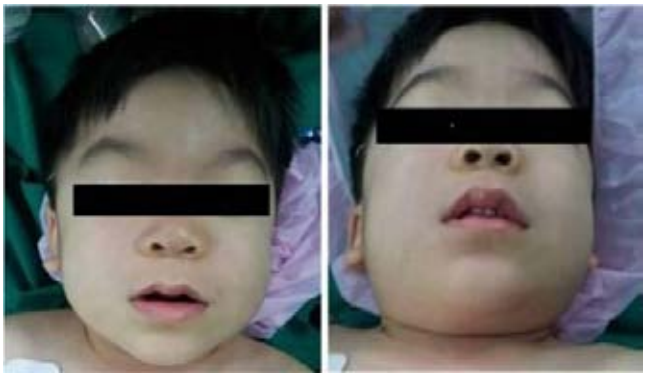
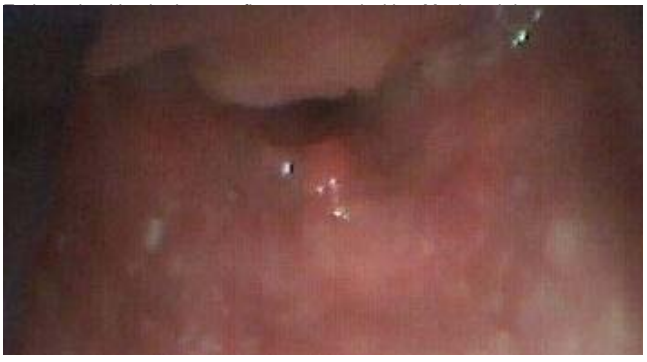
Background: Mucopolysaccharidoses (MPS) are a group of inherited, metabolic disorders caused by a lack of lysosomal enzymes, which leads to the accumulation of glycosaminoglycans (CAGs).
Case report: A 5-year-old male was scheduled for elective myringotomy with ventilation tube insertion due to bilateral non-suppurative otitis media and middle ear effusion. The patient had been diagnosed with Hunter syndrome 2 years previously. Physical examination revealed coarse facies, micrognathia, and a short neck with limited neck extension. Mouth opening was normal and Mallampati grade was 4.



[Fig 1]



[Fig 2]

We next employed an i-gel™ supraglottic airway as the operation duration was not only short but also did not involve the oral cavity. The patient was well ventilated without any leakage in the oral cavity.
Discussion: We will focus on airway management, which is probably the matter of greatest concern during anesthesia in these patients. The continuous accumulation of CAGs in the upper airway can lead to several levels of obstructive risk factors: craniofacial abnormalities, limited mouth opening, hypertrophic tongue, short neck with difficult extension, hypertrophic tonsils and adenoids, and tracheal deformities.[1]
Reference: 1. Kamin W: Diagnosis and management of respiratory involvement in Hunter syndrome. Acta Pædiatrica 2008; 97: 57-60.
Learning Points: The anesthesiologist must prepare various and emergency airway management devices when providing anesthesia in Hunter syndrome patients.

12AP1-3

Successful ventilation and intubation through the I-gel® airway in a patient with post-thyroidectomy hemorrhage and limited mouth opening

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Background: Thyroidectomy is one of most commonly performed surgical procedures.In case of postoperative hemorrhage, airway management is the primary challenge facing the anesthesiologist, as compression of the cervical structures by the hematoma may be fatal[1] The use of Supraglottic Airway Devices (SADs) has been a major advance in airway management, both in elective surgery and in emergency situations. The i-gel® device allows rapid insertion and its use as a conduit for intubation under fibreoptic guidance is relatively simple.
Case report: We report the case of a patient undergoing total thyroidectomy, who suffered cervical bleeding in the immediate postoperative period. The significant hematoma presented, along with a limited mouth opening, made a direct laryngoscopy intubation difficult. Ventilation was compromised by the compression of the airway, endangering patient's life. With the insertion of the i-gel®, a quick restoration of ventilation was achieved. Then we proceeded to intubate the patient through the i-gel® with the help of a fibreoptic bronchoscope (FOB). The i-gel® was removed using Magill forceps, leaving the endotracheal tube in its proper position.
Discussion: A good knowledge of the devices available to the anesthesiologist is crucial at all times, and much more in situations that can endanger patient's life. Videolaryngoscopes(VL) and SADs are included in international guidelines[2]. Which device to use in each situation depends on the availability of the device and on the anesthesiologist's confidence and skill in handling it. The i-gel® is easy to insert and fiberoptic intubation through it is a simple technique.
References:
1. Rosenbaum MA, Haridas M, McHenry CR. Life-threatening neck hematoma complicating thyroid and parathyroid surgery. Am J Surg. 2008 Mar;195(3):339-43
2. Apfelbaum JL Et al. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway. 2013 Feb;118(2):251-70.
Learning Points: VL are devices of a relatively recent appearance and they are not always available in our environment. Moreover, the anesthesiologist must be acquainted with its use and have the suitable skills. We must not forget that VL are not designed for ventilation purposes. Our patient required immediate ventilation due to the rapid decrease in the pulse oximetry.Therefore, we decided to insert an i-gel® with the aim of restoring ventilation prior to intubating the patient.

12AP1-4

Saber-sheath trachea: a case report

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Background: Saber-sheath trachea is an acquired morpho-functional disorder of the intrathoracic segment, characterized by an abnormal configuration of the tracheal cartilage, in which the lateral diameter is < 2/3 of the sagittal, with narrowing of the anterior arch and collapse of the side walls during cough and forced expiration.
Case report: We report the case of a 71 years old male, ASA II, proposed for laparoscopic repair of an inguinal hernia. He had a history of hypertension, obesity, hiatal hernia, lumbar spine surgery and septoplasty. He also had the diagnosis of "saber-sheath trachea" and was under regular Pneumology evaluation. There were no signs of airway difficulty; normal EKG and blood tests. Posteroanterior chest X-Ray revealed slight tracheal deviation to the right and discrete irregular internal contour. We performed vomit aspiration prophylaxis prior to surgery and used rocuronium and propofol to induce anesthesia. Laryngoscopy revealed a large papillomatous lesion. Tracheal intubation(TI) was performed with a 6mm cuffed tube LaserFlex. After good view at laryngoscopy and visually confirmed TI, there was loss of capnography curve by "snapping" of the endotracheal tube. Reintubation was immediately performed with success. Anesthesia was maintained with sevoflurane. Surgery and extubation took place without complications. On arrival to the

Post-Surgical Care Unit, the patient was hemodynamically stable and presented a good ventilatory pattern with no signs of respiratory distress.
Discussion: Our aim was to raise awareness among anesthesiologists for rare cases of saber-sheath trachea and to the relevance of the preanesthetic evaluation of the airway. The anesthetic approach should be carefully considered, taking into account the type of surgery and the risks associated with this disease, particularly the intubation difficulty and possible complications.
Reference: 1-J Anesth.2010;24:128-131; 2- Anaesth Intensive Care. 2001;29(4):417-20
Learning points: Preanesthetic evaluation of the airway is fundamental in all patients, especially in those with suspected or confirmed tracheal morphofunctional disorders, such as saber-sheath trachea. These patients represent a real airway management challenge for which anesthesiologists must be aware in order to anticipate and solve possible difficulties. A previous accurate evaluation is the key to a safe and successful anaesthetic management.

12AP1-5

Awake fiberbronchoscope intubation as a valid technique for a patient with giant orofacial angiomatosis

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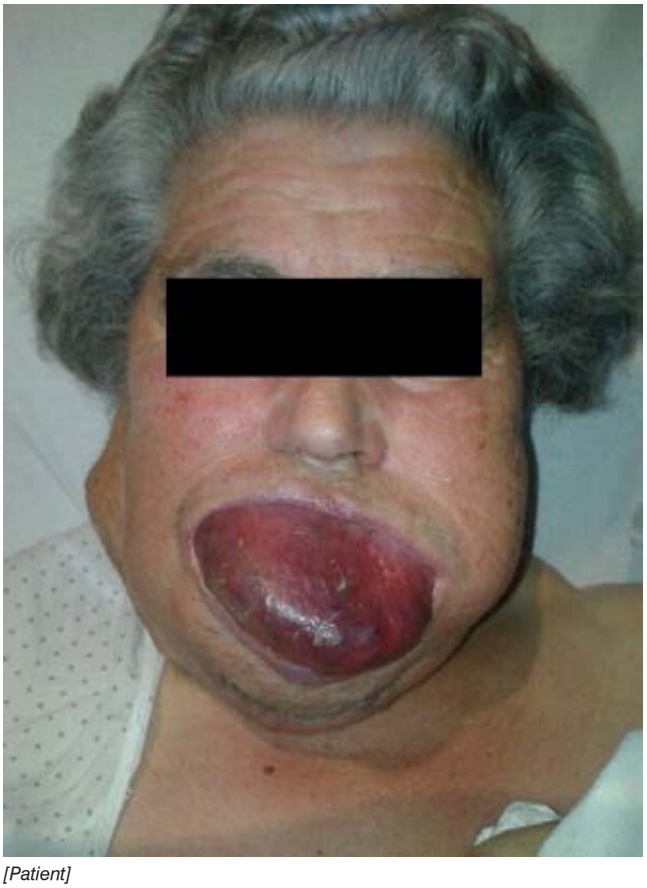
Background: Hemangiomas are benign vascular pathological processes that result from endothelium cell proliferation and most of them are congenital. Such hemangiomas in the oral cavity are more frequent in the lips, with a low incidence in the tongue and more commonly found in females (65%) than in males. They may remain without growing and most show lesion involution, predominantly in teenage patients.Inside the oral cavity, they are more common in the dorsal side of the tongue, the lower lip and palate. Hemangiomas in the tongue cause several problems, such as deformities, functional speech, deglutition and chewing impairment and can become large enough to compromise the patient's airway, that's the reason why it must be secured.
Case report: We present a case of 79 year old female with history of orofacial angiomatosis. Due to the worsening of her clinical status with dyspnoea, macroglossia and hematoma of the tongue, a tracheostomy under general anesthesia was considered necessary.



[Patient]

We decided to realize awake nasotracheal intubation with the patient in sitting position to secure the airway. First we proceeded to the airway preparation of the nasal cavity with topical anesthesia and later we used "spray as you go" technique. After confirming the correct placement of the endotracheal tube general anesthesia was induced. The tracheostomy concluded without any incidents and the patient was transferred to PACU maintaining spontaneous ventilation.
References:
1. Bonet C, Mínguez I, Palma C, Galán S, Penarrocha M, Mínguez J. Clinical characteristics, treatment and outcome of 28 oral haemangiomas in pediatric patients. Med Oral Patol Oral Cir Bucal. 2011;16:19-22.
2. Qureshi SS, Chaukar DA, Pathak KA, Sanghvi VD, Sheth T, Merchant NH, et al. Hemangioma of base of tongue. Indian J Cancer. 2004;41:181-3
3.Tasker J, Geoghegan J. Giant cavernous haemangioma of the tongue. Anaesthesia. 2005;60(10):1043.
Learning points: Although bleeding masses are a contraindication for fiberscope use, in some cases it's the only posible alternative.
Sitting position and nasal route helps fiberscope awake intubation when there's no oral space

12AP1-6

Arndt pediatric endobronchial blocker in an infant for one-lung ventilation: case report of an extraluminal use

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Background: Pulmonary isolation for thoracic surgery in pediatric population, especially infants, can be challenging for Anesthesiologists. Our case report an approach to perform lung isolation using an Arndt Pediatric Endobronchial Blocker(APEB) via extraluminal,in an infant. An extraluminal technique has been already described in few reports, with the blocker attached to the appropriately endotracheal tube (ETT) and positioned with assistance of fiberscope. We describe an approach with the two devices placed separately.
Case report: Twelve months-old, male,9Kg, ASA II,presented for resection of an extralobar pulmonary sequestration, with thoracoscopic approach. The patient was asymptomatic with normal physical examination. After standard ASA monitoring and uneventful inhalation induction with sevoflurane,peripheral accesses and 1 access in the right external jugular vein were placed.Left femoral artery was catheterized.A thoracic epidural catheter was placed in T8-T9. We used an ETT 4.0mm uncuffed and an APEB 5 Fr via extraluminal. The blocker was placed first with laryngoscopy, followed by the placement of the ETT. With pediatric fiberscope via intraluminal, APEB was guided, placed and the cuff was inflated at the entrance of the right main bronchus. After positioning to left lateral decubitus, the APEB placement was reconfirmed with fibrescope visualization and auscultation. Anesthesia was maintained with sevoflurane, neuromuscular block with rocuronium and epidural perfusion of levobupivacaine.Surgery last 4h with no complications and at the end the patient was extubated and transferred to the intensive care pediatric unit. Hospital discharge occurred 2 days after surgery with no complications.
Discussion: Anesthesia with one-lung ventilation can be challenging, because there are few devices for pulmonary isolation in small children. The APEB is a device that allows uninterrupted ventilation while the blocker is placed. The smallest APEB is 5 Fr and can be inserted through an ETT≥4.5mm. That's why the authors describe an extraluminar approach when the conventional isn't possible.
Reference: Bastien J et al.Extraluminal use of Arndt pediatric endobronchial blocker in an infant:a case report.*Can J Anesth*2006 53:2
Learning points: APEB can be used via extraluminal,attached to the ETT or placed first with laryngoscopy followed by the ETT, as we did in our case. This technique shown to be safe and effective in this case, however further studies are warranted to demonstrate that.

12AP1-8

EZ-Blocker and percutaneous tracheostomy - anchoring only made possible by fibroscopic guidance

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Background: Several thoracic procedures require one-lung ventilation (OLV) to allow better surgical exposure, protection from contamination or hemorrhage and for differential ventilation.[1,2] Double-lumen tubes (DLTs) are the most commonly used but the EZ-blocker (EZB), a Y-shaped endobronchial blocking (BB) device, is an alternative for challenging airways.[2-3]
We report the use of the EZB through a percutaneous tracheostomy (PT).
Case report: 64 years old male with esophageal cancer, hypertension, chronic alcoholism and a former heavy smoker, submitted in the previous month to an esophagectomy complicated by esophageal fistula and retrocardiac abscess. The patient was sedated and ventilated by PT in ICU during 22 days and was scheduled for an empyema drainage by left transpleural thoracoscopy. For lung isolation we decided to use the EZB through the PT cannula. The distance between the distal end of the cannula and the carina was 47 mm, measured on thoracic CT. Under fibroscopic guidance, three initial attempts were unsuccessful as the both distal tips were misplaced in the left main bronchus. Malposition was corrected by placing the distal end of the fiberscope between the two cuffs and allowing their proper spreading and anchoring. The surgery proceeded under OLV for two hours without complications. At the end of the procedure the EZB was removed and the patient returned to the ICU.
Discussion: There are two main options for OLV: DLTs and endobronchial blocking devices. The EZB safety in the presence of a tracheostomy made it the most attractive choice in this patient who required minimal airway manipulation. Although a short DLT could also be a plausible approach it requires invasive handling of the stoma and this would increase the risk of airway and respiratory complications. Compared to other BB, the Y-shapped design allows lesser displacement during surgery. Its correct position requires a minimum distance of 40 mm between the carina and the end of the cannula/tracheal tube for precise spread of its tips and bronchoscopic visualization is necessary. [1-3]
In this case, the use of fibroscopy was essential for the proper opening and anchoring of the EZB as the distance was 47mm.
References:
1. BJA 2010;104:119-20
2. BJA 2011;106(6):896-902
3. Anesthesiology 2013;118:550-61
Learning Points: Selection of OLV devices depends on the airway anatomy, available equipment and training of the anesthesiologist.

12AP1-9

Complicated anestheic management using bronchial blocker and endotracheal tube alternately for thoracoscopic tracheal tumor resection and reconstruction

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Background: The management of airway for tracheal surgery presents many challenges for the anesthesiologists.
Case report: This case report demonstrates successful treatment for a 69-year old male with tracheal tumor located 3 cm above the carina, who had a history of COPD and congestive heart failure. CT shows a 1.2 cm polypoid mass with a broad stalk. We determined to perform a thoracoscopic surgery instead of a thoracotomy considering the patient's medical conditions. For thoracoscopic tracheal tumor resection and reconstruction, one-lung ventilation was needed and the endotracheal tube(ET) needed to be repositioned several times according to surgical steps. First, at induction, a ET (7.0 internal diameter, ID) was inserted, positioned above the upper border of the tumor, a bronchial blocker (7 Fr, BB) was then inserted into the right main bronchus using flexible fiberoptic bronchoscopy. After circumferential resection below the inferior border of the tracheal tumor under right lung collapse, the BB was withdrawn up to the upper border of the tumor. Then we attempted to place a sterile reinforced tube (6.0 ID) in the left main bronchus directly across the operative field through the hole in the midclavicular line in the right second intercostal space to maintain one-lung ventilation during surgery. However, the ET tended to go through to the right main bronchus, so fiberoptic bronchoscopy guidance was needed for successful insertion into the left main bronchus. After circumferential resection of the upper border of the tracheal tumor, end-to-end anastomosis was performed as follows. The left cartilage portion of the trachea was sequentially sutured from back to front and the tube located in the left main bronchus was removed, followed by the tube which had been inserted in advance at induction was pushed into the left main bronchus. And then, the remaining anterior and right lateral portions of cartilage and membranous portions were intermittently sutured. After surgery, the patient was transferred to the ICU in an intubated state and was extubated the next day.
Discussion: Thorough preoperative evaluation, comprehensively anesthetic planning, fiberoptic-assisted ET or BB use before induction of anesthesia were mandatory to achieve a safe and delicate anesthesia.
References:
Yasumatsu R, Fukushima J et al. Surgical management of malignant tumors of the trachea: report of two cases and review of literature. Case Rep Oncol. 2012;5:302-7.

12AP1-10

Case report: unpredictable difficult airway due to a fibrotic subglottic bridge

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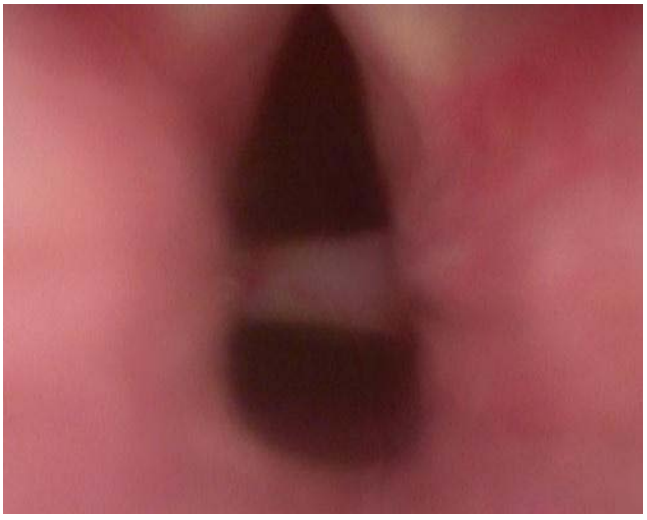
Background: American Society of Anethesiologists (ASA) defined a difficult airway as a clinical situation in which a conventionally trained anesthesiologist experiences difficulty with facemask ventilation of the upper airway, difficulty with tracheal intubation or both.[1]
We present the management of an unpredictable difficult airway due to a fibrotic subglottic bridge.
Case report: A 51-year-old woman was proposed for elective tooth extraction under general anesthesia in ambulatory regime. She had a past medical history of chronic alcoholism and spontaneous thalamic hemorrhage with need of mechanical ventilation during 48 hours.
The patient presented normal relative anatomy, neck mobility conserved and absent stridor, but the right hemiplegia stroke sequel impossible her cooperation in airway assessment. Surgery procedure required to anesthetize and intubate with an orotraqueal tube. At operating room, we administered 0,15 mg fentanyl, 150 mg propofol and 35 mg rocuronium. Then we preceded to a grade I laryngoscopy, but intubation was failed because we found a fibrotic subglottic bridge (Figure 1).
We decided to secure airway with a laryngeal mask and awake the patient. Thereafter, she was submitted to laser photocoagulation by rigid bronchoscope with complete removal of the lesion and then she was able to be successfully intubated and operated.



[Figure 1 - Patient's fibrotic subglottic bridge]

Discussion: Preoperative evaluation was incomplete, but difficult intubation was not foreseeable. Pathologic conditions above the glottis may prevent a clear view of the glottic opening, whereas subglottic lesions permit a good view of the vocal cords. Some examples of those conditions are tumor, infection, post-intubation fibrotic stenosis. Literature relates just 1 case of post-intubation fibrotic subglottic bridge.[2]

Failed intubation consists in endotracheal tube placement failure after multiple attempts. ASA algorithm for safe management of the difficult airway refers that proper response to these emergency situations involves the use of the laryngeal mask.[1]

References:
[1]Anesthesiology 2013; 188 (2): 1-20.
[2]Rev Port Pneumol. 2002; 8 (6):616-7.

Learning points: Fibrotic subglottic bridge observed at this patient is a rare lesion which should be considered as a cause of unpredictable failed intubation.

12AP1-11

Awake laryngeal mask airway intubation for tracheal stent insertion in a patient with massive tumor invasion to trachea: a case report

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Background: Airway stents are employed in procedure to alleviate large airway obstruction, which can occur in patient with various disorders, including malignancy in the mediastinum and intrinsic neoplasia in the trachea. Following advance in airway stent quality, increasing numbers of patients are being treated with this option to relieve symptoms and to extend life-span. However, anesthesiologists may experience challenges.

Case report: A 66-year-old male patient, developed a progressively worsening dry cough and hoarseness over 2 months. Chest CT revealed a tumor spreading to the mediastinum. Tracheal compression was noted, accounting for significant stenosis with tumor invasion. Tatient was scheduled for a palliative tracheal stenting surgery.

The patient received a lidocaine inhalation and spray in the oral pharynx. We performed laryngeal mask airway insertion. After laryngeal mask airway insertion, we used totally intravenous technique for induction and maintenance. No muscle relaxant was administered. A bronchoscope and the introducer of the tracheal stent were inserted into the laryngeal mask airway to visualize the glottic opening, and the stent was inserted into the tracheal stricture.

Discussion: Misplaced stents pose a high risk of acute airway obstruction. We should prepare an emergency plan for rescue. ECMO should be available in the event of airway total collapse. We prefer a laryngeal mask instead of an endotracheal tube because this technique provides an unobstructed surgical view and is especially useful if the stenotic area lies above the carina. An endotracheal tube may interfere with the expansion of the tracheal stent.

Spontaneous ventilation impair the ventilatory dynamics in extrathoracic airway lesions, but improve the dynamics in intrathoracic lesions. Because our patient had a intrathoracic airway obstruction, we used spontaneous ventilation throughout the operation, including the course of LMA insertion.

Reference:
Piao, Successful management of trachea stenosis with massive substernal goiter via thacheobronchial stent. J Card Surg, 2013.

Learning points: Nebulized lidocaine can produces a highly effective anesthetic effect for insertion of an LMA into awake patients.

Spontaneous ventilation impair the ventilatory dynamics in extrathoracic airway lesions, but improve the dynamics in intrathoracic lesions.

An endotracheal tube may interfere with the expansion of the tracheal stent. Laryngeal mask provides an unobstructed surgical view.

12AP2-1

Is the influence of pharyngolaryngeal anomalies important in preanesthesia evaluation?

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Background: A preanesthesia evaluation should be used for preoperative evaluation, increasing the safety of anesthesia, elucidating patients, reducing the number of surgeries cancelled and increasing patient satisfaction.

A physical examination should include an airway examination. The predictors commonly used to anticipate difficult airway usually do not include all pahryngolaryngeal anomalies (PA). Our aim is to detect and investigate the potency of PA in the prediction of difficult intubation performing an indirect laryngoscopy (IL) with a 70°rigid laryngoscope.

Materials and Methods: In 300 patients who were scheduled under general anesthesia for endotracheal intubation, in addition to assessing by demographic and clinical predictors of difficult airway, an IL with a rigid laryngoscope was perfomed to diagnose PA. Afterwards, under general anesthesia and direct laryngoscopy, it was checked if there was difficulty in intubating the larynx and its association with all previous variables was investigated. A logistic regression model for predictive purposes was developed and its power of discrimination was achieved by assessing the area under the curve.

Results: 46 anomalies were found by IL: 31 abnormalities of the epiglottis (22 omega, 9 flaccid epiglottis); 6 hypertrophic lingual tonsils, 3 upper airway tumors and 6 with tongue disorders. Intubation difficulty was found in 14 cases (4.66%).The model found and its coefficients to develop it were: f (x) = 1.322 + (2.173 thyromental distance <6.5 cm) + (1.813 omega epiglottis) - (1.310* cm opening mouth). Global power of discrimination is 0.83 (the CI of 95% is from 0.709 to 0.952). The data were expressed with mean, median and frequency. We used Student t test for continuous variables and Chi2 or Fisher test for qualitative variables. p< 0,05 was considered significant (Table 1)

				CI 95% to Exp(B)	
	Coefficient of the variable	*Statistical significance*	*Odds Ratio*	*Lower*	*Upper*
Mouth opnening (in cm)	- 1.310	0.029	0.270	0.083	0.875
Thyromental distance	2.173	0.001	8.780	2.511	30.707
Omega epligotis	1.813	0.033	6.126	1.155	32.501
Constant	1.322	0.578	3.753		

[Table 1. Independent predictors of difficult intubation by direct laryngoscopy]

Conclusions: Anesthesiologists should obtain the precise airway evaluation as it may effect the perioperative management. IL allowed diagnosis of PA including omega epiglottis, which was one of the variables included in the logistic regression model.

12AP2-3

Indirect laryngoscopy as a predictor of difficult airway

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Background: A difficult visualization of the larynx (DVL) after multiple attempts at conventional laryngoscopy is one of the definitions of difficult airway (DA).[1] In some studies with a rigid 70-degree laryngoscope, the indirect laryngoscopy had the greatest predictive power when compared with others common clinical predictors.[2] There are no published studies assessing the predictive power of a rigid 90-degree indirect laryngoscope. This case series reports the use of an indirect laryngoscopy (IL) with a rigid 90-degree laryngoscope as a predictor of DVL with direct laryngoscopy (DL).

Case report: This case series reports 20 patients in whom a preoperatory IL was used to predict a DVL with DL. The vision obtained was classified into four grades: 1 (vocal cords visible), 2 (posterior commissure visible), 3 (epiglottis visible) and 4 (no glottic structure visible).[2] Grades 3 and 4 were considered predictors of DVL.

Before the surgical procedure and under general anaesthesia a DL with the Macintosh laryngoscope was performed, and the Cormack and Lehane (C&L) classification was registered. A DVL was defined as C&L 3/4. Four patients (20%) presented a difficult airway by DVL and all of them were predicted by IL. Collected data is presented in the table 1.

	DL (C&L I/II)	DL (C&L III/IV)
IL (Grade I/II)	17	0
IL (Grade III/IV)	3	4

DL- direct laryngoscopy; C&L- Cormack and Lehane; IL- indirect laryngoscopy

[Collected data]

Discussion: IL revealed 100% of sensitivity, meaning that it measured correctly all the predicted DVL (p<0,01). The specificity was 85% meaning that some patients assessed as DVL didn't have a real DVL. As this indirect laryngoscope revealed excellent performance in predicting a DVL in this case series and there are no published studies using a rigid 90-degree indirect laryngoscope, this could be a push for a further randomized study with more patients.

References:
1. Anesthesiology 2013;118:251-70
2. Acta Otorrinolaringol Esp 2012;63(4):272-279
Learning points: A IL using a rigid 90-degree indirect laryngoscope was a good predictor of DVL in this case series.

12AP2-4

Increased likelihood of difficult or failed intubation in patients hospitalised with diabetes mellitus: English record-linkage study

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Background and Aim: A number of studies suggest that diabetes mellitus (DM) may be associated with difficult airway management. However, these studies had limited sample size.
We aimed to explore the likelihood of an association between DM and difficult or failed intubation using a large nationwide database of hospital records in England.
Materials and Methods: We conducted a nationwide retrospective cohort study using a dataset of linked Hospital Episode Statistics, which comprises routine hospital data collected for the whole of England in which successive episodes of care for the same individual are linked together. The database includes information on every hospital admission and day care case under the National Health Service (NHS) in England from 1999 to 2011. In the UK the NHS health care is universal.
As a measure of relative risk we calculated the rate ratio of difficult or failed intubation in patients hospitalised with DM compared to control cohort patients without DM. The rates were standardized by gender, age, geographic location and a number of other variables. All conditions were defined according to the International Classification of Diseases 10th edition (ICD 10). We used codes E10 to E14 to identify DM and code T88.4 to identify cases of difficult or failed intubation. The control cohort included patients with a wide range of predominantly minor medical and surgical conditions. The exposure condition was defined as any DM (E10-E14) and, separately, insulin-dependent DM (E10).
Results and Discussion: There were approximately two million patients hospitalised with DM, of whom 426 459 had insulin-dependent DM. The control cohort included more than 9 million people. We identified 1865 cases of difficult or failed intubation in all diabetes patients and 386 cases in patients with insulin-dependent DM. Compared with the control cohort, the rate ratio (95% confidence interval) of difficult or failed intubation was 1.52 (1.44 to 1.61; $p< 0.001$) in all diabetes patients and 1.81 (1.63 to 2.01; $p< 0.001$) in insulin-dependent DM.
Conclusions: We observed an increased likelihood of difficult or failed intubation in patients hospitalised with DM compared to a control cohort without DM. Within the DM cohort, the risk was higher in patients with insulin-dependent DM. Further research is needed to confirm or refute our findings and to establish their pathophysiological basis, including the potential role of glycemic control and limited joint mobility.

12AP2-5

Difficult airway management trolley - all Wales survey

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Background and Goal of Study: The 4th National Audit Project recommends "standardisation of the difficult airway trolley contents"[1]. The objective of this survey was to establish the level of standardisation in the content and layout of the difficult airway trolley within each hospital in the Welsh School of Anaesthesia. The school comprises 13 hospitals which provide round the clock anaesthetic services.
Materials and Methods: A questionnaire was sent to the airway lead consultant of each hospital. 100% response was obtained.
***Difficult Airway Trolley* (DAT)** is defined as a trolley housing equipment for management of both anticipated and unanticipated difficult airway.
***Airway Rescue Trolley* (ART)** is defined as a trolley housing equipment for management of unanticipated difficult airway only.
Results and Discussion: DAT was available in all hospitals. Both DAT and ART were available in 62% (8) of the hospitals. 54% (7) of the hospitals had similar content and 61% (8) had similar layout. All the hospitals had dedicated person responsible for maintenance. 85% (11) were checked at regular intervals. 85% (11) of trolleys had the content listed and DAS guidelines attached to them. 75% (10) had signposts to indicate the location of the trolley. 100% of them had supraglottic airway device and one form of surgical airway (small or large bore cannula or surgical cricothyroidotomy). Videolaryngoscope was available in 85% (11) of the hospitals. 85% (11) of the hospitals organised airway management training days at regular intervals for their staff. Trainees in rest of the two hospitals were sent across to other hospitals within the trust for training.
Conclusion(s): This survey found high level of compliance with the NAP 4 recommendations. There is, however, some variability of the content and layout of the DAMT. This can be source of confusion and may lead to adverse airway incidents [1]. There would be considerable benefits in having national standards for DAMT, in order to ensure familiarity and skill maintenance with the equipment that is used infrequently. All Wales Airway Group is currently working on standardising the DAMT airway equipment in all 13 hospitals in Wales.
Reference:
1. Cook TM., Woodall J., HarpeJ., Benger J. (2011). Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society.
Acknowledgements: All Wales Airway Group (AWAG) linkmen.

12AP2-6

Efficacy of the preoperative airway assessment in predicting intra-operative airway management and outcome - correlative study in Omani population

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Background and Goal of Study: Several parameters/ tests for pre-operative assessment have been validated in large studies. Though these parameters have been time tested ; the racial /regional population anthropological features play a big role in predicting the actual efficacy of such measures. We aim to study the most common parameters in a subset of Arabic Omani Adult population , and seek to validate their efficacy.
Materials and Methods: This was a Prospective observational non-blinded study. Two hundred and ten adult patients older than 18 years and scheduled for elective surgery under general anaesthesia with orotracheal intubation were included in this study. Pregnant patients and emergency procedures were excluded. Preoperative assessment was done for obvious airway abnormality, range of neck movements, mouth opening, Modified Mallampatti grading, Thyro-mental distance, loose/artificial dentition and graded as easy or difficult airway. Mask ventilation was graded and then Laryngoscopy and Endotracheal intubation was performed by the same Anaesthesiologist. Cormack and Lehane grade at laryngoscopy, number of attempts and total time for intubation, use of additional intubating aids like bougie/stylet and any airway injury was recorded. The intubation was graded as easy or difficult based on the above parameters.
Results and Discussion: 202 patients were included and analysed. 24 out of 202 (11.8 %) were assessed to be difficult airways; 58% of these patients had difficulty in Mask Ventilation while 37% had difficulty in Intubation. Of the remaining 88.2 % patients assessed to be easy airways, only 11.7 % had difficulty in ventilation and while 5% had difficult Intubation. They were further analysed as 4 groups based on easy/ difficult assessment vs easy/ difficult intubations. The Sensitivity and Specificity for this correlation was 50% and 91% respectively. Unanticipated Difficult intubations were encountered in 4.4% of total patients.
Conclusion(s): The globally accepted pre-operative airway assessment parameters used in this study were able to predict actual difficult intubations in only 50% patients. However, the very same parameters were able to predict easy intubations in 91% patients. Hence the need for additional clinical tests or assessment modalities, in order to predict difficult airways more accurately.

12AP2-7

A blueprint to determine airway management related adverse events in any hospital easily and efficiently

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Background: Aim of this study was to estimate the incidence of Airway Management Related Adverse Events (AMRAEs) during general anaesthesia (GA) and emergency department (ED) admission at a Dutch academic hospital and to develop an easy and affordable tool similar to the UK NAP4[1] for hospitals to prospectively register AMRAEs.
Methods: After Review Board approval AMRAEs during GA and ED admission were prospectively collected by daily interviews, voluntary reporting and database interrogation. AMRAEs were determined as severe (e.g. death), moderate (e.g. dental damage, lip laceration, desaturation 50-70%), minor (≥1 intubation attempts, desaturation 70-92%), or minor without negative patient outcome
(e.g. anticipated difficult airway upon first look or history).
Results and Discussion: All medical staff consented to participate. Of 175 reports meeting inclusion criteria, 168 were related to GA and 7 to ED admission, more results are presented in table 1. Approximately 95% of all AMRAEs were reported in contrast to an estimated 25% of NAP4. There was no difference in mortality between ED and GA associated AMRAEs. Recognition of AMRAE incidence allows benchmarking and preventative measures. Due to variety in level of care, specialization and patient caseload, each hospital should determine its AMRAEs individually. Two months data collection is enough when patient load is evenly distributed per month.
Conclusion: AMRAEs during GA and ED admission are low and we found 2.6 AMRAEs per day on average. The majority of AMRAEs found were moderate or minor but their long term clinical significance is unknown. Other hospitals could use this accessible and affordable method.

	In total 168 AMRAEs during General Anaesthesia (out of 2835 procedures)	In total 7 AMRAEs during ED/Shockroom Admission (out of 268 admissions)
Minor AMRAEs without negative patient outcome/Minor AMRAEs with possible negative patient outcome	25 (14,8%)/ 112 (66,7%)	3 (42,9%)/0 (0%)
Moderate AMRAEs	7 (4,1%)	0 (0%)
Severe AMRAEs	24 (14,3%)	4 (57,1%)
Death	0 (0%)	1 (14,3%)
Unanticipated ICU admission	12 (7,1%)	1 (14,3%)
Surgical airway	2 (1,2%)	0 (0%)
Irreversible brain damage	0 (0%)	0 (0%)
≥1 of the following: Pneumothorax, Hypoxic resuscitation, Cannot intubate/ventilate, Aspiration, Desaturation <50%	10 (6,0%)	2 (28,6%)
Total	168 (100%)	7 (100%)

[AMRAEs measured over 2 months (24/7) at VUmc]

Reference: 1 Cook TM et al. BJA. (2011) 106 (5) 617-31

12AP2-8

Anaesthetic management of difficult intubation in the paediatric population when direct laryngoscopy initially has failed or is not possible; an audit of current practice at a tertiary paediatric hospital

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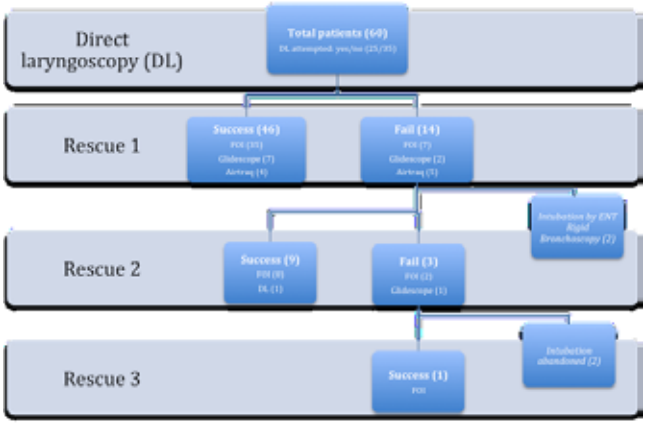
Background: Information regarding rates of difficult airway in the paediatric population is lacking, but available data suggests increased frequency in the young and those with congenital or acquired airway abnormalities. Although newer devices, such as the videolaryngoscope, have been developed, fibreoptic intubation (FOI) probably still remains the gold-standard technique for the management of the difficult paediatric airway.
Objectives: The aim of this audit was to determine what airway management techniques are being utilised in the difficult airway situation, by a group of experienced Consultant Anaesthetists, at a large paediatric centre.
Methods: For a 12 month period, from September 2011 to August 2012, Consultant Anaesthetists at Birmingham Children's Hospital completed a proforma for all anaesthetics in which tracheal intubation was difficult. Patient notes were also studied to retrieve all possible data.
Results: 60 cases of difficult intubation (DI) were analysed. 90% of cases were predicted DI, and 62% had previously been found to have DI. 58% had a medical condition associated with DI and 60% were aged under six years. FOI was the first choice rescue technique in 70% of cases; 90.6% of nasal FOI and 66.7% of oral FOI were successful. Glidescope videolaryngoscope and Airtraq techniques had a 77.8% and 44.4% success rate respectively. 12 cases required utilisation of two different rescue techniques, and in one case progression to a third technique was necessary. The Ear, nose and throat (ENT) surgeons were involved in two cases where a rigid bronchoscope was used to secure the airway.



[Diagram illustrating the rescue techniques used]

Conclusion: No intubation technique was 100% successful. Whilst newer equipment available is useful, FOI probably remains overall the best method in the difficult paediatric airway. The majority of the patients were predicted to be difficult; this fortunately allows planning, not only within the anaesthetic team, but also with other teams such as ENT.

12AP2-9

Airway management skills teaching in ACCS (Acute care common stem) trainees

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Background and Goal of Study: European working time directive and reduced working hours have implications for training and learning1. National Audit Project 4 (NAP4) highlighted the need to improve airway management outside theatres1. The commonest cause of the events reported to NAP4 appeared to be poor judgement followed by education and training. We aimed to assess the airway skills training and teaching in ACCS trainees and identify if the training is providing trainees with the required confidence in their anaesthetic skills as determined by the curriculum and the RCoA.
Materials and Methods: A questionnaire was sent to ACCS trainees in London. 107 trainees responded.Two questions rated the trainee's level of confidence in airway skills and management of anaesthetic emergencies independently.
Results and Discussion: A total of 107 responses were included of which 49 (43%) were male and 53 (53%) females. There were 16 (13%) CT1(first year), 80 (80%) CT2 and 6 (6%) CT2b(2nd Year trainees).7(7%) trainees felt they could not independently deal with anaesthetic emergencies including airway complications. 32(31%) were not very confident whereas 39(38%) had a neutral view. 25(24%) were confident in managing airway emergencies after completing six months of anaesthetic training. The GMC national training survey in 2011(NTS) reported that although teaching standards have been maintained, trainees may not be acquiring sufficient clinical experience within current training posts. Some of them do not feel confident even in skills acquired in initial anaesthetic competencies (IAC). These concerns were reflected in the NTS (2011) where consultants involved in training were unconvinced about the effectiveness of training provision in the new system. This is of interest as

trainees lacking in experience may appear under confident despite demonstrating competence. The NTS (2011) also reported that 82.7% of anaesthetic trainees were satisfied with their training close to figures in our survey (80% rated the teaching provided in their rotation as sufficient).
Conclusion(s): Our results suggest that on call experience may help in providing learning opportunities to trainees.Simulation based training may also help in view of less clinical opportunities to deal with emergencies. This assumes greater importance due to the shorter training period and reduced working hours.

12AP2-10

How did the video-larynsoscope change our daily practice of airway management

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Background and Goal of Study: While awake fiberoptic intubation (FOI) is still considered the goal standard of known difficult airway management, video-laryngoscopes (VLs) have been shown to be useful tools to improve laryngeal view and facilitate endotracheal intubation. Moreover, their use was included in the 2013 ASA Practice Guidelines for the Management of the Difficult Airway. The aim of this study was to investigate if the acquisition of VL (Glidescope)combined with the recent guideline changes, has altered the daily routine practice of airway management at our institution.
Materials and Methods: The anesthetic records for airway management of 300 patients after the introduction of VL in our department (Group A) were retrospectively compared to those of 300 patients who were anesthetized before the VL acquisition (Group B). Airway assessment included thyromental distance, Mallampati test, mouth opening, neck mobility and dentition. Data on the use of conventional direct laryngoscopes (DL), FOI, VL, bougie-assisted intubation and the insertion of supraglottic devices as rescue devices in case of difficult intubation were recorded . Cormack Lehane score was also noted.
Results and Discussion: There was no significant difference in the patients'demographic and airway characteristics between the two groups. Utilization of VL rose from 0% to 16% (p< 0.001). The use of FOI and bougie decreased from 3% to 1% (p< 0.001) and from 8% to 3%(p< 0.001), respectively. The introduction of SGAs as rescue devices in cases of difficult airway were significantly decreased from 38% to 20% (p< 0.001) after the introduction of VL.
Conclusion(s): The increase use of VL shortly after its acquisition was associated with a decrease in FOIs, in the use of bougie and in the introduction of SGDs for rescue airway management. Thus, a considerable change in routine airway management was noticed at our department with the availability of VL.

12AP2-11

Airway management in the Emergency Department (ED) and Intensive Care Unit (ICU): an approach by a diverse team

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Background and Goal of Study: Tracheal intubation (TI) is the gold standard for airway management in the ED and ICU. Limited physiological reserve and logistical aspects make this potentially hazardous, with higher rates of complications in these settings. Our aim: audit the practice of airway approach in the ED and ICU in a Portuguese university hospital and identify its main handicaps.
Materials and Methods: Prospective observational study (June-September 2014). Data collection: information regarding operator, patient, technique and outcome. Records completed at the time of intubation in the ED and ICU. Attempted laryngeal visualization to facilitate TI was used as the definition of an attempted intubation. Statistical analysis: Chi-square test, statistical significance $p<0.05$.
Results and Discussion: 142 TI were performed, 124 records filled. 85 patients were intubated at the first attempt, 39 patients needed 2 or more laryngoscopies; total 177 attempts (min1, max4). 67 (38%) attempts were performed by anesthetists, 80% with successful intubation; 110 (62%) by non-anesthetists, 63% successful (p0,01). Residents attempted 59%, 63% successful; senior doctors performed 41%, 79% successful (p0,02). Doctors with good/excellent airway expertise performed 57% attempts, 82% successful; doctors with less airway experience did 43%, 54% successful ($p<$0,001). The leading cause was respiratory insufficiency 43%. Predictive signs of difficult airway were identified in 57 patients; mean attempts 1,6±0,8. No signal was reported for 67 patients; mean attempts 1,2±0,5. Main contributory factors reported for failure: operator's inexperience 37%, patient-related 33%. After a failed attempt a changed approach was held in 79% cases. Reported complications: Failed intubation 61%, esophageal intubation 31%, aspiration of gastric contents 4%, iatrogenic airway trauma 2%. No surgical or rescue airway supraglotic devices were required.
Conclusion: Avoidable failed attempts and complications may be explained mainly by the operator's inexperience since they were more prevalent among non-anesthesiologists, residents and doctors with little airway expertise. Patient-related factors were also reported as a cause for failure. This emphasizes the need for training in recognition of patients at risk of difficult intubation and planning the appropriate airway approach as well as the rapid access to it, with the right equipment and right expertise immediately available.

12AP3-1

Facial masks performance for anaesthesia induction: is there a difference?

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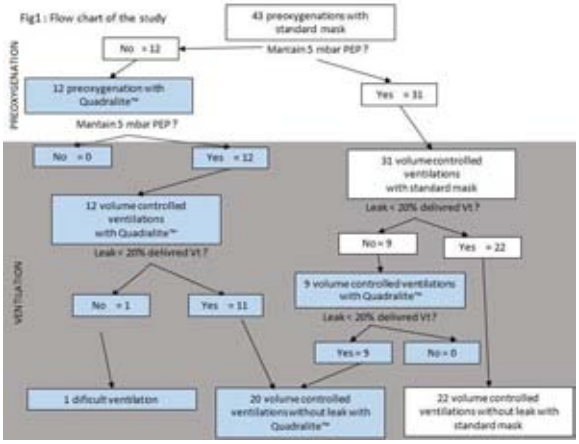
Background and Goal of Study: This study aimed to compare the efficiency of a standard mask with an inflatable cushion(standard mask, SM) and a newly designed mask with a flexible sealing skirt (QuadraLite™, QM, Intersurgical) for preoxygenation and mask ventilation without leaks during induction of anaesthesia.
Materials and Methods: After ethical committee approval and written informed consent, patients with at least 2 difficult intubation criteria: age > 55 years and total edentation scheduled for general anaesthesia were included in this observational prospective study. Preoxygenation was achieved with 10L/min fresh gas flow and a 5 mbar positive expiratory pressure (PEP) with the usual mask. After induction (propofol 1-3 mg/kg, sufentanil 0.1-0.3 μg/kg, rocuronium 0.6 mg/kg), patients were ventilated with a controlled mode (Vt 7ml/kg ideal body weight, 10 cpm, PEP 5 mbar) with a Primus (Drager Medical SAS), with the same mask. Whenever significant gas leak occurred during preoxygenation or mask ventilation, the QM was used (Fig 1). Significant leak-during preoxygenation was defined by theinability to maintain 5 mbar PEP and during mask ventilation, by a measured leak >20% of the delivered Vt. In case of leak, the SM was changed for a QM. Secondary criteria of difficult ventilation were also prospectively collected (use of oxygen by-pass when inflatable bag empty, need of a 2nd operator to ventilate the patient, impossible ventilation). Data were compared by Xi^2-test with a $P<0.05$ as significance level.
Results and Discussion: Forty three patients (76.5 ± 9.2 years, BMI 27.4 ± 5.5, sex ratio 0.79) were included. In 21 patients, the standard mask needed to be changed during denitrogenation (n = 12) and manual ventilation (n = 9) (fig 1). The full success rate (no gas leak) was thus 22/43 for the SM and 20/21 for the QM p = 0.00049. Difficult ventilation was observed in only one patient with both masks.
Conclusion(s): Masks with a sealing skirt improves air sealing and efficacy for preoxygenation and mask ventilation. The type of mask used should be implemented in the difficult ventilation algorithm.



[Figure 1]

12AP3-2

Face-to-face tracheal intubation: a comparison of Airtraq, Glidescope and Fastrach

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Background and Goal of Study: Tracheal intubation in different difficult situations are associated with lower intubation success rates and may create complications. Videolaryngoscopes and Fastrach improve tracheal intubation. However, their use in face-to-face intubation model has not been evaluated in adult patients before.
Materials and Methods: After approval was obtained from Local Research Ethics Committee and the patients, 120 patients who had American Society of Anesthesiologists physical status I-II undergoing surgical procedure requiring endotracheal intubation were enrolled in this prospective randomized study. After standard anesthesia monitoring and induction, rocuronium was administered for muscle relaxation. Patients were divided into three groups and intubated by face-to-face approach with Airtraq, Glidescope or Fastrach devices.
Results and Discussion: Demographic and airway variables of patients were similar between the groups. Total intubation success rates of Airtraq, Glidescope and Fastrach were similar (100%, 98% and 90%). Insertion time of Airtraq (8.5 [6-11]) was the shortest followed by the Glidescope (11 [7-19]) and the Fastrach (16.5 [14.3-21.8]; $p<0.001$).
Intubation time of Airtraq was the shorter when compared to Glidescope and Fastrach (14 [10.3-18.8], 25 [18-45], 46.5 [40-65]; $p<0.001$). All of the three devices increased the mean arterial pressure after insertion but did not alter the heart rate statistically. Glidescope increased the need of optimization maneuvers ($p=0.009$) and the number of intubation attempts when compared to Airtraq ($p=0.004$). Palatal laceration was seen with Glidescope in one patient and it needed surgical repair.
No difference was detected regarding sore throat, dysphagia and hoarseness among the groups. Esophageal intubation ($p=0.001$) and mucosal damage was higher in Fastrach group ($p=0.026$).
Conclusion(s): Airtraq provides not high but faster insertion and intubation times with lowest need of optimization maneuvers, minor complications, number of intubation attempts, and esophageal intubation when compared with Glidescope and Fastrach in face-to-face tracheal intubation.

12AP3-3

A prospective, randomized comparison of the new Baska® mask and the LMA Supreme® in patients undergoing laparoscopic cholecystectomy

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Background and Goal of Study: LMA Supreme® (LMA-S) mask is one of the most used and proved supraglottic airway devices (SADs) for laparoscopy. The Baska® mask is a new SAD with an inbuilt drain channel and just a limited experience has been reported with this device. We compared these two SADs with regard to safety, efficacy, ease of use and incidence of adverse events for laparoscopic cholecystectomy.
Materials and Methods: Prospective, randomized, controlled study of two groups of 40 patients each, undergoing elective laparoscopic cholecystectomy. After induction of general anaesthesia (maintained with 5% desflurane in 50% oxygen and air, remifentanil 0.2-0.5 $\mu g\ kg^{-1}\ min^{-1}$ and rocuronium 0.6 mg kg^{-1}), we evaluated, success rates, speed of insertion, ease of insertion of the drain tube, leak pressure, tidal volume and airway pressures (peak pressure and plateau pressure). We also recorded intraoperative adverse events and postoperative oropharyngeal discomfort (OPD).
Results and Discussion: Success rate on first attempt insertion was definitely higher for the LMA-S group than the Baska® mask group (97.5% and 60% respectively; $P<0.001$). There was no difference in the median time taken for the insertion between groups ($p=0.93$). Ease of insertion of the drain tube differed significantly and it was slightly easy inserted in the LMA-S group ($p=0.04$). Leak pressure was similar between the groups ($p=0.61$) and it was consistent with a similar tidal volume achieved
($p = 0.10$). Both devices showed equal sore throat scoring at 2 h postoperatively ($p = 0.24$).
Conclusion(s): We found that LMA-S was an easier device to insert than the Baska® mask, showing a better success rate on first attempt insertion. Insertion of the drain tube was also easier for the LMA-S group. Leak pressure and tidal volume achieved were similar between groups. Complication rates and postoperative OPD scoring are comparable for both devices.

12AP3-4

LMA limitations for subglotic LASER surgery

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Background and Goal of Study: Use of LASER techniques in larynx and upper trachea surgery raised new problems for anesthesia (1,2). Traditional small section EOT limits the view and operative area. Ventilation using LMA was used to provide safe ventilation without intrusion into surgical area. But this method has its own limitations, as raise of ventilation pressures created due to the presence of fiberscope and problems raised by the suction used during the procedure. These ventilation problems are the aim of the study.
Materials and Methods: Ventilation patterns of 26 LASER interventions for tracheal or larynx pathologies were studied. BGA obtained prior to event were normal. After standard induction of anesthesia LMA was inserted and mechanical ventilation started ($FiO2\leq0.3$, PEEP 5cmH2O). Propofol (Marsh protocol) with additions of fentanyl were used for maintenance of anesthesia. “Swivel” adapter was mountedted to pass LASER fiber bronchoscope (6Fr) and prevent leakage from ventilation circuit. Mechanical ventilation data obtained during the procedure were analyzed and statistical significance revealed.
Results and Discussion: Insertion of instrument in adapter hole increased airway pressure (for LMA size 3.5-5; Δpress +12.76, $p\leq0.01$) and proper adjustments of ventilation were needed to maintain normal SpO2 and $EtCO2<47$ mmHg (maximal value). Suction used during the procedure had expressed impact on ventilation: expired volume decreased significantly (ΔVe 44.6±18%, $p\leq0.01$) and EtCO2 had the same trend ($\Delta EtCO2$ 25.6±12,8 mmHg, $p\leq0.01$). After the correction of ventilation no one from the patients showed significant changes on BGA during the procedures (mean time 1.26 ±0.25 hrs, max 2h 16min). After corrections of ventilation no significant changes on BGA were observed.
Conclusion(s): Insertion of fiberscope increases significantly the resistance of airway ($p\leq0.01$), but not in the patient lungs. Suction used during the procedure produced expressed derangement in ventilation volumes ($p\leq0.01$) and EtCO2 monitoring ($p\leq0.01$). Correction of tidal volume is necessary and EtCO2 monitoring was unreliable. Anyway with proper adjustments of ventilation regimen no significant changes on BGA were observed.
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12AP3-5

Airway management during laparoscopic cholecystectomy: randomized prospective study comparing Ambu Aura Once laryngeal mask and endotracheal tube

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Background and Goal of Study: The use of the laryngeal mask airway for laparoscopic cholecystectomy is still a nonconventional use because of controversial data and study’s results.
The goal of this randomized study is to compare Ambu Aura Once LMA and endotracheal tube (ETT) with respect to efficacy and safety in such en indication.
Materials and Methods: The study was prospective, single blinded, with 90 adult patients ASA I-II, scheduled for elective laparoscopic cholecystectomy, expecting duration of 60 min. Patients were randomly allocated into two groups: ETT group and the LMA group. Non-fasted patients for 6 h, with

BMI >30 kg/m² and hiatus hernia or oropharyngeal reflux were excluded. Airway devices were placed by a single experienced anaesthesiologist (more then 750 LMA placement). Standard non-invasive monitoring was applied. In LMA group just seal intracuff pressure was used with tidal volume of 6-7ml/kg; oropharyngeal leek pressure (OLP) has been determined as well. SpO_2, $EtCO_2$ and blood gas analysis during carboperitoneum were recorded. The surgeon blindly scored stomach size at insertion and before of laparoscope removal. After removal, pH on the LMA and ETT surface was determined using litmus paper, aiming to detect possible regurgitation. All complications were recorded.

Results and Discussion: Device placement was successful in all patients, 96% at the first attempt and 100% at the second in LMA group, 100% of the first attempt in ETT group. Adequate ventilation was achived in both groups. Mean OLP was 22 cm H_2O and central position of vocal cords were seen fiberopticaly in 89% of cases. There were no statistically significant differences between two groups for SpO_2, $EtCO_2$ and blood gas analysis, incidence and degree of change in gastric distension. There were not any grades of acidity detected on the LMA after removal. No specific complications were noted. Ambu Aura Once is a LMA without gastric access, but with serious selection of patients, in the hands of an experienced anaesthesiologist it is the appropriate airway device in such an indication, confirmed in previous works, even though consensus has not been reached yet.

Conclusion(s): A correctly placed and maintained by an experienced anaesthesiologist, Ambu Aura Once LMA provides safe and efficient airway as an ETT for positive pressure ventilation during laparoscopic cholecystectomy, for selected patient in view of the exclusion criteria for the use of LMA.

12AP3-6

Proseal laryngeal mask versus i-gel airway device for radical mastectomy

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Background and Goal of Study: Supraglotic airway devices are increasingly used for elective procedures. The aim of the study was to evaluate the clinical use of two different airway laryngeal devices ProSeal Laryngeal Mask (PSLM) and i-Gel Airway Device (iGAD) for radical mastectomy.

Materials and Methods: Eighty patients of ASA I-III undergoing radical mastectomy procedures under general anesthesia were randomly divided into two groups according to the used device (proseal laryngeal mask vs i-gel supraglotic airway device). Time of insertion, number of insertion attempts, size of the device, time of anesthesia, time of surgery, hemodynamic changes during insertion, ventilation trouble during maintenance were all recorded.

Results and Discussion: To 26 patients out of 40 patients of the Group I (PSLM) the device was placed at the first attempt versus 29 out of 40 patinents of the Group II (iGAD), while to 11 out of 40 patients at the second attempt of the Group I versus 8 out of 40 of the Group II. Three of the patients of each group placing the corresponding device was impossible. Time of insertion at the first attempt for the Group I was 25 s versus 17s for the Group II. Duration of anesthesia and surgery was similar for both groups. Haemodynamic variables were similar in both groups. Ventilation trouble during maintenance were recorded at the rate of 12.5% group I while 15% for the group II. Bronchospasm laryngospasm, hoarsnes, aspiration were not recorded in either group.

Conclusion(s): The use of the ProSeal laryngeal mask and i-Gel airway device is safe and useful for the patients subjected to radical mastectomy. We noticed that when used by skilled physician there is an advantage using i-Gel over ProSeal laryngeal mask regarding the easy and time of insertion of the i-Gel device.

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12AP3-7

Supraglottic airways Ambu AuraGain and LMA Supreme in clinical practice: a prospective observational study

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Introduction: Second generation laryngeal masks with gastric access are increasingly used in daily practice and expand the indications for laryngeal masks in the OR. Only few data exist comparing novel types of laryngeal masks in daily anaesthesia practice. We investigated two laryngeal masks with gastric access for airway management. Ambu AuraGain (Gain) and LMA Supreme (Supreme) were evaluated in adults undergoing general anaesthesia for routine surgery.

Materials and Methods: After approval of local ethics committee, data were collected in a prospective, non- randomised study over a two-month period. When contraindications for laryngeal mask use were absent anaesthesiologists used either Gain (Ambu GmbH, Germany) or Supreme (Teleflex Medical GmbH, Germany) according to their preference. Success rate, insertion time, leakage and airway complications were recorded.

Results: During data collection period 310 patients were documented (Gain n=153; Supreme n=157). Gain was successfully inserted at first attempt in 73% (111/153), compared to Supreme (80% (125/157); p=0.17). Overall success rate was 93% in Gain (143/153) and 94% in Supreme (147/157; p=0.95). Insertion time was slower in Gain (median 30s; IQR [18-40]), compared to Supreme (20s [14-27],
p<0.0001). Leakage during ventilation was comparable between groups (Supreme 10ml [0-24]; Gain 6ml [0-27]; p=0.71). Blood stained airway device after removal was more frequent in Gain 9% (14/153), compared to Supreme 3% (4/157; p=0.01).

Conclusion: Ambu AuraOnce and LMA Supreme can be both successfully used for routine airway management in the OR. However, placement of Gain was prolonged and more often associated with minor trauma to the upper airway. These differences between supra glottic devices might be due to different shape and materials of masks.

12AP3-9

Tracheal intubation in patients immobilized by a rigid collar: a comparison of glidescope and intubating laryngeal mask airway

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Background and Goal of Study: Unsuccessful intubation is rarely seen in servical trauma patients but its morbidity and mortality is high. Intubation must be done with utmost care and rapidly in these patients. The aim of this article is to compare the Glidescope and Intubating Laryngeal Mask Airway in philadelphia collar immobilized patients.

Materials and Methods: After Human Research Ethics Committee approval and written informed patient consent was obtained from patients; American Society of Anesthesiology physical satus I or II, 18-60 years of age 94 patients undergoing elective surgery requiring endotracheal intubation were enrolled in this study. Demographic and airway variables of patients were recorded. Following standard anesthesia monitoring and anesthesia induction, philadelphia type servical collar was applied than patients were intubated with one of these two devices. Ease of facemask ventilations of patients with or without collar were recorded. Groups were compared regarding first and total intubation sucess rates, insertion and intubation times, mucosal damage, effects on hemodynamic changes, postoperative complications.

Results and Discussion: Demographic and airway variables of patients were comparable. We did not detect any difference regarding facemask ventilations with or without collar between the groups. Total intubation success rates were similar between groups (96%).
The insertion time (14.9±10 vs 21.9±6.5, p< 0.001), and intubation time of ILMA was longer (43.5±13 vs 48.4±11; p=0.02) than Glidescope. Mucosal damage was higher in ILMA group (p=0.04).
It was seen that two airway devices were increased the harte rate and mean arterial pressure after insertion when compared with the postinduction values with ingroups.
No statistical difference was found between groups regarding postoperative other minor complications.

Conclusion(s): Even the intubation success rates and effects on hemodynamic parameters were similar among groups, Glidescope has superiority to ILMA regarding lower insertion and intubation times and lesser mucosal damage in servical collar immobilized patients.

12AP3-10

Tracheal intubation in patients with anticipated difficult airway using the Boedeker intubation forceps and McGrath videolaryngoscope. A prospective observational study

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Background and Goal of Study: Videolaryngoscopes with sharp angulated blades may optimize the view of the vocal cords in difficult airway management, however directing the tube to correct placement between the vocal cords may still be difficult and sometimes impossible. The aim of this study was to evaluate the efficacy of using a curved intubation forceps (Boedeker Intubation forceps) in conjunction with McGrath Series 5 Videolaryngoscope (MVL) in patients with predictors for difficult intubation.
Materials and Methods: The study was approved by the regional ethics committee and the Danish Data Protection Agency. The study was conducted at the Dept. of Anaesthesia, Copenhagen University Hospital from Sept. till Dec. 2013. Patients with one or more predictors of difficult intubation scheduled for general anaesthesia were assessed for eligibility. Patients were intubated using Boedeker Intubation forceps and MVL. The primary endpoint was time to intubation. The secondary endpoints were intubation success rate, number of intubation attempts, intubation conditions, and postoperative hoarseness.
Results: A total of 33 patients were assessed for eligibility, and 25 patients were included in the study with a median SARI-score of 3 (IQR 3-4). A total of 22 (88%, 95% confidence interval [74-100%]) of the patients were successfully intubated by the method with a median time to intubation of 115 seconds (IQR 78-247). Steering and advancement of the tube were reported as acceptable in 21 (84%) and 22 cases (88%), respectively, and excellent in 10 cases (45%) for both measures. 10 cases (40%) were intubated on the first attempt. There were 3 cases (12%) of failed intubation, in these cases successful intubation was obtained by using a styletted tube. Postoperative hoarseness was reported in 5 patients, 3 of these had reported hoarseness preoperatively.
Discussion: Successful intubation can be achieved in most patients with predictors for difficult intubation with the Boedeker Intubation forceps and MVL, but the success rate was not higher than in previous studies using MVL guided intubation where a stylet was used.
Conclusion(s): Most patients with anticipated difficult intubation can be successfully intubated with Boedeker intubation forceps and MVL. However, endotracheal tube placement failed in 3/25 patients despite a good laryngeal view.
Reference: clinicaltrials.gov identifier: NCT01976546.

12AP3-11

Usefulness of new model Airway Scope in simulated difficult airway scenarios - comparison with Airtraq and Macintosh laryngoscope

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Background and Goal of Study: Airtraq™ (AT; Prodol Limited, Viscaya, Spain) and Airway Scope™ (AWS; Hoya Co., Tokyo, Japan) are indirect laryngoscopes developed to facilitate tracheal intubation under various conditions, including difficult airway. In addition, new model AWS can display the vision of not only the scope tip but also the external bronchial fiberscope. This system may enable the operator to confirm tracheal tube placement rapidly. The aim of this study is to compare the usefulness of new AWS with AT and Macintosh Laryngoscope (ML).
Materials and Methods: Twenty-three residents participated in this study. Each participant intubated the simulated tongue edema manikin Airsim™ airway management trainer (Trucorp, Belfast, Ireland) with three different devices; new model AWS, AT and ML. The order of device trialed by each participant was randomized. The success rate, total intubation time (from insertion of the device into the oral cavity to confirmation of a tracheal rings view or lung inflation), POGO score and difficulty score evaluated by using visual analog scale (VAS; 0mm: easy, 100mm: difficult) were recorded. Statistical comparisons of values were performed by Kruskal-Wallis test. $P < 0.05$ was considered to be statistically significant. Data were expressed as mean ± SD.
Results and Discussion: Intubation time with AWS and AT (27±16, 30±11 sec, respectively) were significantly shorter than with ML (37±14 sec), and the difficulty score for AWS and AT (25±16, 30±27 mm, respectively) were significantly lower than those for ML (52±26 mm). Furthermore, the POGO score with AWS and AT (95±10, 91±17 %, respectively) were significantly higher than those with ML (56±26 %). AWS was superior to others in regard to intubation time, the difficulty score and POGO score. The success rates were 100% with all three devices.
New AWS shows a superior vision of vocal cords on the monitor, which may lessens the difficulty of intubation when compared with AT. Moreover, new AWS enables the operator to view the tip of the tracheal tube swiftly by external bronchial fiberscope, leading to no risk of sending air into the stomach even when intubated to the esophagus.
Conclusion: Our results showed that the new AWS is useful system for tracheal intubation in difficult airway situations because of enabling the ease of tracheal tube placement and rapid confirmation of tracheal intubation.

12AP3-12

State-of-the-art of the the role of optic dispositives in airway management. International survey

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Background and Goal of Study: Ensuring a secure airway and ventilation are the priorities in patients undergo a general anaesthesia [(1)]. The objective of this research was to know the degree of knowledge to determine the state-of-the-art about the role of Optic Dispositives (OD) in airway management (AM).
Materials and Methods: To perform an international survey with closed questions using the possibilities provided by the Internet and Web 2.0, distributing the survey among Spanish and international contacts. The goal was to achieve a population N of at least 200 professionals. Between 4 of November and 7 of December a total of 668 responses were collected for a total of 40 questions, 217 of them where Spanish Users (SU) (32,48%) and 451 of International Users (IU)(67,52%).
Results and Discussion: The 98.2% (213) of SU used routinely a DO in their daily practice, versus 52.8% (238) of the UI. The Glidescope is the most frequently used OD by IU (45 [10%]), versus the Airtraq between SU (134 [61.75%]).
The general opinion of the respondents is that they are needed in difficult AM, and useful in routine AM (311 IU [69%) versus 181 SU (83,4%)).
When proffesionals are asked about which OD they would buy, 24.6% of IU (111) chose the Glidescope GVL, versus 21.7% (47) of the SU, who would acquire CMAC.
The most of SU have learned to use DO (111 SU [51.15%]) through self-taught ,while IU often learn through courses (191 [42.35%]).
Most respondents believe that OD will be in the future the “gold standard” in the AM (272 IU [60,3%] versus 133 SU [61,3%]). 130 IU (28,8%) think that the reason why the OD had not “finished” with the hegemony of the direct laryngoscopes is that there are no published better results in any clinical trial that provides enough scientific evidences, versus 138 SU (63,6%) who think the main reason is the cost of those OD.
Conclusion(s): in conventional AM the gold standard is direct laryngoscope (DL), but in cases of Difficult Airway the fiberoptic bronchoscope (FOB) remains of choice.
Clinical evidence tells about the real utility of these devices. However, advantages of one over the others and their choice are still to be determined, and there’s not scientific evidence to support the superiority of one above others (2).
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12AP4-1

Ultrasound of the airway - an essential skill for the anaesthetist?

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Background: Ultrasound of the airway provides important anatomic information that would not be evident on clinical examination alone and there is tremendous scope for clinical application in diagnosis and treatment[1]. It remains a relatively new skill for anaesthetists in the UK and so we designed a survey to establish current perception, knowledge and experience in the use of airway ultrasound.
Methods: A questionnaire was sent out by e-mail to trainee Anaesthetists and Consultants mainly in South London Hospitals. The survey was carried out with the help of a popular survey tool and the results analysed.
Results and Discussion: Approximately 250 anaesthetists were sent our survey in total and118 (47%) questionnaires were completed and analysed. The majority of respondents were senior anaesthetists with 39% been Consultants, and 40% senior anaesthetic trainees. 88% had not attended a teaching session on ultrasound scanning of the airway. 1 in 3 thought ultrasound scanning of the airway had a role to play in airway management in the operating theatre. In contrast, 3 in 4 felt it had a role to play in percutaneous tracheostomy on ITU. 80% of respondents had not scanned the airway in the past 12 months while 16% had done less than 5. The cricoid cartilage was the structure most commonly thought to be seen on airway scanning.
Conclusion: The results of our survey show that majority of anaesthetists would like to learn this skill. There is a lack of knowledge in this area with a willingness to learn. Ultrasound scanning of the airway has many advantages including being safe, quick, repeatable, portable, widely available and dynamic[2]. We feel it's now time for anaesthetists to consider airway scanning as an essential skill. Airway scanning is also useful on ITU. Percutaenous tracheostomy under real-time ultrasound guidance is feasible, accurate and safe as it ensures avoidance of vascular structures and correct positioning of tracheostomy tube[3]. There is growing evidence that airway ultrasound is a clinically useful skill which anaesthetists are now keen to learn.
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12AP4-3

State-of-the-art of the the role of ultrasonography in airway management. International survey

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Background and Goal of Study: An inappropriate airway management (AM) is still an important contributor to patients mortality and morbidity (1). Ultrasonography (*US*) is safe, quick, repeatable, portable, widely available, and gives real-time dynamic images in the anaesthesia and emergency AM (2).
The objective was to know and determine the state-of-the-art of US in clinical decision making, intervention and management of the upper and lower airways.
Materials and Methods: To perform an international survey with closed questions using the possibilities provided by the Internet and Web 2.0, distributing the survey among Spanish and internationally contacts. The goal was to achieve a population N of at least 200 professionals.
Between 4 of November and 7 of December a total of 757 responses were collected for a total of 40 questions, 205 of Spanish Users (SU) (27%) and 552 of International Users (IU)(73%).
Results and Discussion: 176 of 205 SU (85,9%) were regular users of US for their daily anaesthetic practice, versus 358 of 552 IU (64,9%), and 151 IU (27,4%) think it does not seem necessary. Nevertheless, 274 IU (49,6%) have never used US in AM, although they would like to try it, versus 155 SU (75,6%) who don't.
SU were younger than IU, 3-4 years in 49 of them (23,9%) versus over 7 years in 224 IU (40,6 %).
The most frequent way to acquire experience in the use of US was Self-taught in 94 IU (17%) versus 78 SU (38%).
IU uses US for the evaluation of the pathology that may influence the choice of technique for the assessment and AM (94 [17%]), location of the trachea and percutaneous dilation tracheotomy (107 [19,4%]) and the prediction of difficult laryngoscopy in surgical patients (76 [13,8%]), versus SU (18 [7,3%], 21 [10,24%], 18 [8,78%] respectively).
Conclusion(s): US is an excellent diagnostic tool and patient safety and, used in conjunction with hands-on, it can be used to predict difficult airway, location of the cricothyroid membrane, prediction of successful extubation, etc. (2). However, the survey is drawn that much remains for to get an US in each anaesthesiology service, and to achieve all the professionals are adequately trained in the US use for AM.
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12AP4-4

A novel oxygen mask reduces discomfort without affecting oxygenation and elimination of carbon dioxide

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Background and Goal of Study: A plastic face mask is widely used for oxygenation in patients with spontaneous breathing. However, some patients feel discomfort and remove the plastic face mask. Thus, there is still a room for improvement in patient comfort, which affects compliance to oxygenation therapy. As gauze or non-woven textile mask has long been used without discomfort even all the day, we developed a novel oxygen mask using non-woven textile[1)].
The purpose of this study is to test whether the novel oxygen mask improve acceptability without compromising O_2 supply and CO_2 elimination.
Materials and Methods: With approval of IRB, 10 volunteers were asked to sit and wear either new oxygen mask (figure 1, left) or conventional plastic oxygen mask (figure 1, right) with O_2 (3L/min). After the subjects were relaxed, end expiratory O_2 (E_TO_2) and CO_2 (E_TCO_2) concentration under resting condition were recorded for 2min.
After 10 mintues resting without a mask, the other mask was tested in the same manner. Acceptability of each mask was evaluated with visual analogue scale (VAS: 100mm, 0 = comfortable, 100 = uncomfortable). Mann-Whitney U test was used for statistical analysis. A p value <0.05 was considered as significant (Means±SD).

[Figure 1]

Results and Discussion: There were no significant differences between the novel oxygen mask and the conventional mask in E_TO_2 (33±5% and 28±3%, respectively) and E_TCO_2 (4.3±0.5% and 3.9±0.8%, respectively). There were significant differences ($p<0.05$) in VAS (the novel oxygen masks and the conventional ones were 14±9 mm and 34±15 mm, respectively). Improved acceptability may be due to its soft and less-smelled texture.

Further study with the patients will be needed to elucidate the utility of the novel oxygen mask. The advantage of the novel oxygen mask might be useful in those who resist to wear plastic mask.
Conclusion: A Novel oxygen mask is more comfortable than conventional mask.
Reference: 1. Japanese patent application, No.167790/2014

12AP4-5

A new laryngoscope with a force sensor that alert the anesthesiologist during laryngoscopy

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Background and Goal of Study: Conventional laryngoscopy remains the fastest and economical technique to achieve tracheal intubation[1]. A new digital laryngoscope was developed with a cable embedded of a force sensor associated to an audible sound (AS)[2]. The aim of this study was to measure the force applied during laryngoscopy technique when an AS alert the anesthesiologist to the force applied.
Materials and Methods: Each participant performed two series of 3 laryngoscopies, one with and other without the AS, in a manikin, using the digital laryngoscope with modified cable. Only the last laryngoscopy of each series was registered. Maximum peak force in Newton (N), intubation time, experience and gender of the operator were registered. For comparison of this paired samples Student's T test was applied. Normality was tested with Kolmogorov-Smirnov/Lilliefors test. Multivariable linear regression analysis was performed to estimate the effect of experience years and gender.
Results and Discussion: Forty-two anesthesiologists from an university hospital participated in our study, however seven participants were excluded due to incomplete data. The mean peak maximum force during intubation using the digital laryngoscope with AS off (40.6 N) and with it on (31.0 N) was statistically significant ($p<0.001$). The difference between intubation time with the AS on and off was 7 seconds and statistically significant ($p<0.001$). The more is the anesthesiologist experience in years, the lower is the mean difference of the maximum peak force during intubation with and without AS ($\beta = -0.284$; 95% CI: -0.518;-0.051).
Conclusion(s): Our results suggest that when anesthesiologist uses a digital laryngoscope with an AS alerting to the force applied, they execute laryngoscopy with lower force.
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12AP4-7

Audit of different endotracheal tube cuff pressure maintain methods in ICU

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Background and Goal of Study: Endotracheal tube cuff underinflation and hyperinflation are associated with different complications [1, 2, 3]. Recommended pressure is 20-30 cmH2O. The aim of this audit was to compare different methods to maintain optimal cuff pressure.
Materials and Methods: 90 patients were included. All patients were divided in to 3 groups according cuff pressure maintain device: 1 group - syringe with subsequent guided by mechanical manometer every 1 h; 2 group - mechanical manometer guided with continuous cuff pressure measurement; 3 group - cuff pressure was maintaining by automated pneumatic line from ventilator, MythoVent (MS Westfalia GmbH, Germany). We used high-volume lowpressure endotracheal tube only. Cuff pressure was recording every 1 h within 8 h. Underinflation and hyperinflation of the endotracheal cuff were defined as cuff pressure less than 20 cmH2O and more than 30 cmH2O, respectively. Identified changes in pressure were corrected by syringe in the first group, by manometer in the second and by pneumatic line from ventilator in the third group.
Results and Discussion: Quantity of cases with under- and hyperinflation were more in the 1 group in comparison with second and third groups significantly ($p<0,05$ Chi - square). 20 hyperinflation cases in the 1 group have been associated with initial cuff inflation by syringe. The reason of hyperinflation in the other five cases in this group was the need for lung ventilation with high airway pressure (above 35 cmH2O). The same reason of hyperinflation was in the 2 and 3 group. All cases of underinflation have been associated with human factors in the first group (staff feared to hyperinflate a cuff). 15 cases of underinflation in the second group have been associated with manometer leakage. 3 cases of underinflation in the third group have been associated with pneumatic line disconnection.
Conclusion(s): The "Human factor" was the leader reason of cuff pressure abnormality in the ICU. Continuous pressure monitoring devices allow to avoid hyper- and underinflation of endotracheal tube cuff. But it is very important to remember that mechanical manometer may be the reason of air leakage from the endotracheal tube cuff.
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	1 group	2 group	3 group
Underinflation	31	15	3
Hyperinflation	25	6	9
Normal	184	219	228

[Cases of under- and hyperinflation]

12AP4-8

Evaluation of the clinical usefulness of novel double lumen tube with movable bronchial cuff for one lung ventilation

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Background and Goal of Study: A double-lumen endobronchial tube (DLT) is often displaced by postural change or surgical manipulation of the lung. Meanwhile, a newly designed Coopdech™ DLT was introduced in 2014. This DLT has movable bronchial cuff, which may reduce the incidence of malposition of bronchial cuff. We evaluated the clinical usefulness of novel Coopdech™ DLT for one lung ventilation.
Materials and Methods: We studied 30 ASA physical status I - III patients scheduled for elective thoracic surgery. Patients were randomly assigned to one of two groups. Fifteen patients received L-DLT Phycon™ (Fuji Systems co. Tokyo, JAPAN), and 15 received novel L-DLT Coopdech™ (Daiken-Iki co. Osaka, Japan). In all DLT, minimal contrast media was injected into both tracheal and bronchial cuff prior to intubation. After the trachea was intubated and both cuffs were inflated by additional air, the relations between the position of the bronchial cuff and the trachea/bronchus were evaluated by chest X-ray on following body position:
1. supine, no head-tilt;
2. supine, head-tilt and
3. lateral decubitus position.
The following variables were also studied:
1. time required to position each tube until satisfactory placement was achieved;
2. number of times fiberoptic bronchoscopy was required to readjust tube position;
3. overall surgical exposure and
4. the number of times that produced the air leak of more than 10% of tidal volume.
Statistical comparisons of values were performed by unpaired two-tailed Student's t-test.
$P<0.05$ was considered to be statistically significant. Data were expressed as mean ± SD.
Results and Discussion: The displacement of DLT caused by postural change from the supine to the supine head-tilt and the supine to the lateral decubitus positions were significantly greater in Phycon group (15 ± 7 mm

and 11 ± 8 mm, respectively) than in Coopdech group (7 ± 7 mm and 5 ± 7 mm, respectively) (P<0.05, respectively). Air leak were observed 11 times in total in Phycon group, in contrast, no leakage was observed in Coopdech group. The other variables did not significantly differ between Phycon and Coopdech groups.
Conclusions: We conclude that novel Coopdech™ DLT is as useful as existing DLT, and can reduce the incidence of malposition of bronchial cuff. Coopdech™ DLT may drastically improve safety of airway management during one lung ventilation.

12AP4-9

Comparision of three insertion techniques of Arndt endobronchial blocker for lung isolation: bougie-, bougie and cricoid displacing- and bronchoscope-guided insertions

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Background: This study was designed to compare the effectiveness of three insertion techniques of Arndt endobronchial blocker (AEB): Gum elastic bougie (GEB)-, Bougie and cricoid displacing (BCD)- and fiberoptic bronchoscope (FOB)-guided insertion in patients undergoing esophageal surgery requiring one-lung ventilation (OLV).
The aim was to determine whether the simple maneuver—GEB or BCD can be a substitute for FOB guidance or verification in most conditions requiring AEB.
Methods: Sixty patients undergoing esophageal procedure for OLV were randomly assigned three groups: Group GEB, Group BCD and Group FOB. The AEB is a 7 Fr catheter with a removable string that loops over the fibreoptic scope for guidance (Group FOB). The blocker was inserted into the left or right main bronchus with the guiding of the J angle tip of the gum elastic bougie, which was looped with the string of the AEB (Group GEB).The techniques of inserting the blocker into the left main stem bronchus with the guiding of the Bougie and cricoid displacing maneuver (Group BCD) will be described. With the patient in a supine position, the head of the patient is moved to the left. The operator then places his right hand fingers near the cricoid and presses to displace the larynx of the patient toward the right and the insert the Bougie looped with the string of the AEB. Finally, using the bronchoscope, the placing of the blocker was ascertained in an appropriate position in Group GEB and Group BCD. We recorded the successful placement of AEB for the first time, the time of placement, the depth of AEB, the bronchus injury score and other complications.
Results: The placement of AEB failed in 4 of 20 patients in Group GEB for the first time. The AEBs were successfully inserted into the left main bronchus in Group BCD and Group FOB for first time. There were no differences about the time of placement (67.5 ± 13.7s vs 70± 10.2s vs74.4 ± 10.6s) and bronchus injury scores (0. 83±0. 18 vs 0. 97±0. 29 vs 0. 87±0. 11) in three groups. In 25 of 60 (40.17%) patients, the depth of placement calculated with the formula of DLT belonged to the range of optimal depth ± 0.5cm. However, there was a significant correlation of depth of insertion with height of patient. The regression line was $y = 0.139x + 5.66$ ($r^2 = 0.42$).
Conclusion(s): Bougie and cricoid displacing-guided insertion of AEB seems to be an effective alternative to FOB-guided method. The depth of insertion of AEB should be calculated with a new formula.

12AP4-10

Positioning of double lumen tube with distal video-camera in normal and adverse anatomy of trachea

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Background and Goal of Study: Correct positioning of double lumen tube (DLT) may be difficult and time consuming even under control of fiberoptic bronchoscope (FOB) due to adverse anatomy of trachea; moreover, absence of continuous visual monitoring of DLT position may be the reason for overlooked DLT dislocation during surgery.
The goal of our study was to evaluate efficacy of DLT equipped with video-camera for navigation and positioning in normal and adverse tracheal anatomy in comparison with DLT and FOB control.
Materials and Methods: This retrospective study included 120 adult patients, who underwent major thoracic surgery with one lung ventilation during 2012-2014. Of 120 patients 77 (64 %) were male and 42 (36 %) female, mean age 59+14years. In 71 patients standard DLT with FOB control was used, in the other 49 patients DLT with endotracheal view video-camera was employed.
Results and Discussion: Standard technique of DLT positioning was successful on the first attempt in 62 (87 %) patients out of 71, who had normal tracheal anatomy. In the other 9 (13 %) patients with adverse anatomy (saber sheath-3, wide carina-2 and S-like trachea-4) positioning was complicated and prolonged (27-35 min) due to 2-3 attempts for insertion and positioning of DLT. In 3 patients out of 9 with adverse tracheal anatomy DLT was exchanged for endotracheal tube and blocker device. Video-navigation of DLT positioning was very effective in normal (41 patients) and in adverse (8 patients) tracheal anatomy and was done from the first attempt. Continuous video-control of DLT position helped to prevent its dislocation in time of bronchial dissection. Employment of DLT with video-camera improved cooperation of anesthesiologist and thoracic surgeon especially during dissection of the main hilar structures.
Conclusion(s): Employment of DLT with video-camera for navigation significantly simplified the process of its positioning in normal and adverse tracheal anatomy. Continuous control of DLT position prevented possible complications and improved lung separation in each stage of the operation.

12AP4-11

Evaluation of the EZ-blocker and double-lumen tube for single-lung ventilation

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Introduction: In anesthesiologist's practice single-lung ventilation (SLV) is often required. Double-lumen endobronchial tubes (DLT) and bronchial blockers (BB) are traditionally used for this purpose, among which EZ-Blocker (EZ) enjoys great popularity recently.
Objectives: To compare the efficiency and safety of DLT and EZ to provide SLV.
Materials and Methods: 2 groups of 10 people in each were formed (DLT and EZ) who underwent SLV. Patients from the DLT group were intubated with a double-lumen tube with a hook for carina. Patients from the EZ group were intubated with a conventional endotracheal tube (ET).
Results and Discussion: Introduction and positioning of DLT took 92±53 sec, which is significantly faster than the similar procedure with EZ (186±84 s, P=0,008). Time spent on FOB was 136±78 s for the DLT group, and for the EZ group - 174±62 s, which was not different significantly (P=0,243). Successful installation and the correct positioning of the device in AW from the1-st attempt in the DLT group took place in 90% of cases. At the same time the similar indicator in the EZ group made only 40%. The difference is obvious not only statistically (P=0,016) but also clinically as the rigid DLT rises on carina much easier than thin and flexible EZ. After turning on its side 3 cases of displacement previously correctly installed deviceswere observedin each group. Perhaps this "symmetry" is explained by the small number of observations. In assessing the degree of lung collapse surgeons found no significant difference between treatment groups (1,4±0,6 for the DLT and 1,6±0,4 for the EZ, P=0,392). The situation was evaluated by the anesthesiologistsin a different way, as DLT implementation is more difficult than intubationwith conventional ET. So, 2,8±1,1 - for the DLT group, while only 1,2±1,0 (P=0,003) for the EZ group. In the DLT group frequency of pain in the throat was 70% and 60% - in the EZ group. There were no significant differences in the degree of pain experienced by the patients in both groups (1,6±0,5 for the DLT group and 1,4±0,6 for the EZ group, P=0,429). Frequency of hoarseness was almost the same in both groups (50% in the DLT group and 40% in the EZ group). But hoarseness severity was significantly higher in the DLT group (2,1±0,6) compared with the EZ group (1,4±0,4, P=0,007).
Conclusions: EZ-Blocker turned out to be an effective, safe and simple alternative to DLT.

12AP5-1

Comparing apples and pears: a body shape index (ABSI) to predict difficult laryngoscopy in the obese

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Background and Goal of Study: It is generally accepted that a centripetal fat distribution (apple shape) is more likely to be associated with airway difficulty when intubating the obese patient. We have previously demonstrated that BMI alone is a poor predictor of difficult laryngoscopy. Waist circumference shows a better correlation, but this alone does not describe body shape.
A Body Shape Index (ABSI) is a recently described anthropometric measure that attempts to link height, weight and waist circumference to describe body shape numerically(1). We wished to see how this correlated with ease of laryngoscopy in a cohort of morbidly obese patients.
Materials and Methods: A database of patients undergoing general anaesthesia for bariatric surgery, containing data on height, weight and laryngoscopy grade was cross referenced against a surgical database to obtain waist measurement for all patients undergoing bariatric surgery during the period March 2010 to August 2014.
For each patient the ABSI (Waist Circ/($BMI^{2/3}$.$Height^{1/2}$) was calculated. The quartile with the highest ABSI was then compared against the rest to assess the difference in numbers of easy (Cormack and Lehane grade 1 or 2) and difficult (C&L grade 3 or 4) laryngoscopies. Fisher's exact test was used to assess statistical significance.
Results and Discussion: Complete data was available for 802 patients. The mean and median ABSI were the same at 0.079, the range was 0.057-0.1105. The number of easy and difficult laryngoscopies were stratified by quartile of ABSI measurement.
The upper quartile against the lower three quartiles is shown below.

ABSI	Number of Easy Laryngoscopies	Number of Difficult Laryngoscopies
Quartiles 1-3	565	35 (5.8%)
Quartile 4	183	19 (9.4%)

[ABSI vs Ease of Intubation]
($p = 0.103$)

Conclusions: Although there was a strong trend towards more difficult laryngoscopy in the patients with a higher ABSI, we were unable to demonstrate a statistically significant difference. This probably represents a study underpowered for a relatively rare event. We were unable to perform a power analysis before this study was undertaken, but it appears we will need close to 2000 patients to demonstrate a difference, which we believe is there. How useful it will be as a future tool in anticipating difficulty will be seen.
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12AP5-2

Use of dexmetedomidine for awake fiber-optic bronchoscope intubation in morbidly obese patients with OSAS

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Background and Goal of Study: Obesity has been associated with increased risk of desaturation after induction of anesthesia [1]. Dexmedetomidine (DEX), a selective alpha 2-adrenergic agonist, affects the locus coeruleus area, which is related to the modulation of sleep regulation and respiratory control, and has a sedative effect. The effects of DEX on hemodynamics are the most commonly reported adverse events [2]. The aim of the study is to investigate the clinical effectiveness and safety of intravenous DEX for sedation during awake fiber-optic bronchoscope (FOB) intubation in morbidly obese patients with history of OSAS demonstrated by a polysomnography.
Materials and Methods: In a reference center that reaches 300 operations of bariatric surgery/years, between September-December 2014 were enrolled five male patients (ASA II-III) undergoing Roux-en-Y gastric bypass. All patients had the variables that predict difficult intubation (Mallampati classification>2, BMI≥ 50, neck circumference > 50 cm, OSAS of moderate-severe degree, android obesity (hip: waist ratio ≥ 0.90) and they had a medical history of hypertension under pharmacological treatment. After pretreatment with topical anesthesia, the patients received a DEX loading dose of 1.5 μg/kg over 15 minutes followed by an infusion of 0.8 based on estimated lean body weight (ideal body weight + 30%). The following data were collected: number of intubation attempts, heart rate (HR), blood pressure (BP), episodes of apnea >60 seconds, drop in O_2 saturation< 90% and sedation's level (using the Ramsay scale 1-6).
Results and Discussion: All patients were successfully intubated at the first attempt. No side effects as drop in O_2 saturation< 90%, apnea or sedation level greater than 3, occurred. The mean of BP and HR were 140±15 and 75 ±25, respectively.
Conclusion(s): In morbidly obese patients with OSAS, the use of DEX for awake FOB intubation, seems free of respiratory and hemodynamic adverse effects.
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12AP5-3

Predicting difficult airway in bariatric surgery

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Background and Goal of Study: Bariatric surgery is becoming increasingly common as a treatment of morbid obesity and the airway management of these patients may be problematic. Evidence is controversial and best way to predict difficult intubation remains debatable. Aim of this study: determine factors associated with increased risk of difficult airway (DA) in major bariatric surgery.
Materials and Methods: Prospective observational study conducted during 6 months after ethics committee approval. Informed consent was obtained for all enrolled patients scheduled for major bariatric surgery. Data recorded during the perioperative period: demographic and anthropometric variables, airway evaluation (Neck circumference (NC), Mallampati score, thyromental distance, sternomental distance, width of mouth opening, mandibular protruding), STOP-Bang score, Cormack and Lehane's laryngoscopic view, intubating attempts, emergence time, adverse respiratory events (ARE). Perioperative anaesthetic management was standardized including for intubating position. Difficult mask ventilation (DMV) was confirmed by the anaesthesiologist responsible for the procedure. Difficult intubation (DI) was assigned when more than one attempt was needed. DA was defined as DMV and/or DI. Exclusion criteria: inability to give consent, noncompliance with anaesthetic protocol. Mann-Whitney U test and Chi-square test were used for descriptive analysis of variables. A P-value < 0.05 was considered to be statistically significant.
Results and Discussion: Of the 52 patients included, 21% had DMV and 8% DI. Patients with DMV had similar rates of DI. Patients with DMV were more frequently men (p=0.001), had a higher weight (p=0.013), a high body surface area (BSA) (p=0.019), a high NC (p=0.006) and higher STOP-Bang score (p< 0.001). These patients presented more frequently STOP-Bang score ≥5 (p< 0.001), obstructive sleep apnoea (OSA) (p< 0.001) and arterial hypertension during PACU stay (91% vs. 39%, p=0.005).
Patients with DI had higher weights (p=0.046), BSA (p=0.033), BMI (p=0.05) and STOP-Bang score (p=0.031): They presented more frequently Cormack class III or IV (p=0.002). Duration of emergence time, duration of anaesthesia, ARE rates and PACU length of stay were similar between patients studied.
Conclusion: DMV and DI had an important incidence in patients scheduled for major bariatric surgery Weight, BSA and STOP-Bang score were significantly associated with DA in bariatric surgery.

12AP5-4

Ease and difficulty in prehospital paediatric airway management in a helicopter emergency medical service (HEMS)

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Background: Paediatric prehospital airway control is a complex task. The lack of routine and the demanding circumstances challenges even experienced health care providers. The choice of the correct endotracheal (ET) tube size and insertion depth is not trivial. Initially unknown age often jeopardizes adequate airway management. Intubation depth was correct in only 43 % in a prehospital paediatric airway management setting over 10 years ago(1). Since then, novel philosophies regarding the use of cuffed ET tubes changed the practice among HEMS, making an evaluation of the current routine immanent.
Materials and Methods: We retrospectively analysed 425 paediatric patients (< 17 years) needing airway management by the Swiss air ambulance service Rega (2010-2014). Rates of successful ET intubation, occurrence of cannot intubate cannot ventilate (CICV) situations, tube size and insertion depth and the use of alternative airway equipment were evaluated. ET tube size was recorded in 356 and tube insertion depth in 310 patients respectively. Tube size deviation > 0.5 mm and tube insertion depth difference of >1 cm from the age-based calculation was judged as incorrect. Statistics were calculated with SPSS. Mann-Whitney-Test and Chi-Square tests were used. Significance accepted when $p<0.05$.
Results: In 425 patients, cannot intubate situations occurred in three patients. Of them, two patients were successfully managed with a supraglottic airway device, the third patient with Goldenhar-Syndrome, already encountered during hypoxic CPR, died in a CICV situation. Mean patient age in years was 6,93(SD 5.5), median 6(IQR 2-12) years. ET tubes were introduced orally in 343(96%) and nasally in 13(4%) patients. Of the intubated children, ET tube size was too small in 6% and too big in 17%. Tube insertion depth was too shallow in 8%, but too deep in 51%. Correct tube size and insertion depth were not significantly different between day and night cases or between primary and interhospital transfer missions.
Conclusion: The incidence of difficult airway or CICV situations during prehospital paediatric emergency treatment was low and no unforeseen difficult airway was encountered. Startlingly high numbers of incorrect tube depth need to be further analysed and practical solutions need to be drafted.
References:
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12AP5-5

Use of the intubating laryngeal mask in 137 patients with overweight and obesity

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Background and Goal of Study: The intubating laryngeal mask airway (ILMA Fastrach™) is an advanced device designed to allow ventilation/oxygenation as well as blind tracheal intubation (TI). We tested the hypothesis that the ILMA is efficient for ventilation and blind TI for patients with overweight and obese with predictive signs of difficult airway or after intubation failure.
Materials and Methods: The prospective study of 137 adults undergoing of the general anaesthesia I-IV classes ASA (84 males/53 females) with increased body mass index (BMI) 25-30 kg m^{-2} and obesity (BMI >30 kg m^{-2}), in whom ILMA Fastrach™ was used electively or emergently in two clinical institutions. 90 patients had predictive signs of difficult TI (PDTI); in 47 patients with unpredicted difficult TI and ILMA was inserted after 2 failed TI attempts. Estimated parameters: ventilation by a facemask; success of insertion ILMA, quality of ventilation (ILMA-V), time for insertion/removal of ILMA and ETT (ILMA-IT), hemodynamic and gas exchange. Size selection was based on gender principle: ILM №5 for male and ILM №4 for female.
Results and Discussion: Among all patients 36 was morbidly obese with BMI>40 kg m^{-2}; 2 of them had BMI>45, 3 - BMI>55 kg m^{-2}. 83/137 patients (61%) had ≥5 signs of PDTI. The ventilation by a facemask was successful in 100%. ILMA was successfully inserted at the first attempt. The blind TI through ILM (ETT 7.5 or 8) was successful in 127/137 (93%) of cases, and in 90% at first attempt with normal parameters of hemodynamics and gas exchange in all patients. 5 blind attempts of TI through ILM in 3 patients wasn't possible; ILMA was removed and TI was performed with direct laryngoscopy (Cormack-Lehane grade 3). 47 patients had only 2-3 DTI predictors, but TI with direct laryngoscopy was unsuccessful (Cormack-Lehane grade 3-4). In this patients TI through ILMA was made at the first attempt 40/47 (85%) patients; 7 patients (15%) required one of adjusting manoeuvre for successful ILMA-TI. In 1 case was situation «can't intubate-can't ventilate», ILMA provided ventilation/blind TI at the first attempt.
Conclusion(s): The ILMA is an easy-to-use airway device with a high success rate of insertion and requires little training time for ILMA-V and ILMA-TI. The choice of ILMA size, based on the gender principle, has been efficient for ventilation and tracheal intubation of obese patients with predictive signs of difficult airway or after intubation failure.

12AP5-6

Postoperative airway management in major head and neck surgery

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Background and Goal of Study: Adverse events involving airway usually occur in patients with acute or chronic head and neck disease. The best strategy for postoperative airway management in major head and neck surgery remains controversial. In these cases, Difficult Airway Society suggests postponing extubation or performing an elective tracheostomy ("at risk" algorithm). The Tracheostomy Scoring System (TSS) evaluates the need of tracheostomy to protect the airway in these surgeries.This study compares postoperative management options (postponed extubation vs tracheostomy) after major head and neck surgery and evaluates TSS as a predictor of tracheostomy.
Materials and Methods: Retrospec tive observational study of patients undergoing major head and neck surgery in an oncology institute between January 1st and December 31st 2013. Information was obtained from clinical records. Descriptive and statistical analysis was performed using SPSS® program (Chi-square, T-student and Mann-Whitney U tests) with 95% confidence interval.
Results and Discussion: Sample included 91 patients. In the postponed extubation group, this procedure was performed mainly in the first 48 hours (95%). Urgent or emergent tracheostomies were necessary in five patients. Four out of those five had TSS ≥5. Following this criteria they should have had a tracheostomy by the end of surgery. Tracheostomized patients had some severe adverse events, one death by airway obstruction. The tracheostomy group had longer hospital stay (median 12.5 vs 22; $p=0.001$).
Conclusions: Despite reduced number of adverse events in both groups, some were severe. The application of TSS before surgery would aid in airway approach and prevent postoperative urgent or emergent tracheostomy. We recommend using TSS in the preoperative consultation to guide airway management. The method of choice should be based on risks and benefits. We verified that tracheostomized patients had a significantly longer hospital stay.

12AP5-7

Reliability of airway assessment tests - a pilot study on the Mallampati classification

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Background and Goal of Study: Preoperative airway evaluation is a key anaesthesia competency. The Mallampati classification is widely used, but its positive and negative predictive value for difficult laryngoscopy is low. This could be due to a high inter-observer variability, a low test-retest-reliability or to simple misclassifications. Studies on inter-observer variability show contradicting results and conclusions.[1-3] This pilot study investigated the correct assessment of the Mallampati class.
Materials and Methods: Thirty-three participants of the Basic Airway Workshop in Bern/ Switzerland gave written informed consent to participate. Photos of 30 volunteers with Mallampati class I-IV were briefly shown in a

standardized way and at random order. Primary outcome was the correct assessment of the Mallampati class. Correct answers were previously defined by consent agreement of the authors. Our hypothesis was that Mallampati class would be correctly assessed in ≥90%.
Results and Discussion: Thirty percent of participants were residents, 18% attendings and 52% nurses; 58% females. Mean clinical experience was 11±2 years. The correct answer was given in 55±16% of cases, with no differences between the professional categories (p=0.33). The percentage of correct answers was 73% (interquartile range 19-83%) for Mallampati class I, 52% (37-70%) for class II, 52% (44-61%) for class III, and 61% (53-65%) for class IV (p=0.48). Fourteen (42%) participants rated an inexistent Mallampati class V at least once.
Conclusion: The low percentage of correct assessment of the Mallampati class may contribute to its low predictive value for difficult laryngoscopy. We will evaluate the percentage of correct assessment, the inter-observer variability and the test-retest reliability of the Mallampati classification in a large collective of anaesthetists in a multicentre study, and the presented pilot shows the feasibility of the study. Results of the multicentre study will be presented at the ESA meeting in June. This will provide evidence how reliable the Mallampati class assessment is. Improved assessment due to better teaching could result in much higher positive and negative predictive values and could increase patient safety.
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12AP5-10

The optimal effect-site concentration of remifentanil for minimizing cardiovascular changes to fiberoptic nasotracheal intubation

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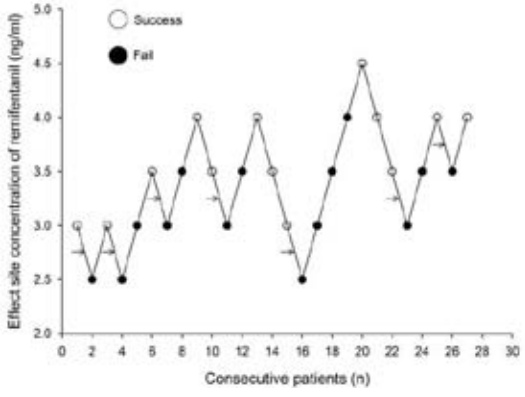
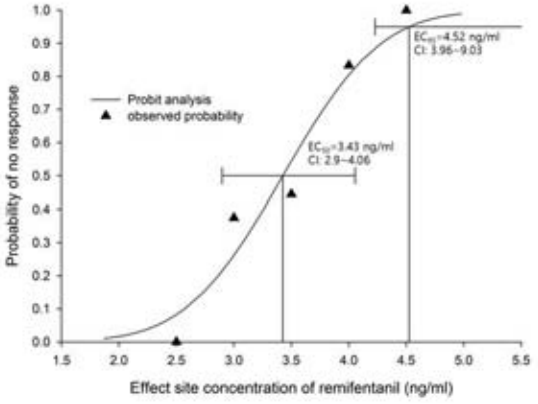
Background and Goal of Study: Nasotracheal intubation is often necessary in patients undergoing oral and maxillofacial surgery. The fiberoptic bronchoscope(FOB) is considered the superior choice for the management of difficult airways, and accounted the most reliable tool for nasotracheal intubation. Nasotracheal intubation induces clinically adverse cardiovascular changes.The optimal effect-site concentration (Ce) of remifentanil for blunting hemodynamic responses to fiberoptic nasotracheal intubation was evaluated.
Materials and Methods: Twenty nine ASA Class I or II patients, aged 18-63 years, scheduled for general anesthesia were involved in this study. Anesthesia was induced using a propofol target controlled infusion (TCI:Marsh model) and remifentanil TCI (Minto model). A propofol Ce of 4 μg/ml was chosen. Ce of remifentanil started at 3.0 ng/ml and the response of each patient determined the Ce of remifentanil of the next patient by the Dixon up-and-down method with an interval of 0.5 ng/ml. Rocuronium 0.8 mg/kg was administered and 90 seconds later we started fiberoptic nasotracheal intubation. The non-invasive blood pressure and heart rate (HR) were measured at pre-induction, Ce reached time, immediately before and after intubation and 1, 3 minutes after intubation, respectively. A successful response was defined as the increase of HR and MAP at 1 minute after intubation that did not exceed 20% of the value just before intubation.
Results and Discussion:



[Figure 1]

The EC_{50} of remifentanil was 3.11 ± 0.38 ng/ml by Dixon's up-and-down method.



[Figure 2]

From probit analysis, the EC_{50} of remifentanil was 3.43 ng/ml (95% confidence Interval (CI), 2.90-4.06 ng/ml), and the EC_{95} was 4.52 ng/ml (95% CI, 3.96-9.03 ng/ml).
Conclusion(s): In the patients of this study, during induction with propofol combined with remifentanil infusion, there was cardiovascular stability.

12AP5-11

Predictive model for difficult intubation based on lateral cephalometric analysis in pediatric patients

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Background and Goal of Study: Difficult intubation is a major cause of morbidity and mortality associated with anaesthesia. Therefore, the importance of preoperative identification of patients in whom intubation is difficult is an area of interest in anaesthesiology.
Based on the low reliability of present tests to detect difficult intubation, we propose to design a cephalometric analisys with specific measurements for airway in order to predict difficult intubation.
Materials and Methods: We prospectively studied 196 patients aged between 9 and 12 years, selected from children who came to the Orthodontic Clinic for consultation. All children were harmonic profile, mesocephalic type and class I facial type. Patients had lateral cephalograms and a cephalometry was traced using computer analysis, employing representative cephalometric landmarks, reference lines and angles previously used in most of cephalometric studies.
These landmarks were clinically selected in order to measure the structures involved in upper airway, following the way performed during orotracheal intubation. A total of 40 variables were included in the analysis.
Results and Discussion: The mean age was 10 yr 5 months (± 6 months; range, 9 yr 4 months - 11 yr) and the sample was homogeneous. After factor analysis was applied to the cephalogram model, the initial 40 selected variables were reduced to 10 factors maintaining the same information. These 10 variables, entirely evaluate bone structures and soft tissues that form airway, following the way performed during orotracheal intubation in normal patients (no difficulty for intubation). Based on mean values, standard deviation, median and confidence interval for a median obtained for each variable, we designed a model (stencil) which can be overlapped over a lateral radiography (cephalogram) of a patient and it would permit to evaluate if that patient may has a difficult intubation.
Conclusion(s): We performed a cephalometric analisys to 196 pediatric patients, selecting 40 variables which represent specific measurements for upper airway, following the way performed during orotracheal intubation. We reduced to 10 factors maintaining the same information and based on its mean values and 95% confidence interval for each variable, we created a model (stencil) which can be overlapped over a lateral cephalogram of a patient in order to predict a difficult intubation.

12AP6-1

Effectiveness of "Hi-STEP" approach for tracheal video-assisted intubation stylet

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Background: Endotracheal intubation is a critical part of anesthetic practice and requires specialized training. Recently, a more proficient intubating device has been introduced - the tracheal video-assisted intubation stylet (TVI-stylet). When we use the traditional stragegy of direct laryngoscopy for intubation with TVI-stylets, it frequently meets obstacles which lead to failure. Presently, no standard teaching method for the tracheal TVI-stylet intubation exists. When operating a complex procedure, it is easier to break it down and learn it step by step ("decomposed learning"). After analyzing the movements of the TVI-stylet in the oropharyngeal space during intubation, a novel concept called "Hi-STEP" was developed to rectify the existing problems. The aim of this study is to assess the effectiveness of this new approaching method.
Materials and Methods: The acronym "Hi-STEP" consists of several steps. First, protect the TVI-stylet lens from secretion by "**Hi**ding" it within the endotracheal tube. Second, search for the epiglottis and target the glottic opening by simply following these four steps. "**S**canning horizontally", "**T**ilting the lens of the TVI-stylet upwards", "**E**levating the handle upwards" and "**P**ushing the handle forward". A questionnaire pertaining to the effectiveness of "Hi-STEP" and characteristics of practitioners was designed. After the "Hi-STEP" learning, this anonymous ten-question questionnaire was given and completed voluntarily. Questionnaire items were assessed using a five-point Likert scale with 1 being strongly disagree and 5 being strongly agree.
Results and Discussion: In total, 96 respondents returned questionnaires, including 50 visiting staffs, 36 resident doctors and 10 interns. Experience levels of using TVI-stylets ranged from < 10 cases (29, 30.21%), 10~50 cases (18, 18.75%), 50~200 cases (18, 18.75%), 200~500 cases (16, 16.65%) to > 500 cases (15, 15.63%). When responding to the question regarding whether the proficiency of the ""Hi-STEP" approach is effective in clinical practice, responses were 60.42% strongly agree and 31.25% agree. AS to whether the "Hi-STEP" approach facilitates clinical teaching, results were 69.80% strongly agree and 26.04% agree. Overall, the "Hi-STEP" approach can optimize the intubation procedure and achieve a higher success rate.
Conclusion(s): The "Hi-STEP" approach for teaching the TVI-stylet intubation should effectively assist physicians overcome obstacles and standardize clinical teaching.

12AP6-2

Experience of awake fiberoptic intubation in patients treated for Ludwig's angina

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Background and Goal of Study: Patients treated for the mouth floor cellulitis (Ludwig's angina) are presented for anesthesia with a known or anticipated difficult airway which is often managed by performing awake tracheal intubation. The goal of study was to analyze the experience of awake fiberoptic intubation (FOI) and to compare the results with demographic data.
Materials and Methods: A prospective questionnaire study was carried out in Lithuanian University of Health Science in the period of February 2014 to November 2014. After the identification in the anesthesia database 31 patient with Ludwig's angina who had undergone awake FOI with standard topical anesthesia and sedation, was at least 16 years old and had written informed consent was included. Patients' demographics were evaluated from clinical records. Subjects completed an anonymous questionnaire during the hospitalization about side-effects of FOI. Nonparametric tests were used for statistical analysis at $p \leq 0.05$.
Results and Discussion: The mean age of patients was 45.74+/-18.642, median 43, mode 31, min 17, max 79 years. The male-female ratio was 2.88:1. Female gender was related to dryness (χ^2=8.88, p=0.003), hoarseness (χ^2=5.135, p=0.023), usage of rescue analgesia (χ^2=5.862, p=0.015) after FOI. 8 (26%) of patients have completed basic, 19 (61%) secondary, 4 (13%) tertiary education. History of cigarette smoking (17 pat., 55%, n=31), chronic lung disease (2 pat., 6.5%, n=31) was related to rhinorrhea after FOI (χ^2=7.33, p=0.007, χ^2=7.33, p=0.007 respectively). 27 (87.1%) of patients said they had enough information about FOI. Patients (n=31) described the procedure as: unpleasant (20, 64.5%), painful (4, 12.9%), very painful (1, 3.2%), neutral (1, 3.2%), did not remember (5, 16.1%). The data about the experience of FOI is similar to the findings of other researchers.[1]
It is important to pay attention to the patient's gender, smoking status, lung diseases, because some patients may need more attention after the procedure.
Conclusions: Experience of awake FOI is often unpleasant and related to demographics in patients treated for Ludwig's angina.
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1. Schnack DT, Kristensen MS, Rasmussen LS. Patients' experience of awake versus anaesthetised orotracheal intubation: a controlled study. European Journal of Anaesthesiology. 2011 Jun 1;28(6):438-42.

12AP6-3

Hemodynamic repercussion of a bispectral index (BIS) guided non paralytic technique for tracheal intubation

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Background and Goal of Study: Studies have shown that remifentanil in combination with propofol provides adequate conditions for laryngoscopy and tracheal intubation (TI) without muscle relaxants. We evaluated the hemodynamic response to a BIS guided, non paralytic technique with two doses of the opiate.
Methods: We reviewed charts of 2 groups of patients: patients anesthetized with 1,2 mcg/Kg remifentanil+ lidocaine 1,5 mg/Kg + propofol enough to produce BIS between 40 and 55; and patients with the same induction but 2 mcg/Kg remifentanil. TI conditions and hemodynamic data were recorded.
Results and Discussion: Among 23 cases in 1,2 mcg/Kg group, and 24 patients who received 2 mcg/Kg remifentanil, BIS 40-55 predicted acceptable TI conditions 18 patients (78,2%) and in 21 (87,5%) respectively. The incidence of drops in hemodynamic variables is depicted in Table1.
With both doses: None of the patients showed a drop as deep as 50% of baseline values, the attending anesthesiologist never deemed necessary resort to muscle relaxation to perform the TI, and there were no hemodynamic difference between the patients with acceptable and non acceptable TI conditions. TI conditions were related to Cormack grade, unacceptable TI conditions occurred more often in Cormack III views. We speculate if it would be useful (or advisable) to add some vasopressor (preemptively) with this technique, for the sake of hemodynamic stability.
Conclusion: Increasing the dose of remifentanil from 1,2 to 2 mcg/Kg increases the reliability of BIS (up to 87,5%) as a predictor for acceptable IOT conditions without relaxants, but also increases the incidence of drops, especially systolic pressure, beyond 25% of the baseline. No disclosures. No financial support.
Table1: Incidence of drops in hemodynamic variables (in % of patients) with the two remifentanil doses.

variation in hemodynamic	1,2 mcg/Kg	2,0 mcg/Kg
drop up to 25% baseline Systolic	43,4%	58,3%
drop up to 35% baseline Systolic	17,3%	29,1%
drop up to 40% baseline Systolic	4,3%	20,8%
drop up to 25% baseline diastolic	39,1%	41,6%
drop up to 35% baseline diastolic	13%	29,1%
drop up to 40% baseline diastolic	4,3%	12,5%
drop up to 25% baseline heart rate	17,3%	4,1%
drop up to 35% baseline heart rate	8,7%	0%
drop up to 40% baseline heart rate	4,3%	0%

[Table1: Incidence of drops in hemodynamic variable]

12AP6-4

High-frequency jet ventilation versus conventional ventilation for CT-guided lung tumor ablation under general anaesthesia

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Background and Goal of Study: Thermal ablation therapies for lung tumors require a precise insertion of needle into the tumor guided by computed tomography (CT). These techniques are hampered by respiratory movements, which increase complications and morbidity. High-frequency jet ventilation (HFJV) is a technique delivering high-flow gas pulses with minimal respiratory movement enabling to immobilize the tumour.
The aim of our study was to determine whether HFJV facilitated CT-guided lung tumor ablation compared to conventional ventilation (CV).
Materials and Methods: A monocentric control trial was performed at Gustave Roussy Hospital (Villejuif, France). The ventilation technique was randomly selected by the anaesthesiologist: HFJV or CV except in case of contraindication to HFJV. The type of treatment (radiofrequency, cryotherapy and microwave) was chosen by the radiologist depending on the size and the localization. Target-controlled infusion anaesthesia with propofol and remifentanil was performed. Data of patients and techniques were recorded. Parametric and non-parametric quantitative data were compared by Student independent-samples *t* test and Mann-Whitney-Wilcoxon test, respectively. Fisher's exact test was performed for qualitative data.
Results and Discussion: Nineteen patients with 27 lung tumors versus 26 patients with 41 lung tumors were included in CV and HFJV groups respectively. No difference for baseline characteristics of patients between groups was found. Time duration (median [range], 460.2 s [120-1800] vs 300 s [120-900]; p=0.04) and radiation dose (181.28 mGy.cm [37.08-589.16] vs 123.6 mGy.cm [61.8-354.32]; p=0.01) required for needle placement in the tumour was significantly lower in HFJV group. There was no difference in tumour size (p=0.34), anaesthesia duration (p=0.42), rate of pneumothorax (p=1), drained pneumothorax (p=0.39), infused propofol and remifentanil (p=0.28 and p=0.32 respectively), EtCO2 before and after procedure (p=0.78 and p=0.05 respectively).
Conclusion(s): CT-guided needle placement into lung tumor seems to be faster and less irradiant under HFJV compared to CV. This ventilation technique could help radiologist to insert the needle especially for localization hard to treat.

12AP6-5

Modified-Ciaglia and Griggs percutaneous tracheotomy techniques, a retrospective analysis

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Background and Goal of Study: Percutaneous tracheotomy (PT) is a commonly performed procedure in intensive care units (ICU). The two most popular techniques for PT are Modified-Ciaglia and Griggs tracheotomies.
In this study we report our experience with PT based on Griggs and Modified-Ciaglia techniques, as well as comparison of these techniques regarding their complication rates.
Materials and Methods: Retrospective evaluation of 158 patients undergone elective PT in ICU between May-2007 and August-2010 in Vakif Gureba Research Hospital was made. Informed consent was taken from the relatives. PT was made either with Modified-Ciaglia (M-Ciaglia) or Griggs techniques. For M-Ciaglia technique CiagliaBlue Rhino Percutaneous Tracheostomy Introducer Kit(Cook Critical Care Inc., Bloomington, IN) was used, whereas for Griggs technique Guidewire Dilating Forceps kit(SIMS, Portex, Hythe, Kent, UK). Demographic data of the patients, MV application times, PT opening time, PT procedure duration, ICU length of stay and decannulation time were noted, as well as ICU acceptance reason, complications related to PT and discharge states of the patients from ICU. Regarding the comparison of quantitative data between the groups Independent Samples t-test was used for evaluation of data with normal distribution and Mann Whitney U test for data without normal distribution. Pearson's Chi-Square test was used for comparison of categorical variables.
Results and Discussion: Totally 158 PTs were performed, where M-Ciaglia technique was used in 114 (72.2%) of them and Griggs in the rest. The procedure duration was significantly shorter with Griggs than with M-Ciaglia technique (P=0.041). No significant difference was detected between the groups regarding complication development (P=0.429). Although not statistically significant, M-Ciaglia technique resulted in more incidence of hypoxia, whereas Griggs resulted in more minor bleeding.
Conclusions: Both M-Ciaglia and Griggs techniques are good alternatives for surgical tracheotomy, with comparable and acceptable complication rates. Duration of percutaneous tracheotomy procedure is shorter with Griggs technique. Longer duration of the procedure with M-Ciaglia technique seems to increase the risk of hypoxia, whereas Griggs seems to result in more bleeding, yet with no necessity for surgical intervention.

12AP6-6

Effect of nasal high-flow oxygen therapy on the swallowing reflex

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Background and Goal of Study: Continuous positive airway pressure (CPAP) is an effective respiratory support strategy to stabilize the upper airway after extubation. However, CPAP reportedly depresses the swallowing reflex, which is a protective reflex for the respiratory tract.[1] This can result in pulmonary aspiration and delayed oral intake. Nasal high-flow oxygen therapy (NHF) is a relatively new strategy used in patients with severe respiratory diseases. Recently, NHF has been used as respiratory support therapy to stabilize the upper airway after extubation. However, the effect of NHF on the swallowing reflex remains unclear. In the present study, we tested our hypothesis that NHF does not depress the swallowing reflex.
Materials and Methods: Seven healthy male volunteers aged 23-43 years were studied. Prior to conducting the experiment, each subject rested in the supine position, after which a nasal cannula for NHF was applied. Two surface electrodes were attached to the skin of the submental region. Respiratory inductance plethysmography (RIP) was then conducted using two elastic bands placed around the subject's rib cage and abdomen. The distal tip of a flexible polyethylene catheter was placed on the retromolar gingiva. Swallowing was induced by administration of a bolus injection of 5 ml of distilled water through a polyethylene catheter under 4 conditions in random order: no NHF (control), and NHF interventions of 15, 30 and 45 L/min. Submental electromyograms (EMG) and RIP signals in each condition were recorded.
Results and Discussion: The latency times for the swallowing reflex at 30 (7.3 ± 1.4 s; $P<0.05$) and 45 (7.9 ± 1.4 s; $P<0.05$) L/min were significantly shorter than those under control conditions (10.6 ± 3.5 s), but that at 15 L/min (8.8 ± 2.3 s) was not statistically significantly different. Distributions of timing of swallows in relation to phase of respiration were very similar under all conditions ($P=0.69$).
Conclusion: Our results suggest that NHF seems to hasten, not depress, the swallowing reflex. Therefore, NHF is likely to be preferable respiratory support therapy for stabilizing the upper airway after extubation in patients who may be at a high risk for pulmonary aspiration.
References: 1. Nishino T, Sugimori K, Kohchi A, et al. Am Rev Respir Dis. 1989;140:1290-1293.

12AP6-7

Feasibility of a single-use, flexible videoscope in intensive care

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Background and Goal of Study: The purpose of the study was to evaluate the feasibility of a single-use, flexible videoscopes in daily practise in an intensive care unit.
Materials and Methods: After approval by the local ethical review committee all non time critical bronchoscopic procedures between Nov 2013 and Aug

2014 were performed with the Ambu® aScope™ 3. A standardised user evaluation form was developed to quantify the assessments for: maneuverability into trachea (trach man), right upper lob bronchus maneuverability (RUL man), the overall maneuverability (overall man), endoscope performance during bronchial lavage (BAL) and image quality during BAL (image qual). A 5-point Assessment scoring was used:
1: very good/very easy;
2: good/easy;
3: acceptable;
4: bad/difficult;
5: very bad/very difficult.
Results are presented as means.
Results and Discussion: 32 patients elected for bronchoscopy because of respiratory insufficiency (n=30) or suspected aspiration (n=2) were included in the study. 28 patients were intubated orally, 3 patients had a tracheotomy and 1 patient was under non-invasive ventilation. In 31 patients a BAL procedure was successfully done. In 1 patient unknown tracheomalazie was found and therefore, no BAL was performed. Assessment scoring were: trach man: 1,4; RUL man: 2,5; overall man: 2,2; BAL: 2,3; image qual: 2,8. No device related complications occures. No change to a "classic" multi use videoscope was needed.
The device is mobile, easy and very fast ready to use with high quality aspects.
As a single-use system hygienic reasons might consider relevant for the use as well.
Conclusion: The data shows that the single-use Ambu® Scope™3 is a feasible flexible videoscope in daily practise in an intensive care unit.

12AP6-8

Effect of laryngeal mask cuff pressure on postoperative pharyngolaryngeal morbidity in geriatric patients

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Background and Goal of Study: During laryngeal mask use the high pressure of the laryngeal mask cuff with pressure on the pharyngeal mucosa and reduction in pharyngeal perfusion may cause the development of postoperative complications such as sore throat, dysphonia and nerve damage (1,2). In this study we researched the effects of adjusting the cuff pressure with a manometer on postoperative pharyngolaryngeal morbidity after laryngeal mask insertion in patients in the geriatric age group.
Materials and Methods: Ninety patients in ASA class I-II above 65 years of age with indications for elective surgery requiring laryngeal mask insertion were included in this prospective randomized and double-blind study.The laryngeal mask Unique (LMU) was inserted in all patients, inflated until the cuff leak sound was heard and cuff pressure was measured with a manometer and recorded. In the pressure-limiting group (n=45), LMU intracuff pressure was adjusted to less than 44 mmHg (60 cmH_2O). No intervention was performed in the routine care group (n=45). In the pressure-limiting group when the pressure was 60 cmH_2O the cuff volume was corrected while in the other group (routine group) the cuff pressure values were simply recorded. Ventilation parameters in the peroperative period and throat pain, dysphonia and dysphagia were evaluated in the 1st and 24th hour postoperative.
Results and Discussion: Baseline demographic data were comparable between groups. Postoperative evaluation of sore throat, dysphonia and dysphagia showed statistically significantly lower scores in the pressure limited group in the first hour as well as 24 hours later. P values are $p< 0.001$, $p< 0.001$, $p< 0.007$, and $p< 0.001$, $p< 0.022$, $p< 0.042$ respectively.
Conclusion(s): The results of this study of the insertion of LM in the geriatric age group and regulation of cuff pressure show that keeping cuff pressure below 60 cmH_2O reduces postoperative pharyngolaryngeal complications. However advanced studies are required to research the effect of factors such as appropriate choice of airway device size and experience, on the postoperative pharyngolaryngeal complications in the geriatric age group.
References:
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2. Burgard G,et al.The effect of laryngeal mask cuff pressure on postoperative sore throat incidence.J Clin Anesth 1996;8:198 -01.

12AP7-1

Oxygen delivery for patients undergoing upper gastrointestinal endoscopy; a mannequin study

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Background and Goal of Study: During sedation for upper gastrointestinal endoscopy (UGIE), oxygen delivery with nasal cannula (NC) is frequently necessary to prevent hypoxia. However according to American Thoracic Society (ATS) recommendation, the oxygen flow of NC is limited to 5 L/min. Generally, 5 L/min of oxygen flow can provide no more than 50% of oxygen fraction. Oxygen delivery via pharyngeal cannula (PC) is closer to trachea than NC. The oxygen delivery via PC may be possible to provide higher oxygen fraction. The aim of this simulation study is to investigate the change of inspired oxygen fraction via PC during high or low tidal volume ventilation settings compared with NC using a mannequin simulated a UGIE patient.
Materials and Methods: Six healthy volunteers participated in this study. Each participant breathed 2 pattern of ventilations, high tidal volume; TV = 700-800 mL and f = 12 and low tidal volume; TV = 350-400 mL and f = 24, via a sealed face mask connected to the retrograde intubated tube into the trachea of a mannequin (SimMan®, Laerdal, Norway). The mouth of the mannequin was opened to simulate the situation of UGIE. After NC or 8 Fr of PC attached or inserted to the mannequin, the oxygen flows were adjusted to 2 or 5 L/min. Prior to the start of each measurement, each participant ventilated for a minute to stabilize oxygen fraction. We measured the oxygen fraction of every breath obtained near the sealed face mask for a minute in each setting.
Results and Discussion: In low and high tidal volume ventilation settings, the oxygen fraction of the flow of 5 L/min via PC (63 +/- 5.8% and 64 +/- 6.8%, respectively) was highest and the oxygen fraction of the flow of 2 L/min via NC (32 +/- 2.1% and 32 +/- 2.1%, respectively) was lowest.
Both in high and low tidal volume settings, the flow of 5 L/min via NC (51 +/- 5.7% for low tidal setting and 54 +/- 4.5% for low tidal setting) is significantly higher than the flow of 2 L/min via PC (39 +/- 4.6% for high tidal setting and 38 +/- 4.4% for low tidal setting). In both via NC and PC, the amount of tidal volume showed no significant difference in FIO2 at the same oxygen flow.
Conclusion(s): During UGIE, oxygen supplement with PC may be a potent way for the patients who need higher oxygen fraction.

12AP7-2

Learning curves and visible airway surface of tracheal intubation using the Macintosh laryngoscope in comparison with a new laryngoscope prototype by medical students: a manikin study

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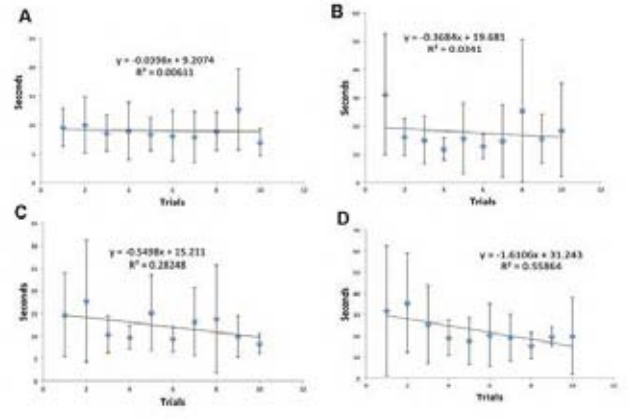
Background and Goal of Study: Regardless of the expertise and the personal skill, intubation can be a really tricky manoeuvre[1]. We designed and 3-D printed a new laryngoscope prototype, focusing in particular on the lighting system and the conformation of the blade. The purpose of this study was to evaluate the clinical performance of our prototype in comparison to the conventional Macintosh laryngoscope in a group of medical students in two simulated scenarios.
Materials and Methods: Twenty medical students from McGill University were recruited. All the participants had previously performed 80 intubations with the Macintosh laryngoscope in manikins. After a standardized training session, students were asked to perform intubations alternately with the Macintosh laryngoscope and with our new prototype for a total of 40 intubations in two simulated scenarios of increasing level of difficulty (easy and difficult setups). Intubation time (sec.) and visual surface area (mm^3) were compared using Wilcoxon 2-sample test. A *P*-value of < 0.05 was considered statistically significant. We also analysed the leaning curves by computing trend line and using analysis of variance. A negative slope denoted a decrease in the time to perform intubation for each consecutive trial.
Results and Discussion: We present preliminary results. Intubation time was significantly lower using the Macintosh laryngoscope in the easy setup (P=0.011). However, the average decrease in time for the sequential trials was greater using our new prototype in both the easy and difficult setups (Fig.1)

and the visible surface area was significantly lower using the Macintosh laryngoscope in the difficult setup (P=0.04). Feedbacks from the students suggested us that our laryngoscope was too heavy; maybe this is due to the particular kind of material chose (polish nickel and steel) for the 3D printing.
Conclusion(s): The results obtained so far encouraging us to continue improving this prototype in order to obtain our final version. We will focus our attention especially on reducing the overall weight.



[Fig.1]

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1. Hung O, Murphy M. *Curr Opin in anaesthesiol* 2004; **17**: 479-81

12AP7-3
A new difficult / obstructed airway portable kit

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Background and Goal of Study: The 4th National Audit Project (NAP 4) looked at airway emergencies outside theatres and the factors contributing to them. In the emergency department the patients are managed by multidisciplinary teams. However, on the wards the response to airway.
emergencies maybe less well coordinated, with a multitude of teams involved, and poorer access to equipment and facilities. This may contribute to morbidity and mortality. A national survey in 2006 made recommendations for an Oxford box with equipment on ENT wards for airway emergencies.[1]
Materials and Methods: We performed a telephone survey in 2013 to assess the availability of emergency airway equipment on wards.127 hospitals had inpatient ENT wards and were included the response was 93% (118). 59% (75) had an airway tray or trolley. The contents of the trolley varied widely and only in 7.8% (10) of the wards the contents complied with the recommendations made for the Oxford box (results presented at DAS 2013 meeting).
Results and Discussion: To address the above, a new, emergency airway equipment box has been designed. This offers immediate access to the necessary, lifesaving equipment in a transparent box hence easily visible and accessible by all. The kit is housed in a well known and tested Wallace Cameron first aid container, adapted for this purpose. The box can be hung on the wall, is lightweight and by pulling off the wall is instantly detachable from the clip-on hinges for immediate use. The content can be adapted and changed, at present it consists of: LMA, Air-traq, gum elastic bougie, ET tube size 6mm, Cook crico-thyrotomy set and a folded self inflating bag (with possibility of O2 enrichment), with compatible connections for immediate ventilation.
Conclusion(s): The wards which may not be adequately equipped to deal with airway emergencies can contribute to increased morbidity and mortality. In the United States 0.5% of emergency intubations required a surgical airway (the National Emergency Airway Registry (NEAR). In a study in Scotland 8.5% of those who had emergency intubations outside theatres had a Cormack and Lehane grade of 3-4. This necessitates regular training of staff and a robust system of clinical governance to ensure provision of equipment on wards for these emergencies.We recommend that this box is available for use outside theatres for emergency airway access. The essential airway equipment in an organised box may save precious time in an airway emergency.

12AP7-4
Submental intubation: an alternative airway approach

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Background: Maxillofacial surgery is particularly challenging not only for the fact of the orotracheal tube being in direct contact with the surgical field but also by the possibility of impairment of the airway. In approaching these patients diferent intubation methods are described. The oral and nasal way are often contraindicated because of nasal or skull base fractures or also by the needed intraoperative dental occlusion. Tracheostomy is an invasive procedure, with several associated complications. The submental intubation is a valid option. Submentonian space approach allows diverting the access to airway from the surgical area and therefore prevent tracheotomy complications [1]. Is here described the case of a patient submitted to submental intubation in order to highlight the importance of this approach.
Case report: 38 years-old patient, ASA I, proposed to open reduction of mandibular fracture, and closed reduction of maxilla fracture. The skull-brain CT SCAN showed evidence of mandibular, jaw and nasal bones fractures, subcutaneous emphysema of the face and neck and pneumomediastium. Upon arrival at the OR, the patient was intubated with a nº 7 wired endotracheal tube (ETT) in mechanical ventilation. After the beginning of the anesthetic maintenance, under ASA standard monitoring and IAP, with propofol, remifentanil and rocuronium, an incision was performed in the submental region and dissection all the way to the oral cavity. Through this incision, ETT was mobilized out of the oral cavity under direct visualization. The surgery proceeded without complications. At the end of the procedure was performed an bronchofibroscopy, to exclude tracheal injury as a cause of pneumomediastium. The patient remained intubated and ventilated.
Discussion: This case shows the relevance of submetonian intubation in situations where orotracheal and nasotracheal intubations are contraindicated. This technique highlights by reconciling the advantages of nasotracheal and orotracheal intubations, and also by having fewer complications and in selected cases may be used instead of more invasive procedures. There are already some cases described in the literature, with this case is intended to increase the evidence degree of this type of intubation effectiveness.
Reference: 1. J Maxillofac Oral Surg 2013;12(3):248-253
Learning Points: Demonstration of submental intubation as an alternative to oral or nasal intubation and tracheostomy in critical cases of maxillofacial trauma.

12AP7-5
Dynamic airway compression, due to severe kyphoscoliosis - cause of prolonged weaning in Noonan's syndrome patient

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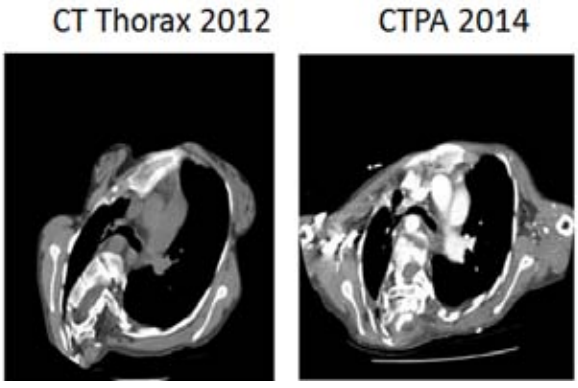
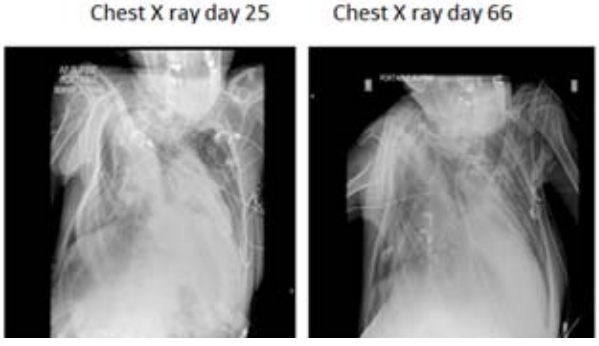
Background: ITU Management of Noonan syndrome patient with pronounced Kyphoscoliosis and dynamic airway compression is quite challenging.
Our patient had severe kyphoscoliosis with abnormally distorted airway anatomy leading to multiple failed extubations and prolonged ventilatory assistance.
Case report: 23yrs Female was admitted with infective exacerbation of Bronchial asthma to ITU.
Patient had Prolonged rehabilitation programme.
Day 1: Invasive ventilation using 6mm ETT(tight fit) and was d ifficult to ventilate and oxygenate due to bronchospasm
Day 19: Pt needed re-intubation due to tube migration needed reintubation and was
Unable to pass 6mm ETT5mm ETT passed eventually
Bronchoscopy showed Right Bronchus 80% collapse and Left 40% collapse
Cardiothoracic team refused for tracheal reconstruction surgery due to severe co-morbidities.
CT Neck and Thorax (see Fig)
• revealed Severe Kyphoscoliosis with compressive effect in the upper mediastinum with mass effect on right main bronchus and Cobb's angle of 116°
ENT Tracheostomy done on day 53 (5.5mm Shiley)
Prolonged weaning due to severe restrictive lung disease and Cor pulmonale
Day 88: Customised cuffed Silicon Tracheostomy tube inserted.
Uncommon ICU Microbiology issues: Aeromonas salmonicida, Enterooccal,

Staph aureus (CNS), Citrobacter, H.influenza ,Human Metapneumovirus
• The distance between Vocal cords and Carina was only 5.5cm.
• 2D Echo:RVSP -60mmHg
End of life care issues delayed due to family disagreement
Patient rested in peace on day 110 due to hypoxic respiratory arrest
Discussion: Noonan syndrome is an autosomal dominant multisystemic disease affecting both sexes equally.
Our Patient had Kyphoscoliosis, Congenital heart diseases (Pulmonary stenosis, ASD) Cardiomyopathy, Bleeding disorders
Patient needed prolonged mechanical ventilation due to airway compression
Pulmonary stenosis was an important prognostic factor and patient had valvuloplasty
Learning points: ETT mal-positioning was attributed to intrathoracic dynamic airway compression.
Rare form of Myelopathy due to Copper deficiency.
Patient developed uncommon Microbiological infections.
Severe restrictive lung disease with Cor pulmonale led to prolonged weaning and ITU morbidities.
Difficult Ethical issues for palliation ,non escalation of treatment
MDT involvement is key for Decision making in critically ill patient.
Reference: Clinical review: The ABC of weaning failure - a structured approach, Leomonks et al., Crit Care. 2010; 14(6): 24



[Noonan syndrome]



[Chest xray]

12AP7-6

A simple and low-cost nasal CPAP mask assembly maintained spontaneous ventilation and oxygenation in a trauma patient with a rigid cervical collar and a limited mouth opening during awake endotracheal intubation

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Background: Patients with a difficult airway often receive O_2 via nasal cannula (NC), fibreoptic bronchoscope (FOB) or endoscopic mask (EM) during awake FOB or video laryngoscopic (VL) endotracheal intubation (ETI). NC or FOB passively delivers O_2 and EM has to be removed during topical preparation or VL. A simple nasal CPAP mask assembly was shown to improve oxygenation in deeply sedated OSA patients.[1-4] We report its use to maintain spontaneous ventilation and oxygenation in a trauma patient during awake ETI.

Case report: A healthy 31 y/o, 5'8", 86 kg, male with multiple injuries sustained from car accident presented for emergency repair of open fracture of right lower extremity. Although CT scan did not reveal cervical fracture, spine injury could not be ruled out by the trauma team owing to the distracting injury. With a rigid cervical collar in place, his mouth opening was ~1 cm. He consented for awake FOB ETI. Topical anaesthetics were applied to the oropharynx (14% benzocaine-2% aminobenzoate-2% tetracaine spray and 5 cc of 4% viscous lidocaine). An infant mask with a fully inflated air cushion was secured over his nose with head straps and connected to an anaesthesia machine via a breathing circuit. APL valve was adjusted to deliver CPAP (4-6 cm H_2O) with 10 L/min O_2. After he was sedated with midazolam (2 mg) and dexmedetomidine (100 mcg over 10 min) IV, we were able to open his mouth to about 1.5 cm to allow the insertion of a small VL blade (#3). VL revealed a class I airway. With VL guidance, ETI and concominant bronchoscopy was easily accomplished with a hand-held FOB. He maintained spontaneous ventilation and 100% O_2 saturation throughout awake ETI. He tolerated the surgical procedure well under general anaesthesia. His trachea was extubated in OR. Postoperative interview revealed no recall of ETI.
Conclusion: This nasal CPAP mask assembly maintained spontaneous ventilation and oxygenation in a trauma patient with a limited mouth opening due to rigid cervical collar during awake FOB/VL ETI. It can be used to prevent severe desaturation proactively by allowing immediate assisted nasal ventilation without interrupting FOB/VL.
References:
1. www.tsemask.com;
2. SASM 3rd AM:P27, 35 & 43, 2013;
3. ASA AM:MC536 & MC1100, 2013;
4. ASA AM:MC39, 2014
Learning Points: It is simple to assemble a nasal CPAP using existing anaesthesia equipment/machine. It maintains spontaneous ventilation and oxygenation in patients with difficult airway during awake FOB/VL ETI.

12AP7-7

An airway lost during total extra peritoneal hernia repair

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Background: Total extraperitoneal (TEP) herniorrhaphy allows a prosthetic mesh to be inserted over an abdominal wall defect without entering the peritoneal cavity. This technique has a number of advantages over the traditional laparoscopic approach, including a reduction in the risk of intra-abdominal complications (infections, adhesions)[1]. Other complications are related to CO2 inflation, namely, surgical emphysema and pneumothorax. These are well documented in the literature as a result of the intra-abdominal approach but less so with regards to TEP procedures.
Case report: A 54 year old male patient attended for a TEP inguinal hernia repair under general anaesthetic. He was fit and well, and was maintained on sevofluorane and O2 via laryngeal mask airway (LMA). Twenty minutes into the procedure he desaturated rapidly to around 50% and was noted to have marked subcutaneous emphysema extending from the incision site to his jaw. The surgeons were asked to pause the operation and stop CO2 inflation. The anaesthetist switched to manual ventilation, improving the saturations and allowing endotracheal intubation. The operation was able to resume without further incident and the patient maintained saturations over 90% throughout. A post-op chest x-ray showed no pneumothorax. His observations remained steady in the post-anaesthetic care unit and he was discharged home that evening.
Discussion: There are multiple possible aetiologies for the desaturation described above - a venous thrombo-embolus or air embolus, a pneumothorax or an obstructed airway. Given his cardiovascular stability we consider the first two to be unlikely, and the rapid reversal of his condition didn't fit with a pneumothorax. The significant subcutaneous emphysema suggests to us this may have been airway obstruction due to compression. This is a documented life-threatening occurrence[2], though to our knowledge, not one that has been previously encountered intra-operatively.
Learning Points: In view of the above, we strongly recommend that a definitive airway be used for all patients undergoing laparoscopic surgery and that O2 saturations and ventilation pressures be closely monitored.
1. Harkin CP et al, An unexpected complication during laparoscopic herniorrhaphy, *Anaesth Analg,* 1999;89:1576-8
2. Williams DJ et al, Upper airway obstruction as a result of massive subcutaneous emphysema following accidental removal of an intercostal drain, *Br J Anaesth* 2005; 94: 390-2

Echo-Guided Locoregional Blocks

15AP1-1

Ultrasound-guided technique of the transperineal pudendal nerve block: feasibility and safety in paediatric surgery

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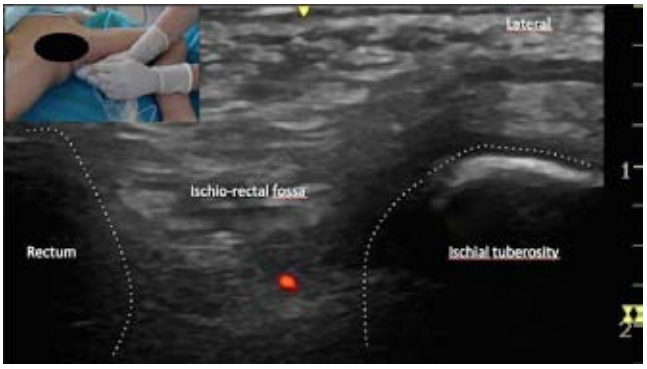
Background: The pudendal nerve block (PNB) has a renewed interest in paediatric surgery, optimizing perioperative pain management.The risk of unwanted rectal or vascular perforation persists under the blind nerve stimulator-guided technique. The ultrasound (US) guidance would increase the safety through the identification of the rectum, ischio-rectal fossa (IRF) and pudendal artery, and direct visualization of the local anaesthetic (LA) spread. This study describes the US-guided technique of transperineal PNB in children.
Methods: After IRB approval and parental consent, all children undergoing general anaesthesia combined to a PNB were included. For block, patients were in supine frog-leg position. The long axis of the US probe was oriented on a line connecting the ischial tuberosity to the anus.



[Ultrasound view of ischio rectal fossa]

After seeks to identify the pudendal artery with colour Doppler, the puncture was performed using an out "of plane" approach. Once the operator considered the tip of the needle in correct position, the neurostimulator was turned on (1 mA) to objectify the presence or not of an appropriate motor response. After negative aspiration test, a mixture of 0.2% ropivacaine and clonidine was injected under real-time US-guidance. The identification of anatomical landmarks, presence of a motor response, visualization of injection and intra-operative opioid requirement were noted.
Results: Over one month, 23 PNB were performed in 17 children (5.6 years [0.8-14], 15kg [7.7-43]). The rectum and the ischial tuberosity were identified in 100% of cases; the pudendal artery in more than 80%. The LA spread was objectified in 90% of blocks. Contraction of the anal sphincter (inferior anal nerve stimulation) was achieved in only four procedures. 95% of blocks have been effective. Only one patient required an additional opioid bolus during surgery.
Conclusion: US-guided PNB appears as an easy and effective technique in children. It avoids multiple and erratic puncture's complications (rectal, vascular or bone). By confirming the correct position of the needle in the IRF, the systematic search for a motor response seems not to be relevant for the effectiveness of the US-guided PNB.

15AP1-2

Estimation of the minimal effective volume of bupivacaine 0.5% for ultrasound guided axillary nerve block

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Background and Goal of Study: Ultrasound guidance for regional anaesthesia techniques is known to allow dose reduction[1] and thus diminish the risk of systemic toxicity as well as the cost of anaesthesia. The minimal effective volume of bupivacaine 0.5% has not been fully characterised for brachial plexus blocks. The aim was to determine the minimal effective volume of bupivacaine 0.5% used for ultrasound guided axillary brachial plexus block (USGABPB).
Materials and Methods: Having obtained ethics approval and written informed consent from each, conscious and cooperative ASA I-III patients aged 18-85 years, scheduled to undergo acute or elective hand, wrist or forearm surgery, were included. USGABPB was performed with 5 ml/ nerve bupivacaine 0.5% in the first recruited patient. Volumes administered to subsequent patients were determined by the non-probability sequential step-up/step-down methodology[2]. The primary end point of the trial was the determination of the minimal effective local anaesthetic volume required for successful USGABPB. Secondary end points were the time required to reach surgical anaesthesia, duration of motor block and duration of adequate postoperative analgesia (VAS ≤4) afforded.
Results and Discussion: We achieved 1 ml/nerve of bupivacaine 0.5% after four consecutive patients, and then repeated USGABPBs with 1 ml/nerve in nine more cases. Lower volumes were deemed clinically impractical, hence the minimal effective volume remained undetermined. All blocks resulted in successful surgical anaesthesia. The median time required for development of motor and sensory block was 10 min (IQR 10-20 min) and 15 min (IQR 10-25 min), respectively. The cessation of motor block took place after 13.84 ±3.96 hours, whereas pain scores (VAS) ≤4 were observed up to 11 hours (IQR 9-13 hours) post-block.
Conclusion(s): The ultrasound guided axillary brachial plexus block with 1 ml/nerve bupivacaine 0.5% results in adequate surgical anaesthesia and post-operative analgesia.
References:
1. O'Donnell BD, Iohom G., An estimation of the minimum effective anaesthetic volume of 2% lidocaine in ultrasound-guided axillary brachial plexus block. Anaesthesiology 2009 Jul; 111(1):25-92.
2. Dixon JW. Staircase bioassay: The up-and-down method. Neurosci Biobehav Rev. 1991; 15:47-50

15AP1-3

The efficacy of ultrasound guided interscalene nerve blocks for analgesia in day case shoulder surgery

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Background and Goal of Study: Shoulder surgery is recognised to cause severe postoperative pain. High analgesic requirements have, in the past, required the routine admission of patients at Croydon University Hospital (CUH). A study at CUH in 2006 (Joshy et al.) demonstrated nerve-stimulator guided interscalene nerve block to be a safe and effective technique in providing post operative analgesia. At this time 83% of patients felt that they could be discharged on the day of surgery.
Currently, over 90% of shoulder surgery at CUH is performed as a day case. Between 2006 and 2013, our technique has evolved from nerve-stimulator guided administration of 40ml 0.25% Bupivacaine, to ultrasound-guided administration of half that volume. This study aims to evaluate the efficacy of this new technique while comparing results with those from the previous study.
Materials and Methods: The first study was performed over a 12 month period yielding 104 patients. This study was performed over 6 months with a total of 93 patients. Both studies were performed prospectively and with the exception of the nerve block, the anaesthetic techniques were comparable.
In both studies, all blocks were performed by a single Anaesthetist experienced in the technique, and all surgery was performed by a single

Orthopaedic surgeon with a special interest in arthroscopic shoulder surgery.
Results and Discussion: In the first study, sensory block persisted for a mean of 20.8 hours. 93% of patients were pain free immediately after surgery, 73% at 6 hours, and 38% at 12 hours.
In this study sensory block lasted a mean of 19.2 hours. 99% were completely free of pain immediately post-operatively, 85% at discharge, and 33% at 24-36 hours.
In 2006, 2 of the 104 cases had severe pain in the immediate post operative period and 6 patients experienced a transient Horner's syndrome. In the current study, one patient required opiates in recovery and one patient had a Horner's syndrome lasting 12 hours.
When surveyed at 24-36 hours after discharge, 100% were happy with their procedure being performed as a day case.
Conclusion(s): These results suggest that the introduction of ultrasound guidance to our interscalene nerve blocks has reduced the required local anaesthetic volume whilst achieving greater efficacy and reducing complication rates.
References: Joshy S, Menon G, Iossifidis A. 2006. Interscalene block in day-case shoulder surgery. Eur J Orthop Surg Traumatol 16: 327-9.

15AP1-4

Ultrasound axillary nerve block in children: the conjoint tendon approch

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Background and Goal of Study: Described as useful block, Ultrasound guided axillary block (UGAB) is widely used in pediatric regional anesthesia. usually blocking a single nerve among radial ,ulnar or median produces sufficient analgesia to perform upper limb surgery for the hand,forearm and elbow .Instead of directing the needle tip nearest to the nerve, we hypothesized that injecting local anesthetic above the conjoint tendon of the latissimus dorsi and teres major (CT) can provide same blockade as the classical approch , avoiding vessels and nerves.
Materials and Methods: Twenty five children scheduled for traumatic upper limb surgery were included in this prospective observational study over a 6 months period (July 2014 to decembre 2014). Blocks were performed under general anesthesia (sevoflurane,propofol) . Linear probe was placed perpendicularly at the axilla , in plane injection of 0,3ml/kg of bupivacaine 0,25% above the plane of the CT.Pain was evaluated using the PRST scale in intra operative & FLACC in post operative at 4h,8h,12h .We reported intra & post operative pain scores, incidents and complications All patients received paracetamol (15mg/kg/6h) intra venous dexamethasone (200μ/kg) and intra rectal diclofenac (2mg/kg).
Results and Discussion: Mean age was 6 years and average weight was 21kg.Four patients (16%) required opioids in intraoperative but no one required additional analgesia in post operative .No hematoma or vascular puncture were noted.
Conclusion(s): The conjoint tendon approach seems to be a safe way to perform UGAB in children .It provides good intra & post operative analgesia and minimize the risk of intra vascular injection and nerve damage, but more studies are necessary to substantiate our conclusion.

15AP1-5

The effect of ultrasound-guided transversus abdominis plane block on postoperative analgesia in patients undergoing open primary inguinal hernioplasty under unilateral spinal anaesthesia

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Background and Goal of Study: Transversus abdomins plane (TAP) block has an increasing role in analgesia after lower abdominal surgery. In this study we evaluated postoperative analgesic efficacy of ultrasound-guided TAP block in patients undergoing open primary inguinal hernioplasty under unilateral spinal anaesthesia.
Materials and Methods: After obtaining hospital ethical committee approval and informed patient consent, 40 ASA I-III patients aged 26-83 scheduled for open inguinal hernioplasty were randomly allocated to 2 groups, no-TAP (n=20) and TAP (n=20) group. After premedication (midazolam, 7.5 mg p.o.) all patients intrathecally received sufentanil 2.5 μg and 0.5% hyperbaric bupivacaine 7.5 mg at L3-L4 intervertebral space over 60 s, in lateral decubitus position with operative side down maintained for 10 min before returning to supine position. After surgery, patients in TAP group received ultrasound-guided TAP block with 30 ml of 0.375% bupivacaine. Diclofenac 75 mg iv was initiated on patient's request and was administered at 12-hour interval. In case of inadequate analgesia (VAS > 3), paracetamol 1 g iv at 6-hour interval was given. At any time, if pain relief was still inadequate, tramadol 100 mg iv was administered. Visual analogue pain scores (VAS 0-10 scale) at 4, 8, 12 and 24 h postoperatively, time to first analgesic, maximum VAS score, tramadol administration during 24-hour period and side effects were analized.
Results and Discussion: Demographic data and hernioplasty duration did not differ between the groups. Median (25^{th} and 75^{th} interquartile range) VAS scores (no-TAP vs TAP) were different at all time points, VAS 4 h: 5 (3, 5) vs 2 (1, 4), $P< 0.001$; VAS 8 h: 4 (3, 5) vs 3 (2, 4), $P= 0.002$, VAS 12 h: 4 (3, 4) vs 2 (2, 3), $P< 0.001$; VAS 24 h: 3 (2, 4) vs 2 (1, 2), $P< 0.001$. Maximum VAS score during the 24-hour period was 5 (5, 6) in no-TAP and 4 (3, 4) in TAP group, $P<0.001$. Two (10%) patients in TAP group required no analgesic within 24 h. Time to first analgesic (mean ± SD) was 302 ± 83 min in no-TAP and 399 ± 122 min in TAP group, $P = 0.006$. Tramadol 100 mg iv received 6 (30%) no-TAP and 4 (20%) TAP group patients, $P = 0.720$. No side effects in both groups were recorded.
Conclusion(s): Ultrasound-guided TAP block significantly reduced postoperative pain during the first 24 h after surgery in patients undergoing open primary inguinal hernioplasty under unilateral spinal anaesthesia.

15AP1-6

Ultrasound guided vs. neurostimulation axillary block for upper limb surgery: a randomized clinical study

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Background and Goal of Study: Brachial plexus blockade is a good option for anaesthesia of the upper limb, the axillary approach being suitable for surgery of the elbow, forearm and hand. The methods for nerve localization are by electrical nerve stimulation or by ultrasound guidance.
The aim of this study was to analyze the impact of new introduced in our clinic ultrasound (US) technique of axillary block on the sensory and motor onset time, dosage of local anesthetic and the incidence of adverse outcomes compared with the standard neurostimulation (NS) technique.
Materials and Methods: During one year period we enrolled patients who required orthopedic surgery distal of elbow, ASA I-III over 18 years. After monitoring and sedation, the patients randomly received ultrasound-guided (35 pts.) or neurostimulation (35 pts.) axillary block with ropivacaine 0.5%. We recorded onset time of sensory (cold sensation) and motor block (Bromage scale), time to surgical incision (pin prick test), pain and analgesic consumption, incidence of adverse effects. The results were statistically analyzed, with significance assumed at $p<0.05$.
Results and Discussion: The patients of US group received less volume of local anesthetic (23.8 ml ±3 vs. 33.1 ml ±4, $p<0.05$). The surgical onset time was 21 min ± 4.5 in US group vs. 28 min ±2.5 in NS group ($p<0.05$). The duration of block was 14 h ±3 (US group) and 16 h ±2.6. In the NS group we recorded 3 local anaesthetic systemic toxicity (minor-moderate neurologic symptoms) with complete recovery and none in US group ($p<0.05$).
Conclusion(s): Both techniques of execution of axillary brachial plexus block are adequate for upper limb surgery. The ultrasound-guided technique, thanks to direct visualization of the anatomic details, results to be more advantageous regarding the reduction of the local anesthetic dose (minimizing the risk of local anaesthetic toxicity), of time to readiness of surgery and of the serious complications.
References:
1. Halaszynski TM Ultrasound brachial plexus anesthesia and analgesia for upper extremity surgery: essentials of our current understanding, 2011 Current Opinion in Anesthesiology 2011, 24:581-591
2. Klaastad O, Sauter AR, Dodgson MS Brachial plexus block with or without ultrasound guidance, Current Opinion in Anaesthesiology 2009,22:655-660

15AP1-9

Analysis of an original articulated arm needle guide as a teaching aid in ultrasound guided regional anaesthesia

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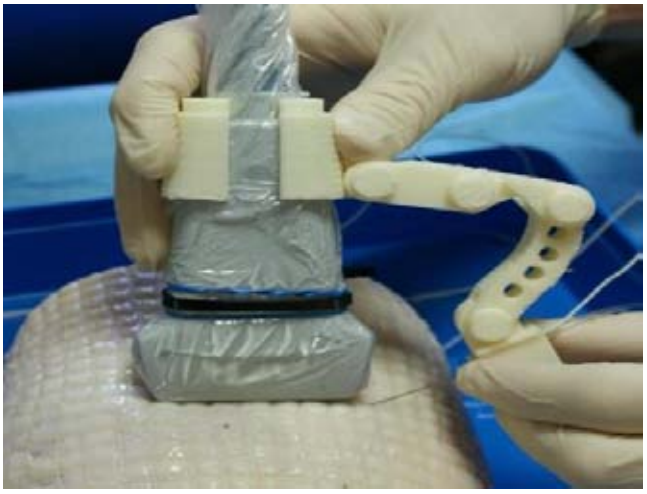
Background and Goal of Study: Safe performance of ultrasound guided regional anaesthesia (USGRA) needs continual needle tip visualisation[1]. Physical guidance devices improve visualisation but restrict perpendicular needle movement [1]. Our device uses an articulated chain to increase operator's vertical degrees of freedom. This study assessed it's value as a teaching aid for learning in-plane needle USGRA in novices and trainee practitioners.



[Articulated Arm Guide and Porcine Phantom]

Materials and Methods: The local research ethics committee provided an exemption. 10 USGRA novices (<2 blocks) and 10 USGRA trainees (>5 blocks) had didactic teaching and a practical session on USGRA and device use. Using an SNerve (Sonosite,Bothell,WA) and 5cm stimuplex needle (BBraun,Melsungen) participants directed the needle to contact a target in a porcine phantom.
The task was done freehand and arm guided, at 90°and 60° scanning planes. US images were assessed for percentage time of full needle visibility, initial visualisation time and analysed with paired t test. A usability questionnaire was analysed with paired Wilcoxon's test.
Results and Discussion: The arm guide significantly improved percentage visualisation times ($p < 0.05$) at 60^0 in the trainees and at 90^0 in novices. A decrease ($p < 0.05$) occurred in percentage visualisation time for trainees using the arm guide at 60^0. Attempts by trainees to make corrective movements may have resulted in needle "bend" and confusion between the needle shaft and tip, leading to poorer visualisation times.

Transducer Angle	*Percentage needle visualization (Mean(SD))*				*Time to initial needle visualisation (Mean(SD))*			
	Arm Novice	**Arm Trainee**	**Free-hand Novice**	**Free-hand Trainee**	**Arm Novice**	**Arm Trainee**	**Free-hand Novice**	**Free-hand Trainee**
90 Degrees	54 (45)	81 (25)	43 (44)	54 (31)	2 (3)	5 (4)	9 (11)	12 (17)
60 Degrees	43 (34)	41 (31)	16 (27)	67 (34)	22 (31)	24 (41	31 (33)	19 (18)

[Needle Visualisation Results]

Differences in median usability scores indicated subjectively, novices found the guide helpful, whilst trainees felt it a hindrance.
Conclusions: The articulated arm guide has value as a teaching aid for USGRA novices. More experienced operators may require less restrictive training aids which also represent a higher fidelity learning experience.
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Patient Safety

16AP1-1

Can modern daily devices improve patient safety? - Accuracy of a smartphone and a tablet for evaluation of laryngoscopes' illuminance

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Background and Goal of Study: This study compares the accuracy of a smartphone and a tablet measuring the illuminance of laryngoscopes against a certified lux meter.
Materials and Methods: While auditing 33 laryngoscopes, we tested each one for illuminance using a certified lux meter, a smartphone and a tablet with a lux meter application. The illuminance was measured using a standard protocol where the laryngoscope was placed on a specific built device to hold the laryngoscope with the tip of the light 20 mm away from the lux meter device, isolating it from any exterior light. For each laryngoscope, illuminace was measured with using the three devices as lux meters, all in a dark room. The results were analysed using paired sample t-test, with a p-value of 0.05. The null hypothesis was that no statistically significant difference exists between measurements from the calibrated lux meter compared to either the smartphone or the tablet.
Results and Discussion: There was no significant difference in the scores for the calibrated lux meter against the smartphone and the tablet; $t(32) = 1.359$ and 1.234 respectively, $p > 0.05$.
From the author's experience, in many hospitals worldwide, light from laryngoscopes is assessed in a very subjective manner, leading to problems in laryngoscopies that could be prevented if a more accurate method was used. This study was aimed at providing a more practical yet still reliable way to determine illuminance levels in laryngoscopes, using readily available devices from our daily life.
These results suggest that either a smartphone or a tablet can be reliably used to test laryngoscopes' illuminance levels.
However, there are some drawbacks in this study. Smartphone and tablet light sensors vary arbitrarily between devices, so this conclusion cannot be generalised without further studies.
Conclusions: We believe that all laryngoscopes should be audited regularly using a highly accurate method like a certified lux meter. However, these audits could be interspersed with more frequent audits using any of the two methods proposed, as these provide a satisfactory level of accuracy.
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16AP1-2

Capnography monitoring in recovery areas: a quality improvement project

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Background: Nearly one third of airway complications occur during emergence from anaesthesia[1].
The AAGBI[1] and NAP4[2] recommend monitoring with continuous capnography in recovery areas for patients with supra-glottic airway devices (SADs) in situ. We undertook a quality improvement project over 3 months to evaluate and improve the standards of capnography monitoring in recovery areas at our tertiary referral hospital.
Materials and Methods: We prospectively audited use of capnography in all patients with SADs in recovery areas over 1 week period. Recovery staff training and confidence in capnography monitoring was evaluated with the help of a questionnaire. This was followed by a structured teaching program emphasizing its importance, use and interpretation. The practice was re-audited after 4 weeks.
Results and Discussion: Pre-training 18 out of 30 staff (60%) responded to the questionnaire.17 out of 18 (94.4%) replied having no formal training in capnography. Only 4 out of 18 (22.2%) were confident in interpreting capnography.
Structured training in capnography monitoring was subsequently delivered over a period of 2 months.29 out of 30 (96.6%) recovery staff participated in the program.
Post-training, 100% of the recovery staff who responded to the questionnaire (22 out of 30) were confident in using capnography. All of them correctly identified abnormal capnography traces as well.
In the initial audit, 52 out of 80 patients (65%) with SADs were monitored with capnography in recovery. Following the intervention, practice improved to 88 out of 95 patients (92.6%).
Conclusion: Pre-training, practice of capnography monitoring in recovery areas in our hospital was sub-optimal. Recovery staff lacked the requisite training with low confidence in its use. Following the quality improvement project, capnography monitoring in recovery areas has successfully improved with recovery staff now confident in its use. This is a positive step forward for achieving the recommended standards of post-operative recovery area care for patient safety[1,2].
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2. Association of Anaesthetists of Great Britain and Ireland.Immediate Post-anaesthesia Recovery 2013. Anaesthesia 2013; 68: pages 288-97.

16AP1-3

"Two many cooks" Potential errors as a result of two anaesthetists working together

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Background and Goal of Study: Anaesthetic errors have been well documented in literature but focuses on anaesthetists working alone or within the surgical team. There is little literature looking directly at errors that occur as a direct consequence when two anaesthetists are working together.
This study looked at opinion of anaesthetists working in a UK hospital on the potential errors that can occur in the above situation.
Materials and Methods: A brain-storming exercise was conducted by trainee and consultant anaesthetists at Peterborough City Hospital. A list of potential errors that could occur was then collated and described as clinical vignettes. At a departmental meeting, these vignettes were ranked by the participants in terms of their likelihood of occurring and degree of harm they may cause.
Results and Discussion: Ten potential errors were identified and ranked. These errors were divided into sub-categories of: Information-sharing, Task-allocation and Maintaining situation awareness. In general, vignettes ranked with a high likelihood of occurrence were also been rated as causing a lower degree of harm.
One clinical vignette however, where both anaesthetists are distracted and do not notice a significant change in the patient's condition during an operation, ranked highly in both the likelihood and degree of harm scale.
There are often situations where two anaesthetists may be working on the same case (for example, a trainee and a trainer or in major trauma) or have different working and cultural backgrounds (for example, working in a different institution or country). Further study should look into behaviours and procedures that will help minimise these errors occurring.
Conclusions: This study has highlighted potential errors that could occur as a result of two anaesthetists working together. The most significant potential error identified in our institution was one that arose as a result of both anaesthetists becoming distracted whilst managing the same case.

16AP1-5

A sequence of iatrogenic complications in a girl anaesthetised for retroperitoneal tumor biopsy an example of swiss cheese model. Could have this vicious circle been prevented?

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Background: Iatrogenic complications compromising patients' safety occur as a result of human errors. High workload, lack of situation awareness, suboptimal leadership, teamwork and decision making processes toped up with stress, fatigue during night shifts are contributing factors (1). Children may be more vulnerable to medical harm. This case shows how one error led to many adverse events (AE).
Case report: A 9 year old girl with retroperitoneal tumor infiltrating vessels (schwannoma) was to have an open biopsy as decided by her oncologist. Intraoperatively the surgeon decided to reduce the tumor volume instead (lack of cooperation oncologist-surgeon, lack of leadership, wrong decision). It prolonged surgery and made the need for keeping the iliac artery out of surgical site. The anaesthetist in charge, also on duty for 17 hours after, was not informed, nor asked to monitor the legs' perfusion (lack of communication surgeon-anesthetist, lack of situation awareness). At 3 am, she was in pain, her left leg cold with absent pulses. After Doppler exam showing thrombus in the iliac artery she was taken back to the OR for embolectomy. The blood flow returned, but during the procedure 75000 IU of was used to flash the vessel (lack of situation awareness, wrong dosing due to stress and fatigue?). It caused a hemorrhage requiring massive blood transfusions. She developed TRALI and was admitted to PICU. On day 2 she had rebleeding and the third surgery. She was weaned from a respirator after 3 days and discharged showing residual neurological dysfunction: motor, sensory and autonomic.
Discussion: It is important to analyse medical harm in order to prevent it in the future. There is no data on the frequency of perioperative AE in children. It can be assumed the majority of them are neither revealed nor published. Our case shows how one wrong decision to change the extent of surgery resulting from lack of interdisciplinary approach led to life-threatening sequelae and morbidity.
Learning points:
1. Medical harm is fact.
2. Errors may result in more errors.
3. Producing safety culture, good interdisciplinary cooperation with one leader responsible for treatment as well as working on improvement of the decision making, situation awareness and teamwork in the OR are the important ways to prevent it.
4. Prospective trials looking for perioperative AE are needed
References:
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16AP1-6

Anaesthetic factors associated with cardiac arrest and severe brain damage. A retrospective analysis of 169,500 anaesthetic procedures

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Background and Goal of Study: To identify risk factors associated with anaesthesia-related cardiac arrest and severe brain damage.
Materials and Methods: Retrospective analysis using univariate and multivariate regression models. Critical incidents from 169,500 anaesthetic proce-

dures were analysed at a tertiary referral academic medical centre.
Main outcome measures: Incidence of critical incidents in anaesthesia was measured. Furthermore the rate of anaesthesia-related severe brain damage and anaesthesia-related cardiac arrest was identified. Logistic regression was applied to generate independent predictors of death and severe brain damage and to develop a risk model.
Results and Discussion: This retrospective single centre study from Germany is focusses on complications in anaesthesia and identifies risk factors for anaesthesia-related cardiac arrest and severe brain damage. From January 2007 until December 2012, a total number of 169,500 anaesthetic procedures were performed. Overall, 318 critical anaesthesia incidents were reported. We observed a rate of anaesthesia-related severe brain damage of 0.23/10,000 anaesthetic procedures. The rate of anaesthesia-related cardiac arrest was 0.71/10,000. Multivariate analysis revealed that a "cannot ventilate, cannot intubate"-situation was independently associated with severe brain damage ($p<0.001$, OR 11.52, [3.078-43.118]). As an independent predictor for cardiac arrest the following variables were identified: myocardial infarction ($p<0.001$, OR 8.441 [3.096-23.016]), hypoxia ($p<0.001$ OR 6.308 [3.368-11.814]) and ASA ≥III ($p=0.001$, OR 3.143 [1.598-6.180]). Taken together, the rate of anaesthesia-related rate of cardiac arrest and severe brain damage in a tertiary referral academic medical centre is comparable with data from other studies from Europe and USA.
Conclusion: Current German one-on-one anaesthesia practice may contribute to a low incidence of damage to patients caused by anaesthesia. Collecting data from critical incident reports facilitates description and identification of risk factors.

16AP1-7

Responsibility due to medication errors in France: a study basedon SHAM insurance data

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Background and Goal of Study: The safe medication practices at the hospital constitute a major public health problem. Drug supply chain is a complex process, potentially source of errors and damages for the patient. SHAM insurances are the biggest French provider of medical liability insurances and a relevant source of data on the health care complications.
Materials and Methods: The main objective of the study was to analyze the type and cause of medication errors declared to SHAM and having led to a conviction by a court. We did a retrospective study on insurance claims provided by SHAM insurances with a medication error and leading to a condemnation over a 6-year period (between 2005 and 2010).
Results and Discussion: Thirty-one cases were analysed, 21 for scheduled activity and 10 for emergency activity. Consequences of claims were mostly serious (12 deaths, 14 serious complications, 5 simple complications).
The distribution of claims by specialty is : surgery (7), radiology (6), pediatrics (5), medicine department (5), oncology (4), psychiatry (2), emergency room (1) and intensive care unit (1).
The types of medication errors were a drug monitoring error (11 cases), an administration error (5 cases), an overdose (6 cases), an allergy (4 cases), a contraindication (3 cases) and an omission (2 cases). Intravenous route of administration was involved in 19 of 31 cases (61%). The causes identified by the court expert were an error related to service organization (11), an error related to medical practice (11) or nursing practice (13). Only one claim was due to the hospital pharmacy.
Conclusion(s): The claim related to drug supply chain is infrequent but potentially serious. These data should help strengthen quality approach in risk management.

16AP1-8

Safety in anaesthesia working group in a tertiary hospital in Madrid: changing safety culture since 2006

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Background and Goal of Study: The Safety In Anaesthesia Working Group (GTSA) is an expert comittee of Hospital Universitario Gregorio Marañón (HGUGM) in Madrid established to improve security in daily surgery practice and achieve a culture of safety. The group activity is based on the Anaesthesia and Reanimation National Incident Reporting System (SENSAR-ANESTIC), where all *reported unintendent situations which could have, or did, lead to an unnecesary harm to a person* are analyzed and corrective measures proposed. We would like to:
- Present GTSA activity since 2006.
- Propose video-simulation as a useful feedback tool for health care professionals
Materials and Methods: We present a descriptive and retrospective analysis of GTSA activity. Data is collected from:
- Local survey (2006): Transversal, descriptive study based on surveys given to 101 HGUM anaesthetists to determine their level of attachment to the Spanish Society of Anaesthesiology, Reanimation and Pain Therapeutics's Safety Standars and their point of view on Incident Reporting System (IRS)'s utility.
- SENSAR-ANESTIC national database (since 2009).
- Audio visual materials developed to train potential analyst and to give feedback to reporters.
Results and Discussion: Among **local survey** respondents, 60% knew the definition of CI, 49% were aware of the existence of IRS**,** 92% of them considered that establishing an IRS in our hospital would be useful and 81% considered that the establishment would be feasible. The GTSA was born as a result of these data, and it founded, in 2009, the national group ANESTIC-SENSAR.Since then, 82 hospitals and 360 analysts have analyzed 4.710 IC. 492 of them have been analyzed in HUGM and several corrective measures have been proposed, such as email alerts, newsletters, bibliographic reviews, anual courses and video-simulation training. Acording to the published data, low reporting rates are one of the main feebleness of the system and are caused by a lack of feedback to the reporters. GTSA has opted for video-simulation of real CI as a way of applying the principles of *andragogy* (latest trends in teaching strategy), by bringing the clinical case scenario as close to reality as possible.
Conclusion: Since 2006, GTSA works to improve safety culture in the hospital environment, which have the greatest impact on accident reduction of any process. Further and more powerful studies are needed to determine the effectiveness of the developed security measures.

16AP1-9

Surgical safety checklist: impact of the anesthesiologist's commitment to reduce surgical infection

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Background and Goal of Study: In developed countries, an incidence of 3 -16% of surgical related complications and a 0.4 - 0.8%[1] mortality rates are estimated. The application of the Surgical Safety Checklist (SSC) reduces surgical and anesthesiology complications [2]. The objetive of this study was to determine if the anesthesist's commitment has an impact on the infection rates of the surgical site (SSI) after having implanted the SSC.
Materials and Methods: A retrospective, quasi-experiment, of before and after SSC implantation in a geral hospital that performs 15.200 surgeries per year. The pre period was from 2006 to 2009 and the post period was from 2011 to 2013. Only clean procedures were considered. In the implantation of the SSC, the anesthesist was defined as the person responsible for the administration of the surgical antibiotic profilaxis 30 minutes before the skin incision. The statistical analysis were performed using the Pearson X^2 or the

Fisher exact test, considering statistical significant values when p<0,05. The study was approved by the Research Ethics Committee of the institution.
Results and Discussion: 5.481 pre-intervention and 9.838 post-intervention surgeries were analyzed. The general rates of the ISC were 4.2% x 1.1% and the timing adequation to antibiotic profilaxis were 20% x 92% respectively. A significant reduction in the general rate and in the spine, aneurism and vascular *by-pass* procedures, hernia repair, prostatectomy and plastic procedures (Table 1).

Procedures	Before SSCL (2006-2009) - surgeries -	Before SSCL (2006-2009)	After SSCL (2011-2013) - surgeries -	After SSCL (2011-2013)	p	RR (IC 95%)
Spine	947	56 (5.9)	1.317	32 (2.4)	<0.001	0.41(0.27-0.62)
Hip prosthesis	473	15 (3.2)	592	9 (1.5)	0.07	0.48(0.21-1.08)
Knee Prosthesis	43	0 (0.0)	444	16 (3.6)	0.38	
Cardiac	295	18 (6.1)	220	16 (7.3)	0.57	0.77(0.34-1.74)
Aneurism & By-pass	233	19 (8.1)	446	6 (1.3)	<0.001	0.16(0.06-0.39)
Plastic	1.759	18 (1.0)	4.731	3 (0.1)	<0.001 /	0.06(0.01-0.22)
Hernia repair	1.202	61 (5.1)	1.789	21 (1.2)	<0.001	0.23(0.14-0.38)
Prostatectomy	529	42 (7.9)	299	6 (2.0)	<0.001	0.25(0.10-0.58)
Total	5.481	229 (4.2)	9.838	109 (1.1)	<0.001	0.25(0.20-0.32)

[Surgical Site Infection rate stratified by surgery]

Conclusion(s): The anesthesist's commitment to the timing adequation of the antibiotic profilaxis of the SSC implantation was decisive for the reduction of SSI.
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16AP1-10

The safe surgery checklist: are the results generalizable? A meta-analysis of comparative studies

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Rationale: There remains some scepticism regarding the effectiveness of the safe surgery checklist (SSCL) to tangibly improve patient safety in the real world setting, especially with respect to relative benefits in high-income versus lower-income settings.
Objective: To determine, through meta-analysis, whether clinically-relevant outcomes after implementation of the WHO Safe Surgery Checklist (SSCL) in the real world setting are improved, and whether greater benefit is found in low-middle income countries (LMICs) than in high income countries (HICs).
Methods: A comprehensive search of Medline, Cochrane Library, and scientific abstracts was undertaken to identify all studies that measured the clinical impact of the SSCL, or a modification of the WHO SSCL, up to October 1, 2014. Odds ratios and 95% confidence intervals (OR, 95%CI) were calculated using the random effects model, and heterogeneity across studies was measured using the I^2 statistic. Subgroup analysis (for LMIC versus HICs; and for randomized versus cohort study design) were planned using the p-value test for interaction.
Results: A total of 13 studies (262,970 patients) met the inclusion criteria, including 12 cohort studies and 1 randomized trial. For SSCL versus control, the risk of death was significantly reduced by 21% (OR 0.79, 95%CI 0.67-0.93; I^2=41%; p=0.003), and the magnitude of reduction in death was similar between LMIC and HIC (p-value for interaction = 0.47). The risk of surgical site infection was reduced by 28% (OR 0.72, 95%CI 0.62-0.84; I^2=85%; p=0.001), and while HIC and LMICs both experienced reductions, the magnitude of reduction was greater for LMIC (p-value for interaction = 0.004). Postoperative complications were significantly reduced by 30% (OR 0.70, 95%CI 0.59-0.82; I^2=92%; p=0.009), and while HIC and LMICs both experienced reductions, the reduction was greatest in LMICs (p-value for interaction = 0.03). Subanalysis by study design for clinical trials settings versus real world settings showed the results were of similar magnitude, suggesting generalizability to the real-world setting.
Conclusions: Current evidence suggests that SSCL reduces mortality, surgical site infections, and overall complications. The reduction in adverse clinical outcomes across a variety settings highlights the tangible clinical benefits from SSCL, whether low- or high-income setting, and whether in the clinical trial setting or real-world setting.

16AP1-11

Usability of a lightweight wireless optical head mounted display (OHMD) for anaesthesia monitoring

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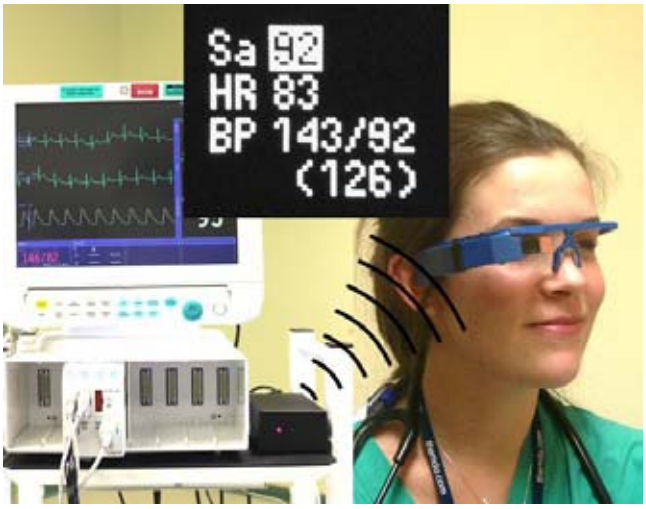
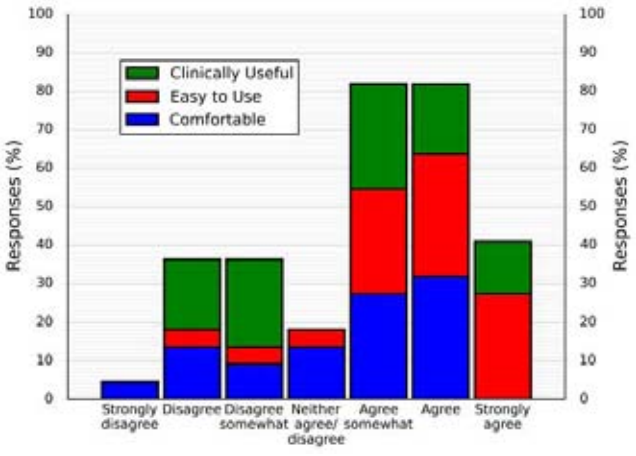
Background and Goal of Study: OHMDs were pioneered for military use in the 1960s [1] and offer an ergonomic means of continuous monitoring of vital signs during anaesthesia. Previous OHMDs required a bulky ancillary body-mounted units containing wireless communications system, computer, and power supply; however a lightweight OHMD has been recently launched as a consumer product (`Google Glasses').
We have developed a dedicated low cost (<$200) proof of concept system from readily available electronic components which transmits vital signs data from an anaesthesia monitor via a wireless link to a lightweight monochrome OHMD. (Figure 1)



[Figure 1]

Materials and Methods: 22 anaesthetists wore the OHMD and completed an 11 item questionnaire which collected demographic data; Likert scale ratings for comfort, ease of use, clinical utility; and free text entry.
Results and Discussion: Descriptive statistics were used: Histograms for Likert scales (Figure 2),



[Figure 2]

and qualitative analysis with emerging themes for free text data.
Participants demographics were: Male 64%: Female 36%; with level of experience ranging from: consultant (27%), senior trainee (27%), intermediate trainee (9%), junior trainee (36%). Positive comments included: continuous visibility of vital signs (9%); allowing wearers to focus on complex procedures - e.g. intubation, line insertion (4.5%); or work away from standard monitors without missing abnormal values(9%).
Suggested improvements included: colour display (68%), adjustable head attachment (18%), smart phone connectivity/ configurability (59%), and reduced weight (32%) and size (27%).
Conclusion: Further development is necessary but there is demand and utility for a device of this type.
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16AP2-1

Prewarming - a good way to get perioperative normothermia

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Background and Goal of Study: Inadvertent perioperative hypothermia (IPH), is a common but preventable complication of perioperative procedures, which is associated with poor outcomes for patients[1].Even with evidence to support the need for prevention of IPH its prevalence ranges from 50% to 90%[2] and its incidence is up to 70%[3].Prewarming patients before anesthesia induction has been used as a preventive measure and some guidelines recommend it[1].The aim of this study is to determine the effectiveness of a defined protocol which included, among other measures, forced-air warming blanket starting before anesthesia induction, in minimizing perioperative hypothermia.
Materials and Methods: Prospective, longitudinal, analytical, non-controlled study. Patients undergoing abdominal surgery of expected duration between 45-240 minutes with general anesthesia were included.A perioperative warming protocol was applied to all patients.Protocol included: forced-air warming blanket with temperature above 36ºC starting 10 minutes before anesthesia induction and during all the procedure, warmed intravenous fluids and half-closed system.Core temperature with an esophageal probe was recorded just before the end of anesthesia - final core temperature (FCT).Hypothermia was defined as a core temperature less than 36.0ºC.Severity of hypothermia was defined as follows:mild hypothermia:core temperature 35.0ºC to 35.9ºC;moderate:34.0ºC to 34.9ºC;severe:≤33.9ºC.Statistical analysis with SPSS Statistics (v.21, IBM SPSS, Chicago, IL).
Results and Discussion: 33 patients were included.Mean temperature was 36.3±0.1ºC (mean ± standard deviation).28 (84,9%) of all patients had normothermia, 4 (12,1%) had mild hypothermia and 1 (3%) had moderate hypothermia.None of the patients had severe hypothermia.There was no statistically significant difference in FCT in laparoscopic procedures (p=0,378).There was no correlation between the procedure's duration and FCT (r=-0,251 ; n=33 ; p=0,159).
Conclusion(s): In this study, a perioperative warming defined protocol which included active prewarming with a forced-air warmer achieves a very low incidence of hypothermia at the end of surgery.
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16AP2-2

Malignant hyperthermia - beyond the acute crisis: how our institute managed its first mh patient, and the problems faced

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Background: We report the issues faced by our institute in the post-crisis management of its first malignant hyperthermia (MH) patient and how we circumvented them, as well as the issues facing our country in managing our handful of cases.
Case report: A well 15 year-old girl developed classical symptoms of MH during an emergency appendicectomy, with a score of 70 on the Larach clinical grading scale; and responded rapidly to Dantrolene with good outcome. However, the 3-day course of peripherally administered intravenous (IV) Dantrolene resulted in severe bilateral upper limb thrombophlebitis. She only required antibiotics and not anticoagulation. Due to the paucity of testing centres in the Southeast Asian region, we were unable to obtain definitive diagnosis for her. In addition, there is no national MH registry and we had to provide a substitutive labelling of "allergy" to the triggering drugs in the national drug allergy registry.
Discussion: Thrombophlebitis is the second most common complication of IV Dantrolene therapy due to its highly alkaline nature and the presence of mannitol, a known independent risk factor for thrombosis. In the acute phase, Dantrolene administration precedes the need for a central venous line (CVL) insertion, but on retrospect, it may have been prudent to insert the CVL in the post-crisis period. An alternative could be via the oral route as suggested by the manufacturers but there is a scarcity of reports on the use and bioavailabilty of oral dantrolene.
Our country and the region have a paucity of MH testing centres and national registries due to the low incidence of MH. Referring our patient and her family to the nearest centre, which is in Australia, for in-vivo contracture testing was financially unfeasible. Hence, her diagnosis was a departmental consensus based on her clinical scoring and rapid favourable response to Dantrolene.
References: B.W. Brandom. Complications Associated with the Administration of Dantrolene 1987 to 2006: A Report from the North American Malignant Hyperthermia Registry of the Malignant Hyperthermia Association of the United States. *Anesth Analg* 2011
Learning points: This case highlights the potential side effects of intravenous dantrolene and its continuation in the post-acute phase, an often overlooked issue. However, due to the paucity of such cases occurring, there is no local protocol for notification, further diagnostic workup and management of MH, which is something to look into.

16AP2-3

Anaesthetic management of a 9 month old boy with a posible episode of malignant hyperthermia: a case report

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Background: Malignant hyperthermia (MH) is a rare but potentially fatal genetic disorder of skeletal muscle with an incidence of 1:100.000 administered anaesthetics. We present a case of a 9 months old boy that developed signs and symptoms of MH during anaesthetic induction.
Case report: The patient with history of extrahepatic biliary atresia diagnosed at age of 2m, treated with portoenterostomy at 3m, and with several other procedures under general anaesthesia (GA). The GA is induced for hepatic transplant with fentanyl, sevoflurane and rocuronium. Immediately after he presents rising etCO2 up to 80mmHg resistant to increasing minute ventilation, mixed acidosis (pH 6.91, PaCO2>115mmHg, HCO3 15mmol/l) and hyperthermia up to 38.8ºC. Sevoflurane is suspended, FiO2 set to 100% and minute ventilation increased. Blood analysis detects raising CK values. The patient remains haemodynamically stable during the episode and etCO2 and temperature slowly fall back to normal in one hour and CK lowers. Therapy with Dantrolene is not initiated. Given the emergency, the surgical team decides to continue with the procedure. No additional complications occur. In the immediate postoperative period the patient presents elevated CK but no hyperkalaemia. The genetic study for MH is realised and still pending at the moment.

	Before the induction	Immediately after induction	1h after induction	12h after induction	36h after induction	21d after surgery
CK (U/L)	/	321	210	796	855	15
K (mEq/L)	4.12	4.12	4.72	4.95	4.13	5.26
pH	7.29	6.91	7.26	7.39	/	/
pCO2 (mmHg)	31	>115	36	32	/	/
HCO3 (mmol/L)	14.9	15	16.2	19.4	/	/

[Laboratory analysis]

Discussion: MH is potentially fatal complication of general anaesthesia in susceptible individuals. We have to suspect it when clinical manifestations like hypercarbia, sinus tachycardia, masseter or generalized muscle rigidity are present. In paediatric population it is less likely to find muscle rigidity and they present lower peak CK levels. Prompt treatment is essential. Oxygenation and ventilation have to be optimized, triggering agents discontinued, dantrolene ready to be administered and acidosis and hyperkalaemia corrected.
References: Nelson P et al. *Malignant hyperthermia in children: an analysis of the North American malignant hyperthermia registry.*Anesth Analg.2014 Feb;118(2):369-74.
Learning points:
1. MH can develop after uneventful exposure to triggering agents.
2. Every hospital should have a MH protocol and an adequate stock of dantrolene on site.

16AP2-4
Guidewire retention - not a problem?

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Background: Central venous cannulas (CVCs) are routinely used in the care of critically ill patients and those requiring long-term venous access. Guidewires are used for the majority of these insertions.
Loss of the guidewire is a serious and life-threatening complication, with reports of fatalities in 20% of cases where the complete wire is lost [(1)]. Given the number of procedures undertaken worldwide the risk to patients is significant and avoidable.
In 2011 the National Patient Safety Agency (NPSA) issued a Signal document that highlighted the continued risk of harm from retained guidewires [(2)] and in 2012 made the retention of a CVC guidewire a ‚never event'.
The incidence of retained guidewires is thought to be rare, estimated at 1:3291 procedures [(3)]. However we suspect that the incidence is higher due to under-reporting. To determine the rate of guidewire retention we conducted a national survey of anaesthetic departments.
Methods: A postal survey was sent to the Clinical Director of departments in the UK asking how many guidewires they recall being retained in the last 5 years in their institution and how these were managed.
Results and Discussion: Of the 54 departments that responded 18 (33%) cite at least one episode of retained guidewire in the last 5 years. The majority of these were managed using interventional radiology (52%) or cardiothoracic surgery (29%).
This recall rate suggests that the incidence of this ‚never event' is underestimated. The NPSA Signal document advised various approaches to eliminate the risk to patients (e.g. training and introduction of checklists) but it continues to be a problem despite such strategies [(3)].
Following recommendations to design out error, a novel guide wire has been developed by our institution. This prevents the operator from over-inserting and accidentally retaining the guidewire.
Conclusion(s): Despite guidance retained guidewires continue to pose a problem, which is most likely under-reported. Novel guidewire design may help to reduce its incidence.
References:
1. Heberer M et al. Infusionstherapie und Klinische Ernahrung. 1984; 11 (5):254-261.
2. Risk of harm from retained guidewires following central venous access, 2011,
3. Vannucci A, et al Anaesthesia & Analgesia. 2013 July; 117 (1): 102-8 doi: 10, 1213

16AP2-5
Guidewire retention: a lesson learnt

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Background: Guidewire retention is a rare complication of central venous catheter placement. The true incidence is unknown, but one investigation estimated that it may occur at a rate of 1 case every few thousand catheter insertions.[(1)]
Case report: A 72-year-old woman with rectal cancer, proposed to an elective surgery of abdominoperineal resection. During the intraoperative period, the central venous catheterization was done via the left internal jugular vein using the Seldinger technique. The catheter was inserted by a 1st-year anesthesiology resident. No complications or difficulties in cannulation were reported, but there was resistence to injection and back flow in the distal lumen was not normal. It was inserted a new catheter in the right internal jugular vein using the same technique, without complications. When both catheter trays were checked after the procedure, there was just one guide-wire and the other was missing. After the surgery finished, the radiology was called to the operating room and the patient underwent X-ray in all the traject of the guidewire, confirming its intravascular presence.
The interventional cardiology was called, and in the day after the endovascular guidewire was removed.
Discussion: The inadvertent intravascular insertion of the entire guidewire is a avoidable complication. Operators' inexperience, fatigue, inattention and inadequate supervision of trainees were suggested as predisposing factors. The signs of guidewire loss include: missing the guidewire in the tray after the procedure, resistance to injection via catheter, poor venous backflow and guide wire visibility on radiographs.[(2)] The primary error is advancing the guidewire too far into the vein. To prevent this, it should be held at least 18 cm distant from the vein.[(2,3)]
There are limited published literatures on the complications of lost guidewire, but usually is asymptomatic and is often incidentally found on a routine X-ray. The interventional radiology is usually successful as the first line therapy to remove the guidewire.[(3)]
References:
1. Anesth Analg 2013;117:102-8;
2. J Surg Tech Case Rep 2013; 5(2): 78-81;
3. J Minim Invasive Surg Sci 2013; 2(1): 108-110
Learning points: Guidewire retention is a relevant patient safety issue. This is a rare and preventable complication. Inattention is the main cause. No specific preventative strategies are recommended. The interventional angiography is usually successful as the first line therapy.

16AP2-6
A rare case of sevoflurane hypersensitivity

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Background: Sevoflurane (SEVO) is largely assumed to be safe for anaesthesia induction in children and is often administered before assuring an IV line. There are no documented cases of inhalational agents causing anaphylaxis in the peri-operative setting.[1]
We describe a case of cutaneous reaction due to SEVO administration.
Case report: JHG is a healthy 12 years-old male admitted for urgent nasal fracture reduction. His mother referred previous cutaneous reaction at age of 5 months, when submitted to a CT scan under sedation (without contrast); medical records are unavailable.
Induction was smooth with IV fentanyl (F), propofol (P), rocuronium (R) and dexamethasone (D). Short after initiating SEVO, he developed an exuberant skin rash mainly in the neck and thorax, so SEVO was immediately discontinued with rapid regression of the rash. Surgery continued uneventfully under P. At the end of surgery, we reintroduced SEVO and after a few seconds the rash reappeared, and again regressed after discontinuing the gas.
The patient was referred to Drug Allergy Unit. Skin prick tests (SPT) were negative for latex, F, R, P, D, iodopovidone and chlorhexidine; intradermal tests (IDT) were negative for F, R, P and D. In vitro basophil activation test (BAT) was positive for both SEVO and P and negative for F and R. SPT and IDT were repeated for P, being again negative; SPT were also negative for soy, egg and SEVO (probably unreliable due to immediate vaporization at skin application).

Discussion: We found only three case-reports of SEVO allergy in the literature, all in occupational context among operating room staff.[2,3]
Sensibility and specificity of BAT to SEVO and P are unknown and drug challenge with the suspected agent remains the gold standard for diagnosis. The obvious time relation of symptoms to first gas administration and re-exposure suggest SEVO hypersensitivity.
To our knowledge, this is the first case of SEVO hypersensitivity in non-occupational context.
References:
1. Br J Clin Pharmacol. May 2011; 71(5): 647-658
2. Allergy. 2006 Dec;61(12):1485-6
3. Acta Anaesthesiologica Scandinavica, 2014 Oct; Vol 58, 9, 1151-1153
Learning points: SEVO is generally safe for anaesthesia, with scarce reported hypersensitivity reactions. However, as outlined by this case of cutaneous reaction, its use is not innocuous and anaesthetists should be aware of it.

16AP2-7

Availability of anaesthetic emergency guidelines in South Yorkshire hospitals

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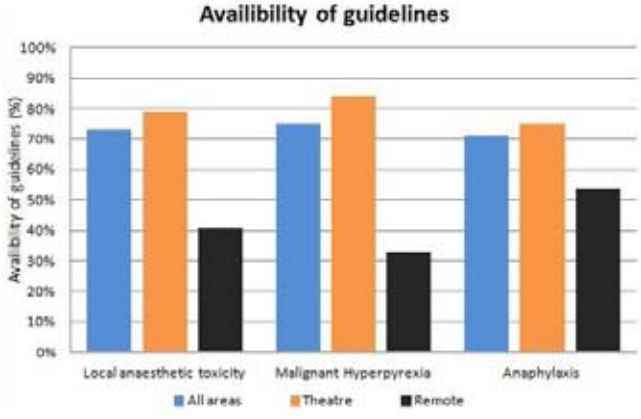
Background: Anaesthetic emergencies require available up-to-date guidelines that are easily accessible. In 2013 an audit at Doncaster and Bassetlaw Hospitals Trust found large variations in the availability of emergency guidelines, particularly in areas of remote anaesthesia. This led to a new guideline folder and 100% availability.
On the strength of its impact we expanded the audit to include the whole South Yorkshire region (9 hospitals in 5 trusts).
Methods: Data were collected for all areas of anaesthesia regarding malignant hyperpyrexia (MH), local anaesthetic (LA) toxicity and anaphylaxis guidelines.
The questions answered were:
- Are guidelines present, easily accessible and up-to-date?
- Are all specific therapy locations documented on the guidelines?

The data analyst was blinded to the source hospital.
In addition a questionnaire was sent out to all anaesthetic trainees gauging their opinions on guideline availability using the Google Forms platform.
Data were analysed using Microsoft Excel.
Results: Overall there was 73% guideline availability, of which 80% were up to date and 69% were easily accessible. Availability of guidelines was significantly higher in theatres compared with remote locations (75% vs 43%, P=0.0000000003, Chi-square test). Further details regarding the individual types of emergency are shown in the graph below. Overall, most medication locations were displayed, although this was more common in remote areas than in theatre (84% v 65%).



[Availability of emergency guidelines]

The questionnaire (n=38) included respondents from all training levels and all hospitals in the region. On 5 point numerical scales, trainees appeared fairly confident they could locate emergency guidelines (mean 3.34) but that uniformity of guidelines would be more useful (mean 4.65).

Conclusion: This audit has shown that there is inconsistent availability of emergency guidelines within the region and wide variability in how they are displayed. A consistent approach to the storage of emergency guidelines would be beneficial and possibly improve safety.
Acknowledgments: C Fraser, W Low, J O'Keeffe, N Akhtar, C Riley, R Chowdhury, D Eastwood.

16AP2-8

Comparative study of two preoperative evaluation reports: a randomized controlled study among anaesthesiologists in a tertiary university hospital

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Background and Goal of Study: In our daily practice, patients are sometimes attended by an anaesthesiologist who couldn't to prepare the case, and only had a few moments to assess risk and make an anaesthetic plan. Therefore, a concise and accurate pre-operative evaluation (PRE) is necessary. The aim of this study was to compare two models of PRE commonly used in our hospital (computerized (CF) and ¨by-hand¨ (HF)).
Materials and Methods: For this anonymous survey, a simulated PRE was generated about an 82-year old, ASA IV patient, with COPD, mild renal failure, atrial fibrillation, hypertension, diabetes mellitus and allergy to pyrazolone, scheduled for a femoral-popliteal bypass. Volunteers of our anaesthesiology department were randomly assigned to read the CF-PRE or the HF-PRE of the case for a maximum of 1min, and we assessed the memorization of the information thanks to a checklist of 33 items. We also collected data about time to review the report, years of experience, working area, and evaluated the opinion of our colleagues in terms of organization and legibility of the questionnaire on a Likert scale. Variables were compared using χ^2or parametric tests when appropriate. $p < 0.05$ was considered significant.
Results: 60 anesthesiologists were recruited. 56 assessed PRE (27 CF and 29 HF) and 4 refused to answer the survey and were excluded. There was no difference in time to review the preoperative evaluation (CF: 51±11s, HQ: 55±8s, p=0.13). Experience seemed to affect the memorization (< 5 years of experience: 19,7±3,8/33 items; >5 years of experience: 15.9±3,5/33 items; p=0,02), but not the type of PRE (CF: 16,8±3,6/33 items; HQ: 16,2±4,0/33 items; p=0,60). The survey result was not either influenced depending on the usual working area (p=0.60). Of all the items, no differences of memorization were found between groups, outside the diagnosis and the surgical history, better memorized in CF group (p=0.02 and 0,02), and treatment with β-blockers, better memorized in HQ (p=0,04). HF obtained higher legibility score (CF:4,7+0,5/5; HQ:3,8+1,0/5 p< 0.01), and was considered better organized (CF:4,1±0,8/5; HQ: 3,3±1,1/5 p< 0.01).
Discussion and Conclusion(s): Anesthesiologists memorized less than half of the information presented in the PRE during a 1-minute evaluation, with little difference between 2 types of formats. However, computerized format ranked higher than ¨by-hand¨ in organization and legibility.

16AP2-9

A simple, low cost and ready to use kit for lipid rescue

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Lipid rescue refers to a treatment of systemic toxicity caused by local anaesthetics, by means of intravenous infusion of 20% lipid emulsion[1]. Since its introduction by Weinberg in 1988, lipid rescue has also been suggested in several types of poisoning or overdose, especially those caused by very lipophilic drugs. Lipid emulsion infusion is present in various resuscitation guidelines, such as ASRA, AAGBI, AHA and others.The immediate availability of both lipid emulsion and infusion protocol is strongly recommended, and most of authors and guidelines suggest that the drug and all accessories needed for infusion must be storaged in a kit[2].We propose a simple, low cost and ready to use kit.The kit case is a well known yellow container of disposable needles, without cap. Inside we put 500 ml of lipid infusion (20%) in two bottles, three-way stopcocks, a 50 ml syringe, an infusion intravenous line and needles. Container cap has been replaced by the plastic-coated protocol to facilitate the correct administration of the lipid emulsion. In addition, we have introduced two forms. One must be filled out in case of incidence, with the description of the case, in order to be communicated to Dr. Weinberg's

site lipidrescue.org. The other is the list of items contained.Kits are placed in the CPR carts, close to the places where local anaesthetic techniques are performed.In conclusion, we believe that these simple kits are useful to aid to treat this range of potentially lethal complications more efficiently.

References:

1. Weinberg GL, Vadeboncouer T, et al. Pretreatment or resuscitation with a lipid infusion shifts the dose-response to bupivacaine-induced asystole in rats. Anesthesiology 1988; 88: 1071-5.
2. Neal JM, Bernards CM, Butterworth JF, Di Gregorio G, Drasner K, Hejtmanck MR, Mulroy MF, Rosenquist RW, Weinberg GL. ASRA practice advisory on local anesthetic systemic toxicity. Reg Anesth Pain Med 2010; 35:152-161.

Learning Points:

- Correct storage is essential to improve lipid rescue efficiency
- Design of a lipid rescue kit is possible using simple and available materials.

[General view of the kit]

[Kit contents]

[Kit placed on a CPR cart]

16AP2-10

Evaluation of a nomogram for calculation of maximum volume of local anaesthetic (LA)

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Background: LA toxicity is an avoidable cause of medical error, occurring in ~1/1000 administrations, due to incorrect recall of maximum doses and errors in unit conversion [1,2]. A nomogram exists to calculate the maximum volume of LA directly, based on the agent, formulation, and body weight [3] (Fig 1).Our randomised study compared accuracy and speed of calculation of maximum volumes of LA by 3 methods: Pen & Paper, Electronic Calculator, and Nomogram.

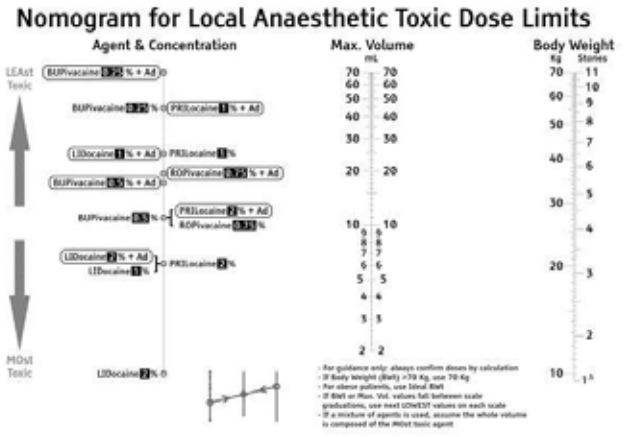
Methods: Following a period of instruction, 25 volunteers each performed 9 calculations (3 by each method, in random sequence) using randomised values for agent, formulation and body weight; then completed a questionnaire to assess preference for the 3 methods. Software provided randomisation, stored participants' responses, and measured response times. Analysis was performed with Minitab.

Results: Maximum dose and speed of calculation were analysed using ANOVA, and ease of use visual analogue scales (VAS) with a Kruskall-Wallace test. (Data for speed of calculation exhibited positive skew, thus were log transformed to allow parametric tests to be applied).There was no significant difference between bias (mean error) of the three, but accuracy (judged by the SD) varied significantly (Levene's test, P=0.003). The Nomogram was the most accurate. Nomogram bias 0.0mL (SD 1.0); Calculator -0.2mL (SD 8.6); Pen & Paper 0.9mL (SD 7.1).Speed varied between methods and attempts. Pen & Paper was significantly slower than other methods, P<0.001. Nomogram 24.7s (SD 10.8); Calculator 32.0s (SD 31.0); Pen & Paper 40.8 (SD 21.0). On first attempt the Nomogram was faster (P=0.001) than other methods: Nomogram 26.4s (SD 9.9); Calculator 53.5s (SD 45.0); Pen & Paper 48.3s (SD 22.0). The Nomogram had the quickest learning curve.The VAS demonstrated differences between all the methods (P<0.001): the Nomogram was considered easiest to use (median: 90.16): followed by the Calculator (64.75); and the Pen & Paper (47.54).

Conclusion: The Nomogram is a safer and faster means of calculating maximum volume of LA than existing methods.

References:

1. RAPM 2009; 34: 534-41
2. EJA 2004; 21: 921-931
3. Anaesthesia 2014; 69:847-853



[Figure 1. Nomogram for Local Anaesthetic Toxic Dose]

16AP2-11

Raising awareness on... awareness

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Background: Intraoperative awareness is a potentially psychologically devastating complication of General Anesthesia, and one that is particularly feared by patients. There is an imbalance between the depressant effects of general anesthetics and the stimulating effects of surgical aggression, with human error or equipment failure implicated in a significant number of cases. Therefore, strict adherence to the best standards of care has the potential to decrease its incidence.
Case report: We present the case of an ASA II, 90 Kg, 63-year-old female patient scheduled for unilateral mastectomy due to breast cancer. As co-morbidities she presented controlled arterial hypertension, diabetes mellitus type 2, obesity, depression and generalized anxiety disorder, and had already been operated on under general anesthesia twice (curettage, more than 10 years before). She was chronically medicated with benzodiazepines.
Anesthesia induction was made with midazolam 2,5mg, fentanyl 0,15mg and propofol 200mg, and after appropriate face mask ventilation was confirmed, atracurium was administered (35mg). ETT insertion was more difficult and lengthy than anticipated, but repeat propofol administrations were performed during this period. Once the airway was secured, anesthesia was maintained with sevoflurane, and afterwards fentanyl and atracurium were administered on an as needed basis. Though initially tachycardic, the remainder of the procedure took place uneventfully.
Post-operatively it was realized that the patient had recollection of the first 5 minutes of surgery. A close follow-up was performed and psychological counseling offered, and since then she has already been reoperated on without complications.
Discussion: This case prompted an investigation as to the underlying cause for the awareness episode. Aside from difficulty with ETT insertion and chronic benzodiazepine use, analysis of the data automatically gathered by the anesthesia machine evidenced that there had been a period with low $et_{Sevoflurane}$ - even though the vaporizer was set to attain an appropriate MAC. Subsequent interventions in the same OR also pointed to dysfunction of the vaporizer, which was signaled for repair.
Learning points:
This case underlines the importance of:
- always looking for the cause of awareness
- automatic anesthesia data collection systems, which allow a more in-depth retrospective review of the anesthetic
- setting MAC alarms appropriately
- offering psychological counseling

16AP3-1

"Where's the blood?!" - Where to find drugs, equipment and staff in anaesthetic emergencies

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Background and Goal of Study: Anaesthetic emergencies are often of very rapid onset with little or no warning of potential danger and many situations require local knowledge to find or access life saving equipment. During the average period of anaesthetic training within the UK a trainee may change hospitals in excess of ten times. It is easy to imagine, therefore, a situation when a disaster occurs as a result of the lack of knowledge of locations of critical drugs, blood products, equipment or personnel. This study proposes that a universally recognisable poster should be located within each area of anaesthetic practice clearly stating the location of various drugs and equipment together with critical contact numbers.
Materials and Methods: A series of verbal questions were posed to a variety of anaesthetic staff (n=37) including anaesthetic doctors of all grades and anaesthetic technicians. Personnel were asked the location of various drugs and equipment and how they would access urgent senior anaesthetic help.
Results and Discussion: The results showed that there is a lack of awareness of the location of various essential items for use in emergencies, even amongst permanent staff. For example, 30% of staff were unaware of the location of the resuscitation trolley, 54% were unaware that the hospital did not stock Sugammadex and 68% did not know the location of the nearest blood. It was particularly concerning that 30% of staff thought that blood was stocked in the theatre complex and were surprised to hear that it had been withdrawn months previously. It was noted that locum doctors were particularly poorly prepared for emergencies and in most cases were relying almost entirely on the local knowledge of the on duty anaesthetic technician.
As a result of this data, a simple poster has been designed which details the locations of all the equipment concerned and how senior anaesthetic help can be contacted.
Conclusion(s): Our data confirms that anaesthetic staff have considerable gaps in their knowledge of the location of emergency anaesthetic equipment, drugs and how to call for help in critical situations. There is a significant potential for a situation to develop where important equipment may be difficult to access in a time critical scenario. It is the firm opinion of the authors of this study that posters such as those described should be a universal safety feature in every area of anaesthetic practice.

16AP3-2

Continuous Hb and plethysmography variability index (PVI) monitoring is associated to a decreased mortality at the scale of a whole hospital

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Background and Goal of Study: Hypovolemia and anemia are the main factor of morbidity and mortality directly attributable to anaesthesia (1). Optimization of volemia on a patient-basis decreases both morbidity and mortality but requires invasive assessment (2). This is why too few patients beneficiate such a monitoring (3). Measurement of both continuous hemoglobin levels (SpHb) and response to fluid loading by plethysmography variability index (PVI) is possible with the Radical7 (Masimo). The aim of this study was to measure the impact on mortality and morbidity of introducing such a monitoring in all the patients at the scale of a whole hospital.
Materials and Methods: After ethical committee approval, operating rooms and intensive care units were equipped with monitorsover a 6 month period and the whole team was educated to its use with an algorithm. From February 6th to August 7th 2014, all the patients under general anaesthesia should be connected with a specific probe to the monitor and had to receive crystalloid infusion and/or packed red blood cells (RBC) if PVI > 15% and/or Hb< 8g/dL. All the results given by the monitor were registered on computer. Administrative data base were used to collect comorbidities, complications, in-hospital deaths and at 1-month. Results were compared between 2013 and 2014 during the 2 same periods with Chi-2 tests or ANOVA. Results are expressed as numbers of patients or mean [confidence interval].
Results: During the period approximately 65% of the patients received the probe. In-hospital mortality was not different between the 2 years (not shown). Death in cardiothoracic surgery was slightly lower (p =0.07). At one-month,mortality decreased in 2014 (vs 84/5123= 1.64% vs 121/5478 = 2.2%, p = 0.024, Odds ratio = 0.69 [0.83-0.91]). The difference results from a lower mortality after cardiothoracic (3.06% vs 4.59% p = 0.01) and orthopedic surgery (0.37% vs 0.88% p = 0.015). Severity and number of comorbidities and complications were not significantly different (not shown).
Conclusion(s): These results suggest that by using a non-invasive monitor, measuring SpHb and fluid loading responsiveness is possible on a large scale. The observed reduction of mortality agrees with multicentric randomized studies using more invasive monitoring systems (2) and support the large use of such a device.
References:
1: Lienhart et al Anesthesiology 2006.
2: Hamilton et al. AnesthAnalg. 2011.
3: Canesson et al Crit Care. 2011.

16AP3-4

Inadvertent intra-aortic propofol infusion secondary to a misplaced central venous catheter

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Background: Intra-aortic propofol after the inadvertent placement of a central venous catheter (CVC) into the carotid artery is rare. We report this case to highlight the sequelae, management and prevention of an iatrogenic carotid artery injury from a misplaced CVC insertion. In addition, we explore the potential causes of the neurological injuries sustained in this case.
Case report: An 82-year-old female presented for aortic valve replacement and coronary artery bypass grafting. Real time ultrasound (US) guidance was used to insert a 7-Fr multi-lumen CVC into the right internal jugular vein. Despite dynamic US guidance, it was not appreciated at the time of insertion that the CVC was inadvertently placed into the right carotid artery. Over a 90 minute period, 20 mL of propofol (1%) was subsequently infused into the CVC before the complication was identified. As a consequence the patient developed bilateral cerebral and cerebellar ischaemic infarcts.
Discussion: The fat emulsion in propofol is metabolized by lipoprotein lipase, the activity of which can be suppressed by increased free phospholipids, large particle sizes and a high infusion rate. Considering a total of 20 mL of propofol was infused intra-aortically via the misplaced CVC, the sudden rise in intra-arterial lipid level from the fat emulsion could have over-saturated the available lipoprotein lipase, leaving the unhydrolyzed lipid globules as a source of fat emboli for the cerebral and cerebellar infarcts. In this case, a step-by-step procedural analysis found that additional ultrasound proficiency, the anticipation of potential risks of puncture at various steps, application of appropriate precautions, and direct supervision may have ensured correct CVC insertion. Furthermore, confirmation of correct CVC placement using a transducer, arterial blood gas analysis, or imaging, should be performed prior to any drug infusion through a CVC.
Learning Points:
1. CVC related complications can still occur despite real time US being utilised.
2. Employ at least two safety methods to ensure correct CVC placement before starting an infusion. These include:
i) blood colour or backflow pulsatility,
ii) transduction of CVC waveform,
iii) arterial blood gas analysis confirmation, and iv) US demonstrating the absence of the catheter in the artery and presence of the catheter in the vein.
3. Hospitals should have formal guidelines for small or large bore needle puncture or cannulation of the carotid artery.

16AP3-5

Jehovah's Witnesses: the importance of perioperative optimization

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Background: The religion of Jehovah's Witnesses is a Christian movement that reject the administration of blood and blood products though, since 2000 is accepted that some members may receive them, according to their personal decision.1
Case report: Female patient 65 years old, Jehovah's Witness, with history of breast cancer, thalassemia minor, hypercholesterolemia and depression. Usually treated with letrozole, sinvastatin, alprazolam, paroxetine and omeprazole. Evaluated in pre anesthetic consultation with 10.4g/dl of hemoglobin (Hb) and ASA Physical Status 3. Submitted to elective surgery of colon resection, under balanced general anesthesia, with blood loss estimated at 400 ml. In the immediate postoperative period, showed sudden hypotension and oliguria with abdominal drain with plenty of hematic content. Started crystalloid fluid resuscitation, vasopressor support and was reoperated immediately. Exploratory laparotomy was performed with hemostasis review and removal of a large clot, presenting at the end 3.4 g/dl Hb.
Transferred to ICU sedated and ventilated. Started hematological support therapy with aminocaproic acid perfusion, iron, erythropoietin, folic acid and cyanocobalamin.
During hospitalization, initially requiring dopaminergic support, which was suspended with the rise of haematological parameters. Extubated uneventfully on the 15th day of hospitalization. Water balance controlled with diuretic therapy. Early enteral nutrition and parenteral to the 5th postoperative day and oral diet after 16 days. Abdomen with good healing process and abdominal drain removed after 15 days of hospitalization. At the time of transfer, the patient was conscious, oriented and cooperative. Afebrile and in spontaneous ventilation. Hemodynamically stable. Analytically with 5.4 g/dl Hb.
Discussion: It is believed that a threshold of 5 g / dl can be tolerated without any adverse effect on morbidity or mortality. However, especially in situations of elective surgery, there are several strategies for perioperative clinical optimization of the patient, with the involvement of a multidisciplinary team and the planning of the necessary conditions for all the perioperative period. Not implementing these measures can lead to very poor prognosis and very substantial human and economic costs. 2,3
References:
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16AP3-6

Patient time spent in the OR: the effect of allowing surgeons use of more than one operating room concurrently

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Background and Goal of Study: Surgeons with busy schedules sometimes request to use more than one OR in an overlapping fashion (concurrence). For some surgical procedures, this practice may lengthen patient OR time (PORT) with the surgeon's time split between multiple ORs .Our goal was to investigate the effect of allowing a surgeon two concurrent rooms on PORT. The working hypothesis is that allowing this practice of concurrency delays timeliness and may expose the patient to longer times spent in the OR.
Materials and Methods: I imported the raw surgical log data from Jan 2013 to present from our Electronic Health Record system into Excel for Mac 2011, and calculated the times all patients spent inside our Inpatient, Pediatric, and Outpatient ORs. I then categorized cases into:
- Procedure types
- Individual surgeon involved

Cases were then further divided into:
- Cases in which the surgeon was in one OR the entire time
- Cases in which the surgeon was allowed to operate in more than one OR during scheduled procedures

I analyzed results for the 50 most common surgical procedures performed in our medical center. Primary results of interest included: 1) differences in overall average times and, 2) proportion of cases' PORT times that were either quickened or lengthened. I analyzed results categorized by 1) surgical procedure and 2) surgeon. I tested for normal distribution for the 50 cases with the highest case volumes. I then applied Student's T-test for testing differences in mean PORT between cases in which OR concurrency was scheduled and those in which it wasn't scheduled.
Results and Discussion: Effect of concurrency on PORT for top 50 procedures:
- 27 of 50 (54%) procedure types resulted in shorter average PORT times.
- 23 of 50 (46%) resulted in longer PORT times.
- Overall, the proportions were not significant different statistically.

Effect of concurrency on PORT categorized by surgeon
- Differences in proportions were not statistically significant different.

Statistical significance:
- 13/50 (26%) of procedure types had statistically significantly different OR times
- Of these 13 procedure types:
- 7 (54%) had statistically significantly shorter times
- 6 (46%) had statistically significantly longer times.

Conclusion(s): Giving surgeons more than one OR to work in has varying effects on time the patient spends in the OR. When allowing surgeons more than one OR, individual surgeons and case types need to be considered when scheduling surgical cases.

16AP3-7

Preoperative inferior vena cava sonography as predictor of hypotension after induction of general anaesthesia

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Background and Goal of Study: During general anaesthesia intraoperative hypotension caused by hypovolaemia is associated with adverse outcomes. Inferior vena cava (IVC) ultrasound sonography, by measuring variation in IVC diameter during spontaneous respiration, is considered as an effective tool to assess volume status, and could play a useful role in managing circulatory changes after induction of general anaesthesia. The aim of this preliminary investigation was to determine whether IVC sonography performed prior to induction could predict the onset of hypotension.
Materials and Methods: Adult patients, ASA I~III, scheduled for surgery undergoing general anaesthesia were enrolled. Maximum and minimum IVC diameters (D_{max} and D_{min}) were measured by M-mode abdominal sonography at a point 2~3 cm below the right atrium, when the patient was breathing normally. Variation in IVC diameter, the caval index (CI_{IVC}), was calculated by $(D_{max} - D_{min})/D_{max}$. Hypovolaemia was defined by $D_{max} < 1.5$ cm or $CI_{IVC} > 50\%$. Anaesthesia was induced with etomidate 0.3 $mg.kg^{-1}$, fentanyl 2 $\mu g.kg^{-1}$. Blood pressure and heart rate were recorded in the 10 minutes period following induction. Post-induction hypotension was defined as either mean arterial pressure (MAP) decrease of > = 30% or MAP<60 mmHg. Receiver operator characteristic (ROC) curve analysis was used to determine the predictive power of CI_{IVC}.
Results and Discussion: Data from 26 patients mean (±SD) age 46 ±17 years, 10 male and 16 female, were analyzed. Eleven were hypovolaemic according to IVC. Twelve (46%) experienced post-induction hypotension. Area under the ROC curve was 0.72 (95% CI, 0.52~0.93). The optimal predictive value of CI_{IVC} for occurrence of post-induction hypotension was 39% with 75% sensitivity and 74% specificity. Hypovolaemic patients experienced greater decreases in MAP (Mean difference:11%).

Variables	Hypovolaemia (n =11)	Normal (n =15)	p value
Age (years)	47 ± 19	46 ± 17	0.84
Gender (M/F)	3/8	7/8	0.28
ASA status (I/II/III)	4/4/3	6/3/6	0.62
Hypertension (Yes/No)	6/5	4/11	0.23
Decrease in MAP (%)	33 ± 8	22 ± 11	0.01
Change in HR (%)	21 ± 6	23 ± 10	0.61

[Demographic data and haemodynamic changes]

Conclusion(s): Pre-induction IVC sonography was able to predict patients at risk of developing hypotension following induction of general anaesthesia. IVC sonography is a simple bedside screening test for post induction hypotension.

16AP3-8

$ScvO_2$ measurement as a tool to guide red blood cell transfusion in postoperative stable patients

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Background and Goal of Study: Red blood cell (RBC) transfusion is a common practice in the peri operative period. Current recommendations for RBC transfusion of the French Society of Anesthesiology and Reanimation (SFAR), are only based on haemoglobin (Hb) levels, associated with clinical informations. Hb is an important factor for oxygen delivery and central venous oxygen saturation ($ScVO_2$) is an interesting tool to evaluate adequacy between oxygen delivery and consumption.
The aim of the study was to evaluate whether $ScVO_2$ level might be more relevant as tool for RBC transfusion decision rather than Hb level alone and thus reduce the number of RBC units.
Materials and Methods: It was a prospective randomized controlled trial conducted between November 2009 and November 2013 in surgical units (abdominal, thoracic, vascular surgery) at the University Hospital of Lille. Stable patients with a central venous catheter and anemia as defined by SFAR were included. They were randomized in two groups. In Optimized group (OG), administration of red blood cells was achieved only if $ScvO_2$ was below 70% and repeated until a value beyond 70% or worsened value evolution. In Controlled group (CG), RBC was given to obtain an Hb level as defined by SFAR. $ScvO_2$ and Hb were measured before and after each transfusion. Clinical and biological data were collected from Day 1 to 5. Primary end point was number of RBC units, and secondary end points were mortality at Day 30 and morbidity occurring over 3 months. Analysis was by intention-to-treat. A p value <.05 was considered significant.
Results and Discussion: Number of RBC transfusion was similar between groups: 78 in CG (n= 43) versus 80 in OG (n = 39), p=0.23. The mean average of RBC units per patient was 1.8 ±1.1 RBC in CG and 2.2 ±1.3 (p=0.23) for OG. $ScVO_2$ increased in OG from 64 % ±7 to 71% ±9; $p<10^{-6}$, and in CG from 68 % ± 10 to 71 % ±9; p=0.22. There was no difference in morbidity or mortality within the two groups. However if $ScVO_2$ criteria was applied in the CG, 39 RBC units transfusion would have been saved. Increased $ScVO_2$ value was probably related to an increase of Hb level and/or improved cardiac output.
Conclusion(s): The use of $ScvO_2$ in transfusion decision algorithm does not reduce the number of RBC transfused. If $ScvO_2$ was used on all patients, 39 RBC were saved. But the impact on patient prognosis of such strategy must be determined.

16AP3-9

Surgical complications in patients undergoing major surgery: a comprehensive grading system according to the CHADx and the Clavien-Dindo systems

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Background and Goal of Study: Postoperative complications are common in patients undergoing major surgery and are associated with increased hospital length of stay, readmissions and poorer long-term survival. The aims of this study were to collect detailed information on postoperative complications. We hypothesized that postoperative complications in patients undergoing major surgery are common, and are associated with procedural risks and increased hospital length of stay.
Materials and Methods: We conducted a single-centre, prospective observational study at a University teaching hospital of adult patients undergoing major surgery. Complications were classified according to the CHADx then graded according to Clavien-Dindo system. The associations between complications, procedural risks and length of hospital stay were evaluated using descriptive statistics.
Results and Discussion: Over a 12-week period, 542 consecutive patients undergoing major surgery (excluding liver transplantation) were included. The CHADx system identified complications in 357 (66%) patients. Of these, 71 (13%) had 2 complications and 169 (31%) had ≥3 complications. CHADx Class 5 (cardiovascular) was the most common class of complication (70%), followed by CHADx Class 15 (metabolic disorders) (34%), CHADx Class 9 (genitourinary) (30%), and CHADx Class 6 (respiratory) (29%). For the Clavien-Dindo classification system: Grade I: 690 complications were seen in 164 patients), Grade II: 302 complications in 137 patients, Grade III: 57 complications in 37 patients), Grade IV: 23 complications in 14 patients, Grade V (postoperative mortality): 4 complications in 4 patients). Median (IQR) length of hospital stay for patients with complications was 8 days (5:13) compared to 4 days (2:6) for patients without complications (p<0.0001). Procedural risks were associated with the development of complications.
There were 338 complications in cardiac surgery (24% of patients with complications), followed by orthopaedics surgery (97 complications; 12% of patients with complications), and urology surgery (88 complications, 10% of patients with complications).
Conclusion(s): Postoperative complications in patients undergoing major surgery were common. Complications were strongly associated with increased length of hospital stay. The type and duration of surgery may influence the development of complications. These results can be used to build hypotheses for future controlled trials.

16AP3-10

Transfusion-associated bacterial sepsis in a pregnant patient: rare but real!

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Background: Transfusion of blood components is associated to many potential adverse events, ranging from mild to fatal consequences. Bacterial contamination of transfusion products is one of the risks and all efforts should address a safe transfusion policy.
Case report: A 39-year-old female was admitted in the Intensive Care Unit (ICU) in the immediate post-operative period of an urgent caesarean after transfusion-related severe sepsis. By 36 weeks gestation of an unsupervised pregnancy the patient was admitted at the hospital due to breathlessness and anemia (Hb 6 g/dL), and 2 red cell packs (RCP) were transfused. Immediately after transfusion the patient developed a self-limited reaction characterized by fever, hypotension, nausea and vomiting. Because it was suspected red cell bacterial contamination and sepsis, blood cultures were taken from the patient and the transfused RCP before antibiotics and surgery. Two days after, she developed tachycardia, hypotension, fever (39,5ºC) and shivering, this situation led to an urgent caesarean and subsequent transfer to ICU under sedation and mechanical ventilation, where she stayed for 3 days with a favorable clinical evolution. Blood cultures from the patient and the transfused RCP were both positive to *Serratia marcescens* resistant to ampicillin and amoxicillin with clavulanic acid, confirming the hypothesis of transfusion-associated bacterial sepsis.
Discussion: Despite being more common with platelet transfusion, bacterial contamination is also implicated in sepsis resulting from RCP transfusion, being the most prevalent organisms *Yersinia enterocolitica*, followed by *Pseudomonas spp, Serratia spp,*and others[1]. Transfusion of a contaminated blood product may be associated to variable non specific signs and symptoms, so the clinical severity of a transfusion-associated septic reaction can vary considerably and it can lead to unrecognized sepsis. We are investigating to establish a root cause analysis of this event and the ensuing errors that were main causes of the event. It also points out systematic corrective actions in the future.
References: 1.Wagner S. Transfusion-transmitted bacterial infection: risks, sources and interventions.Vox Sanguinis(2004)86, 157-163.
Learning Points: Transfusion-associated bacterial sepsis may not be recognized and may lead to severe outcomes, so all Anesthetists should follow a safe transfusion policy and must be very aware of this rare but severe transfusion risk.

16AP3-11

Quality of recovery after anaesthesia: validation of the Portuguese version of the quality of recovery 15 questionnaire

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Background and Goal of Study: The Quality of Recovery 15 (QoR-15) questionnaire is a validated scale used for the study of quality recovery after anaesthesia and surgery. The aim of this study was to translate, back-translate and validate the QoR-15 questionnaire for use in Portuguese Post Anaesthetic Care Unit (PACU) settings.
Materials and Methods: After study approval by the institutional ethics committee, a prospective study was conducted on patients scheduled for elective surgery admitted at the PACU from June to August 2013. The QoR-15 questionnaire was translated and back translated in accordance with available guidelines. The QoR-15 Portuguese version was used to measure postoperative health status before surgery (T0) and 24h after anaesthesia on postoperative day 1 (T1) on *170* patients. Patients who were unable to give informed consent or had cognitive impairment were excluded. Poor Quality of Recovery (PQR) was defined for patients with a QoR-15 score lower to the mean QoR-15 score at T1 minus 1 standard deviations. Reliability and observer disagreement was assessed using interclass correlation (ICC). Descriptive analyses of variables were used to summarize data and non-parametric tests were performed for comparisons.
Results and Discussion: There was a significant negative correlation between the QoR-15 and time spent in the postanaesthesia care ($\rho = -0.264$, $P = 0.004$) and duration of hospital stay ($\rho = -0.274$, $P = 0.004$). All but one of QoR-15 items had higher scores 24 hours after surgery. Patients submitted to amputation and toracotomy showed worse QoR. Of the 170 patients included in our study, 32 (19%) patients had PQR. The PQR was higher on patients submitted to amputations ($p = 0{,}003$) and thoracotomies ($p = 0.013$). Patients who developed PQR had more frequently diabetes mellitus and hypertension and more frequently took antidepressive drugs and were more frequently submitted to general anaesthesia ($p = 0.002$) and less frequently to locorregional anaesthesia ($p = 0.012$). Patients with PQR stayed longer in the hospital (6 vs 4 days, $p = 0.002$). The questionnaire had a good internal consistency with Cronbach α of 0.884. Test-retest reliability was good, ICC=0.986 (95%CI 0.967-0.994).
Conclusion(s): The Portuguese version of the QoR-15 showed a good correlation with the original version. This questionnaire appears to be an accurate and reliable assessment for QOR.

16AP4-2

Inferior vena cava ultrasound guided volume repletion reduces post-spinal hypotension rate. A randomized, case-control, prospective trial

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Background: Significant hypotension is frequent after spinal anesthesia. Empiric fluid administration is common to prevent this complication, carrying the risk of volume overload. Inferior vena cava ultrasound (IVCUS) has been shown effective to assess fluid responsiveness in critical care patients, but it has never been investigated in an elective surgical population.
Aim of this randomized, case-control, prospective trial is to assess the efficacy of IVCUS in guiding titrated volume repletion to prevent hypotension after spinal anesthesia. Secondary outcomes are: need for vasoactive drugs and total volume of fluids given.
Methods: ASA 1-3 patients undergoing surgery with spinal anesthesia were randomized to receive either IVCUS guided volume repletion or no preventive fluid therapy. A breathing variation in IVC diameter >36% was considered as fluid-responsiveness and treated with boluses of 500 ml crystalloids until normalized. Non-invasive arterial blood pressure (NIBP) was periodically measured until discharge to PACU and significant hypotension rate calculated. This was defined as a fall in NIBP of more than 50 mmHg or 25% from baseline, an absolute value of NIBP of less than 90 mmHg, an absolute mean value of less than 60 mmHg, its reduction of more than 30% from baseline and/or clinical symptoms of inadequate perfusion. Exclusion criteria were: contraindications to spinal anesthesia, patients' refusal or lack of protocol adherence. A power calculation was preliminary performed, resulting in 80 patients per arm. Data are given as rates, with relative p values and confidence intervals. The trial is registered on www.clinicaltrials.gov (NCT02271477).
Results: 185 patients were recruited over 5 months. 25 patients did not meet inclusion criteria and were excluded; 160 patients were included and randomized. Significant hypotension rate was 42.5% (N=34) in control group versus 27.5% (N=22) in the IVCUS group, this difference being statistically significant ($p = 0.044$, CI=95%). Although the number of patients requiring vasoactive drugs was not significantly different ($p = 0.137$), patients in the control group required a lower amount of fluids over the entire procedure ($p = 0.004$).
Conclusion: IVCUS is effective to assess fluid responsiveness in elective surgical patients. It could be employed to guide a tailored preoperative volume status optimization, to prevent significant hypotension after spinal anesthesia.

16AP4-3

The effects of regional anaesthesia on 5 year survival after transurethral resection of bladder cancer: a retrospective analysis

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Background and Goal of Study: Recent studies reported that cancer patients who had surgery with additional regional anaesthesia would have better outcome than those who had surgery under general anaesthesia. However, the effects of anaesthetic techniques have not yet been investigated in bladder cancer. Therefore, we designed this retrospective study to investigate

which anesthetic technique would have better prognosis in bladder cancer.
Materials and Methods: Sixty one patients had transurethral resection of bladder tumor under general anesthesia among a total of 531 patients, from 2001 to 2008, in our hospital. Patients with follow-up for 5 years after surgery and showed pathologic findings of urothelial carcinoma grade I-II/III were enrolled. Finally, 24 patients (G group) who underwent general anesthesia and 138 (R group) who underwent regional (spinal or epidural) anesthesia were compared. Five year survival and recurrence free time were compared by chi-square and T-test, respectively. Logistic regression analysis was performed for evaluating other factors affecting survival.
Results and Discussion: Five-year survival was 88% in group G and 96% in group R (P = 0.13). Recurrence free time was 47 ± 22 months in group G and 40 ± 24 months in group R (P = 0.21). According to regression analysis, older age and longer hospital stay time contribute to reduced survival.
Conclusions: There was no difference of 5 year survival between regional anaesthesia and general anaesthesia in non-metastatic bladder cancer. Because it was a small sample size, large prospective studies are needed to determine whether the association between regional anaesthesia and survival is causative.

16AP4-4

An audit to our operating room laryngoscopes using the ISO standard of 2009

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Background and Goal of Study: The International Organization for Standardization (ISO) published in 2009 an International Standard (ISO 7376:2009) specifying a minimum illuminance of 500 lux after 10 minutes for hook-on type laryngoscopes [1]. Recent audits [2,3] report poor compliance with ISO standards. Since no audits were made to the laryngoscopes of our hospital's Operating Room (OR) in recent years, we proposed an audit to determine compliance of the illuminance level with the ISO standard.
Materials and Methods: We audited 33 reusable laryngoscopes, of different brands, available in our OR and ready to use. The laryngoscopes have hook-on type blades, xenon bulb and internal battery power source. We used a standard protocol with a specific measuring device. Illuminance was measured 10 minutes after the laryngoscope light was turned on, in a dark room with a certified lux meter 20mm away from the light source.
Results and Discussion: Only 1 out of the 33 laryngoscopes met the minimum illuminance level required by the ISO standard of 500 lux. Mean illuminance observed was 211.91 lux, with a minimum of 53 lux and a maximum of 738 lux. The interquartile range was 179 lux (Q1=116 and Q3=295). Laryngoscope light quality is fundamental for a good laryngoscopy. Poor-quality light in direct laryngoscopy can result in more attempts required before success, and this is further worsened by the need to change batteries or laryngoscope. In turn, prolonged laryngoscopy can lead to a worse outcome with respect to tracheal intubation and the patient's health.
Conclusion(s): Regular audits shall be made to the laryngoscopes' lights in order to promptly identify and prevent potential problems.
References:
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16AP4-5

Exploring the relationship between anaesthesiologists' non-technical and technical skills in a simulation scenario of unexpected difficult airway management

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Background and Goal of Study: A combination of good non-technical skills (NTS), technical skills (TS) and medical knowledge is important to prevent and handle adverse events to ensure patient safety. Some studies have indicated a correlation between NTS and TS whereas others have been unable to find a correlation. The evidence regarding the relationship between anaesthesiologists' NTS and TS is scarce. In addition, training and implementing NTS is still a challenge. The aims of this study were to explore the qualitative characteristics of trainee anaesthesiologists' NTS and TS and the correlation between these skills.
Materials and Methods: This was an explorative, mixed methods study using video-recorded simulation scenarios of anaesthesiologists' management of unexpected difficult airway as data source. The ratings of participants' performance were performed independently by two trainee anaesthesiologists for NTS and two anaesthesiologists for TS, respectively. The NTS ratings were performed using Anaesthesiologists' Non-Technical Skills System customised for Danish setting; ANTSdk. The TS ratings were performed using a technical checklist. Intraclass Correlation Coefficient (ICC) was calculated to assess interrater reliability for NTS and TS raters, respectively. The correlation between the NTS and TS ratings was calculated using Spearman's correlation coefficient (SCC). Directed content analysis was used to explore and analyse the characteristics of the observed NTS qualitatively.
Results and Discussion: Twenty-five 2nd year trainee anaesthesiologists participated. The interrater reliability was substantial for both NTS and TS raters (ICC^{NTS}=0.66 and ICC^{TS}=0.73). No correlation between the NTS and TS ratings was found (SCC=0.1, 2-tailed significance of 0.61). Themes characterising good and poor use of NTS were identified. We developed a list of concrete NTS to be used in this anaesthetic emergency. The lack of correlation between NTS and TS ratings could be due to: the interplay between NTS and TS is too complex to measure, the measurement instruments, or the raters' abilities.
Conclusion: NTS and TS are closely related, therefore it is relevant to consider if the skills can or should be separated when rated. It is the combined use of these skills that is important for the patient safety. We describe themes characterising the use of NTS and provide a list of concrete NTS for this specific anaesthetic emergency to aid understanding, training and use of NTS.

16AP4-6

Opinions regarding the completion of difficult airway alert documentation: a survey

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Background and Goal of Study: Adequate forewarning of patients with a difficult airway is desirable before undertaking any form of anaesthesia. This is particularly important where difficult intubation has been previously unanticipated. Often there is a lack of clear documentation. Our survey aims to elucidate the reasons for significant under reporting of difficult airways.
Materials and Methods: An online survey was conducted over a month, aimed at anaesthetists in and around London.
Results and Discussion: 110 responses were received (40 consultants, 70 trainees). 104 (95.41%) regarded the concept of alert forms useful whereas 5 (4.59%) did not. 53 (61.62%) had formal electronic or paper reporting system at their work place. However, 46 (53.49%) preferred to write a letter in addition. Regarding communication of this information to others 93(86.11%) preferred to document in notes while 86 (79.63%) communicate the information to patients. Respondants sould choose more than one option. Triggers for filling in a form were grade III view for 34 (31.78%), grade IV view for 74(69.16%), use of advanced intubation techniques for 83 (77.57%) and multiple intubation attempts for 83 (77.57%). 75 (70.09%) issued a form if mask ventilation was difficult whereas 87 (81.31%) filled one in for any unanticipated difficult airways. 3 (2.75%) encounter a difficult airway weekly, 13 (11.93%) monthly whereas 93 (85.32%) said it was less frequent ie 1-12 months. 20 (18.18%) respondents reported having never filled in an alert form whereas 83 (76.26%)

fill one every one to 12 months. Only 1 (0.92%) respondent regularly has patients with a previously issued alert form every month and 25 (22.94%) said they had never seen one. With regards to the barriers to completing the form 26 felt that lack a standardized system was responsible, 14 found accessing the form difficult and 8 had doubts about their utility. 23 respondents said that noncompliance was due to lack of time but 90 (85.71%) said it took less than 30 minutes to fill in a form.
Conclusion(s): Noncompliance in filling in alert forms is attributed to the lack of and easy access to standardized systems either online or paper.There are no standardized guidelines as to when an alert form should be issued. Therefore the information available via these forms maybe varied and less useful to some. The introduction of standard guidelines or scoring system to guide filling in the alert forms will help standardize the process and improve compliance.

16AP4-7

The effects of occupational exposure to waste anaesthetic gases in the inflammatory markers of medical residents

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Background and Goal of Study: There is great concern about the possible harmful effects of exposure to volatile anaesthetics on occupationally exposed professionals. Literature is scarce in relation to the effects of this exposure on immune system. The current study aimed at evaluating, for the first time, inflammatory markers on medical residents who work in operating rooms exposed to waste anaesthetic gases.
Materials and Methods: The Ethical Committee of the Institution approved the protocol of the study. The study included 30 individuals who were allocated into two groups: the exposed group, consisting of medical residents from anaesthesiology and surgery areas exposed to waste anaesthetic gases (isoflurane, sevoflurane and nitrous oxide) for a three year-period, and a control group composed of medical personnel not exposed to waste anaesthetic gases (internal medicine). Blood samples were collected at the same time for both groups. Plasma inflammatory cytokines (IL-1b, -6, -8, -10, -12 and TNF-a) were determined by the cytometric bead array (CBA) using flow cytometry.
Results and Discussion: There were no significant differences between groups in relation to demographic data ($P>0.05$). Results showed a significant increase in pro-inflammatory IL-8 in the exposed group compared with the control group ($P=0.003$). This interleukin induces chemotaxis in target cells and induces phagocytosis, and is believed to play a role in the pathogenesis of bronchiolitis, a common respiratory tract disease. Hence, the systemic inflammatory response may be consequent to pulmonary inflammation as IL-8 is a major pro-inflammatory mediator highly involved in the recruitment of neutrophils in the lungs. In relation to the other cytokines evaluated, no significant differences between groups were observed.
Conclusion: The findings suggest an inflammatory response among health workers exposed to waste anaesthetic gases, even if for a relatively short period (three years).
Acknowledgements: This study was supported by FAPESP (grant #2013/21130-0)

16AP4-8

Do pacemakers fail intraoperatively?

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Background: Due to the aging of the population and to caring for patients with increasingly complex cardiac diseases, surgical patients with pacemakers (PM) is becoming common situation. Despite the remarkably high reliability of modern devices, PMs can and do fail.We present a case of a failure of ventricular capture during a femoral fraction reconstruction in an 83-yr-old woman with a DDDR PM.
Case report: Preoperative PM evaluation was performed with the device functioning normally on the DDD mode pacing at 60 bpm.Subarachnoid anesthesia was performed with fentanyl (20γ) and ropivacaine 0.75%(2.2ml). The patient was placed in the right lateral position. Only bipolar electrocautery was used during the procedure. After 50min of surgery, bradycardia at 35bpm occurred.Loss of successful ventricular pacing was also noted. After IV injection of 3 mg of atropine there was no response.
IV isoproterenol (0.5μg/min) was then used and stable vital signs were achieved.No myocardial ischemia or electrolyte disturbances was noticed. The surgery was rapidly completed and the patient was transferred to the cardiac ICU. Chest radiography showed that the ventricular lead was displaced. A new PM was placed.
Discussion: In our case, the most probable cause of the loss of the ventricular capture was the displacement of the tip of the lead from the heart due to the patient's position. PM failure has 3 causes:generator, lead or capture failure. The response to PM failure depends on the patient's hemodynamic stability.If a patient has a perfusing rhythm and stable vital signs, a plan is made to correct the problem. For a patient with inadequate perfusion, cardiopulmonary resuscitation may be necessary.
References: Lead failure, although unusual has been reported in the past. Samain et al reported a displacement of the electrode of a PM during shoulder arthroscopy that was caused by shoulder edema.[1]Moreover, lead retraction from the heart can occur after repeatedly rotation of the pacer under the skin by the patient (Twiddler syndrome).[2] Finally, Maisel et al reported 8,834 (0.4%) confirmed malfunctions and 30 deaths in 2.25 million PMs implanted from 1990 to 2002 in the US.
Learning points: Despite an appropriate PM evaluation, unexpected PM failure may occur.[3] Thus, monitoring of the PM function intraoperatively is crucial for safe and efficient management of patients with implantable PMs.
1. Samain Anesthesiology2010
2. Bohm Pacing Clin Electrophysiol1998
3. Maisel JAMA 2006

16AP4-9

Measurements of fatigue in anesthesiologists with human herpes virus-6 DNA extracted from saliva (part 2)

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Background and Goal of Study: We suspected that human herpes virus-6 (HHV-6) is part of the etiology of exanthema subitum in infants, and that HHV-6 stays in salivary gland cells as a latent infection. In addition, the involvement of HHV-6 has been noted in the relationship of chronic fatigue syndrome. To explore the possibility that HHV-6 DNA values can be used as an indicator of anesthesiologist's fatigue, extracted HHV-6 DNA from the saliva of anesthesiologists before and after they worked a night shift.
Materials and Methods: We prospectively examined the relevance between the amount of HHV-6 DNA from saliva and the degree of fatigue. The study was approved by the ethics committee of University of Tsukuba Hospital. Informed consent was obtained from each subject. Saliva was collected from 11 anesthesiologists in our hospital before and after they worked a night shift, and 37 patients who were to undergo elective body surface surgery, when they were resting quietly. All patients were classified as American Society of Anesthesiologists-Physical Status (ASA-PS) I. The degree of fatigue among the anesthesiologists was measured using Visual Analog scale from 0 to 100. HHV-6 DNA was extracted from saliva. DNA in the saliva was collected with the ORAgene DNA kit. Reverse transcription-polymerase chain reaction was performed with the 7500 Fast Real Time PCR system and the TagMan Fast Universal PCR Master mix. The data were analyzed with unpaired or paired Student's t-tests.
Results and Discussion: HHV-6 DNA was detected in 15 of the 16 (94%) anesthesiologists and eight of the 37 (22%) patients ($p< 0.05$). The amounts of virus from the fatigued doctors after a night shift were higher than those collected before duty. The degree of fatigue after a night shift is conjectured to be strong, because HHV-6 DNA was detected in only very small quantities or not detected in the non-fatigued doctors and the resting patients.
Conclusion: The degree of fatigue of doctors can be predicted by using HHV-6 DNA extracted from their saliva. We suspected that the measurements of HHV-6 DNA extracted from saliva is a useful method for objectively quantitating an individual's degree of fatigue. This method could be used to help prevent medical accidents from overwork or burnout syndrome.

16AP4-10

Screening for cognitive impairment in surgical inpatients using the clock drawing test

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Background and Goal of Study: Cognitive impairment in surgical patients is associated with post-operative delirium, delayed discharge and mortality (Robinson, Ann Surg 2009; 249:173-78). Guidelines suggest that older patients should be screened pre-operatively (Chow, J Am Coll Surg 2012;215;453-66). Identifying cognitive impairment enables prevention of post-operative delirium with multi-disciplinary intervention such as modifying anaesthetic technique and comprehensive geriatric assessment (Zhang, Crit Care 2013:17). It allows formal dementia diagnosis and mental capacity assessment. The Clock Drawing Test (CDT) is a validated cognitive screening tool and is more convenient to conduct than many others (Pinto, Dement Geriatr Cogn Disordr 2009; 27: 201-213). We aimed to use the CDT for the first time in screening surgical patients.
Materials and Methods: We introduced the CDT into standard practice in our urban tertiary hospital. It was performed within 48 hours of admission in surgical patients aged ≥70, over 10 weeks. Scores ≥1 indicate cognitive impairment (Pinto, Dement Geriatr Cogn Disordr 2009; 27:201-213). Data was subjected to X^2 and T-test analysis.
Results and Discussion: 94% of the 215 patients included performed the CDT. Patients from urology (n=132), breast (30) and general surgery (40) were included, 117 were planned admissions and 85 were emergencies.

CDT score	All patients (n=202)	Elective (n=117)	Emergency (n=85)	Mean length of stay (days)	Range of days stayed
0	92 (46%)	62 (53%)	30 (35%)	2.89	0-16
≥1	110 (54%)	55 (47%)	55 (65%)	4.80	1-45

[Cognitive impairment in surgical patients]

54% of surgical patients displayed impaired clock drawing. General surgery patients had more evidence of cognitive impairment than breast surgery (X^2 3.889, p=0.049) and urology patients (X^2 4.25, p=0.039). Cognitive impairment was more prevalent in emergency than elective patients (X^2 6.127, p=0.012). Mean length of stay was significantly prolonged in patients with evidence of impairment (T-test 2.109, p=0.018).
Conclusions: This is the first data assessing the feasibility of the CDT as a peri-operative screening tool. Whilst the CDT is not diagnostic, our data indicates that many surgical patients warrant further cognitive evaluation. Patients with impaired CDT have longer admissions which can represent complications and discharge delays (Jacobs, Ann Thorac Surg, 2007:84;1416-1421). This data has implications for preventing post-operative delirium and emphasises the need for collaboration between anaesthetists, surgeons and geriatricians.

16AP5-1

After-hours emergency laparotomy - does it affect thirty-day mortality?

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Background and Goal of Study: Emergency laparotomy is a common surgical procedure, many times performed at late night hours. Team fatigue, decreased availability of support staff and other logistical factors may play an adverse role in postoperative survival[1]. However, the magnitude of performing emergency laparotomies under such conditions is unknown.
The aim of this study was to identify the impact of after-hours surgery on thirty-day mortality after emergency laparotomy.
Materials and Methods: A prospective observational survey of all adult patients undergoing emergency laparotomy was conducted over a six month period. Time of surgery and thirty-day mortality was evaluated.
The $\chi 2$ test was used in statistical analysis and a p value of less than 0.05 was considered statistically significant.
Results and Discussion: Sixty nine laparotomies were performed with a mortality rate of 13% (n=9).
Twenty one patients (30,4%) were operated during morning (8 am - 2 pm), twenty seven (39,2%) in the afternoon (2 pm - 8 pm) and twenty one (30,4%) at night (8 pm - 8 am). The number of patients who died in the morning, in the afternoon or at night were the same (n=3). The time of surgery showed no significance on mortality (p=1,000)
Conclusion(s): Emergency laparotomy is a stressful procedure, often associated with poor outcomes. The performance of the team can be affected in after-hours surgery, with influence in patients' survival.
Nevertheless, in our small survey no differences were found in 30-day mortality after late night emergency laparotomy. However, larger studies are needed to estimate the real impact of after-hours abdominal urgent surgery.
References:
1. J Trauma.2011 Aug:71(2):447-53.

16AP5-2

Claims in surgery due to wrong side, site or person: a study based on French insurance (SHAM) data

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Background and Goal of Study: Wrong-side or site surgery is an event that should never even happen particularly since the recent implementation of the World Health Organization (WHO) checklist [1]. There are few available data which are probably underestimated: in the few published economic studies the incidence is 1/50000 or 100000 surgeries [2]. There is no French epidemiological study on this subject. SHAM insurances are the biggest French provider of medical liability insurances (50 % of the market), insuring 80 % of public and 27% of private hospitals. The study of the insurance claims provided by this insurer is therefore a relevant source of data and information.
Materials and Methods: The aim of this study was to analyze the claim rate related to wrong side, person or site (or organ) during surgery. We did a retrospective study on insurance claims provided by SHAM insurances over a five years period (2007-2011).
Results and Discussion: On the study period, out of a total of 29565 registered claims, 125 (0.42%) originated from wrong side, person or site during surgery.
111 cases have been settled by a Regional Commissions for Conciliation and compensation for medical accidents and 14 have been settled by a court with an average amount of compensation respectively of 10223 and 19837. The medical specialties concerned are primarily the orthopedic surgery (n=46), the neurosurgery (n=18), the stomatology (n=13), the ENT (ear, nose and throat) surgery (n=8) and the visceral surgery (n=7).
The facts have occurred in 112 cases in the operating room and in 85 cases after January 1, 2010. This incident took place in public hospital (n=85), in a nonprofit (n=8) or a for-profit private clinic (n=18) or for a practitioner (n=14).
Conclusion(s): The claim rate due to wrong site, side or person is rare but with a relatively large amount of compensations. The file review shows that the causes are mainly related to human errors in a multifactorial context: emergency surgery, significant number of caregivers, non-team communication, excessive workload, no procedure verification (checklist)…
These data should help strengthen quality approach in the operating room and shows the importance of the systematic use of the WHO checklist. The majority of claims occurred after January 2010, when the use of this checklist became compulsory in France.
References:
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2. Arch Surg2006;141:353-7.

16AP5-3

Clinical research consent form templates in six English-speaking countries fail to meet linguistic norms

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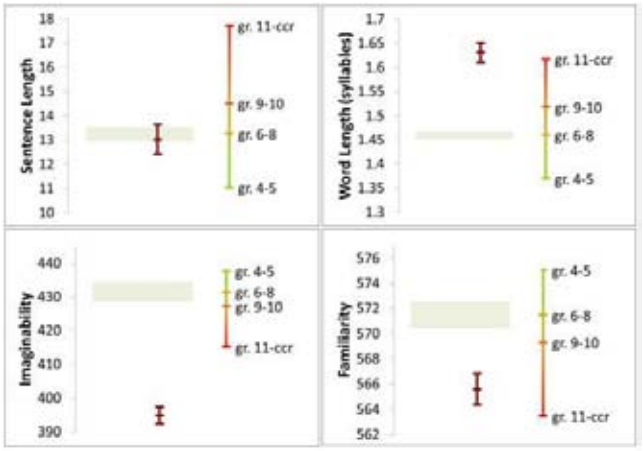
Background and Goal of Study: Comprehension of study information is needed for valid consent. Texts are understood by the majority of adults if they are written at a grade 8 level or lower. Yet the majority of consent forms use more sophisticated language. Medical school research ethics boards (REBs) often endeavor to improve consent form readability by providing

clinical research consent form templates (RCFTs). If sample text in the RCFTs does not meet linguistic standards, a poor example is set. Therefore, the purpose was to examine the availability, readability and linguistics of REB RCFTs from 6 English speaking countries.
Methods and Materials: We searched for RCFTs from the websites of 122 accredited medical schools in Australia/New Zealand, Canada, South Africa, the United Kingdom, and the US. Linguistic measures were calculated using Coh-Metrix (v. 3.0, Memphis, USA). Statistical analysis was done using SAS (v. 9.2, Carey, USA). RCFT linguistics and norms were compared using t-tests. The influence of country of origin and the presence of REB specific readability standards on RCFT linguistics were evaluated using MANOVA. Post hoc t-tests with false discovery rate correction were used.
Results and Discussion: 77% (94/122) of RCFTs were available online. On average, RCFT readability and word linguistics exceeded the grade 8 level ($p<0.05$). Further, only 9% of RCFTs met their own REB specific readability standard. Country of origin ($p<0.01$), but not the presence of an REB specific standard ($p=0.45$), influenced discrepancies between RCFT linguistics and norms. Post-hoc contrasts revealed that the US had a significantly worse sentence length than all countries ($p<0.0001$), except AU/NZ ($p=0.27$). Poorly written RCFTs are an issue in all 6 countries examined, containing words that are too abstract, obscure, and lengthy. In the US, lack of readability is exacerbated by the use of long sentences.



[Compliance with linguistic norms (mean+95%CI)]

Conclusion(s): REBs must simplify the vocabulary used to meet quantitative readability and linguistic standards. They should also strive to meet their own REB specific standards. This would help promote valid consent and would avoid the perception of hypocrisy.

16AP5-4

Government Health Organizations do not provide appropriate research consent form templates

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Background: If a consent form is too complex for a given research participant to comprehend, consent is not valid. Lack of comprehension may be related to poor consent form readability, which is ubiquitous. A grade 8 readability standard is associated with comprehension in the majority of adults. Both research ethics boards (REBs) and government health organizations (GOs) often provide researchers with clinical research consent form templates (RCFTs), which include sample text. If this text is not appropriately readable, a poor example is set. If no RCFT is provided, the opportunity to set a good example is missed. Both circumstances may result in the inadvertent promotion of poor consent form readability. While RCFTs produced by REBs may have poor readability no investigation of GO RCFT readability exists. Therefore, the purpose of the study was to calculate the number of GOs providing RCFTs, the average GO RCFT readability, and the proportion of RCFTs meeting a grade 8 readability standard.
Materials and Methods: We collected RCFTs from the websites of GOs in English speaking countries and the United Nations. Sample text was extracted using a standardized protocol. Readability statistics were calculated using Coh-Metrix computational linguistics software (v. 3.0, Memphis, USA) and statistical analysis was done using SAS (v. 9.2, Carey, USA). The Flesch-Kincaid Grade Level formula was used to calculate quantitative readability.
Results and Discussion: Only 30.4% (17/56) of organizations had RCFTs. Of these, 58.8% (95% CI 32.9-81.6%) of organizations failed to meet the recommended grade level and the mean grade level of RCFTs was significantly higher than the grade 8 standard ($t=2.04$, $p=0.0293$). The mean grade level of RCFTs was 9.1 (95% CI 7.95-10.24), with RCFTs generally exceeding the recommendation by 2.6 grade levels (95% CI 1.4-3.7). 17.6% of organizations (3/56) stated an explicit readability standard in their RCFT. Of the three GOs, only one met their own standard.
Conclusion(s): The majority of GOs fail to provide RCFTs, and most of the RCFTs provided do not meet readability standards. GOs must provide RCFTs with sample text meeting the common readability standard. GOs contribute hundreds of millions of dollars to biomedical research each year, making them well positioned to effect positive change in behavior. Leading by example, they can promote the proliferation of readable consent forms.

16AP5-6

Multiple surgery in patients with coronary stents in a two year period multicentre registry

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Background and Goal of Study: Up to 5% of patients with coronary stents will have noncardiac surgery (NCS) the year after its implantation, reaching 26% within 5 years of follow-up, with an average of 1.7 ± 1.3 procedures per patient. The aim of the study was to assess the rates of major cardiac and cerebrovascular events (MACCE) and major bleeding events (MBE) in patients with coronary stents undergoing NCS, and to compare them with the incidences in a subgroup of patients undergoing multiple surgery.
Materials and Methods: Observational, multicentre and prospective study. All patients with coronary stents undergoing NCS from February 2010 to April 2012 were included. Demographic data, preoperative clinical risk factors and antiplatelet drugs (APD) management were registered and analysed during hospital admittance and up to 3 months after surgery. Outcomes were the occurrence of MACCE, including major cardiac events (acute coronary syndrome, cardiac death) and cerebrovascular events (arrhythmia, heart failure, stroke, transient ischaemic attack); and MBE: transfusion ≥ 2 red blood cells, haemoglobin level descent >2g/dL, intracranial bleeding. χ^2 test was used to compare qualitative variables and Mann-Whitney to compare quantitative variables.
Results and Discussion: We included 432 surgical procedures (SP) from 365 patients; 48 underwent more than one SP, accounting for a total of 115 SP (mean 2.4; Standard Deviation 0.98). Surgical risk was high-intermediate in 68.7%. A preoperative haemorrhagic surgical condition was present in 7.0% and trauma in 3.5%. Global MACCE occurred in 63 (14.6%), an incidence similar to the one observed in the multi-SP subgroup ($n=115$; 13%; $p=0.589$). The overall incidence of MBE was 37.3%, and it was significantly higher in the multi-SP subgroup (47.8%; $p=0.006$). The multivariate analysis in the multi-SP found that the only predictor for increased MBE risk was surgical risk (high $p<0.001$; intermediate $p=0.002$), while other preoperative medical conditions or APD management were not identified as related to MBE risk.
Conclusion(s): This population has high perioperative morbidity and mortality. Multiple surgery had an increased risk of MBE, but not of MACCE. High-intermediate surgical risk is a predictive factor of increased MBE risk in patients with multi-SP. The later result must be interpreted with caution because of the small sample size, but warrants further investigation through the assessment in larger series.

16AP5-7

Near-infrared spectroscopy reveals transient endothelial dysfunction during acute anaphylaxis: a case report

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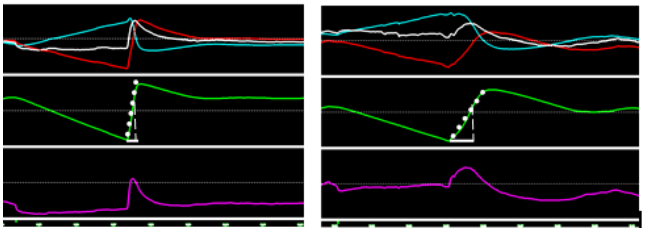
Background: During severe acute anaphylactic shock, circulating blood volume may decrease by as much as 50%. It has been suggested that this increased vascular permeability might be attributed to a transient endothelial dysfunction,[1] but firm evidence for this hypothesis is lacking.
Endothelial function can be assessed by measurement of the postocclusive

reactive hyperemia (PORH) response.[2] PORH refers to the reproducible transient increase in blood flow after release of an arterial occlusion. The velocity and degree of flow restoration depend on the capacity of the microvasculature to recruit arterioles and capillaries, thereby reflecting the integrity of the microcirculation.[2]
We report the PORH response assessed by near-infrared spectroscopy in a case of acute anaphylaxis. The responses during this event were suggestive for the presence of transient endothelial dysfunction.
Case report: A 53-year-old male patient was scheduled for coronary artery bypass grafting surgery. After induction of anesthesia, a thoracic flush with a dramatic fall in arterial blood pressure and tachycardia were observed. An arterial blood sample showed an increase in hemoglobin from 14.6 g/dl before induction to 21.7 g/dl after the event. A prominent capillary leak induced by the anaphylactic reaction was suspected.
During the surgical procedure, the extent of capillary leak evolution was monitored by sequential PORH measurements. The figure demonstrates a significant impairment of microvascular reactivity after the event, indicated by a longer recovery time (time from release of cuff to initial value) (solid line) (from 12 to 64 sec), and lower rate of recovery (dotted line) (from 118%/sec to 30%/sec). At the end of the operation, PORH measures were partly restored.
Discussion: Our results indicate that increased vascular permeability during acute anaphylaxis might be attributable to transient endothelial dysfunction.
References:
1. J allergy Clin Immunol 2005;115 S483-523;
2. Gerovasili V et al. Int J Ind Ergonom 2010;40:218-22
Learning Points: Sequential PORH measurements offer the opportunity to monitor the extent and progress of capillary leak during acute anaphylaxis.



[PORH before and after anaphylaxis]

16AP5-8

NO as a pre-operative marker of respiratory function for the prognosis of post-operative progress in patients with respiratory disease

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Background: NO is an unstable free radical produced by various types of cells, including endothelial cells of the respiratory tract. Endogenous NO is a regulatory factor of respiratory function .A number of studies confirm its accurate measurement in the exhaled air which can be used to follow the development of the disease.
Goal of Study: The aim of this study is to evaluate NO as a prognostic marker of respiratory function during the immediate and distant postoperative period in patients with COPD, who undergo major abdominal operations. Identifying pre-operatively patients with respiratory dysfunction results in better preparing the respiratory system, paying the necessary attention intraoperatively, and monitoring the patient closely post-operatively.
Materials and Methods: 30 patients about to undergo medium or major operations (enterectomy, gastrectomy, nephrectomy etc) were studied. They were closely and meticulously monitored in 3 different stages: Pre-operatively, intra-operatively and post-operatively.Pre-operatively a detailed medical history was taken, clinical examination of the respiratory and the cardiovascular system took place, the patients underwent laboratory exams, lung function tests, thorax Ro, ECG, echocardiogram, and NO measurement with a specific device. Intra-operatively various incidents were reported as well as the need of additional drug administration. Post-operative observation included the recording of various occurrences during emergence, duration of stay in the resuscitation room, need of respiratory drugs, regular blood gas analysis, and the need of intensive care unit stay.
Results and Discussion: Nine of our patients had an NO< 15 while 21 patients had NO>15. The latter had a lower hemoglobin saturation point when breathing air. However they presented remarkable improvement after bronchodilation. 40% of our patients had pathologic findings on their thorax Ro, 75% of which had NO>15.
13 patients (43%) presented productive cough 1 hour after the operation (30% had NO>15 and 13% had NO<15). Similar results were observed 3 hours postoperatively. 7 out of 21 patients who had NO>15 stayed longer in the resuscitation room due to coughing, dyspnea and low hemoglobin saturation. 3 of them had to be transferred in the ICU.
Conclusions: Patients with NO>15 present increased risk for perioperative respiratory complications. Their prompt recognition allows us to follow specific protective strategies aiming to improve outcome.

16AP5-9

Postoperative adverse outcomes among physicians receiving major surgeries: a nationwide retrospective cohort study

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Background and Goal of Study: Outcome after surgery in physicians as surgical patients remains unknown. This study aimed to compare postoperative adverse events between physicians as surgical patients and non-physician controls.
Materials and Methods: Using Reimbursement claims data from Taiwan National health Insurance Program, we conducted Matched retrospective cohort study of 7973 physicians as surgical patients and 7973 propensity score-matched non-physician controls receiving in-hospital major surgeries between 2004 and 2010. Postoperative major complications, prolonged hospital stay, intensive care unit, increased medical expenditure, and 30-day mortality were compared between physicians and non-physician controls.
Results and Discussion: Compared with non-physician controls, the adjusted odds ratios (95% confidence intervals) of postoperative surgical site infection, prolonged length of stay, intensive care unit admission, and increased medical expenditure among physicians as surgical patients were 0.74 (0.64-0.85), 0.70 (0.64-0.77), 0.77 (0.68-0.87), and 0.81 (0.74-0.89), respectively. Physicians working at medical centers, internal medicine, dentists, and those with fewer coexisting medical conditions had lower risks for postoperative surgical site infection, prolonged length of stay, intensive care unit admission, and increased medical expenditure.
Conclusion(s): Physicians as surgical patients have lower risk for adverse outcomes after surgery than non-physician controls, particularly among internal physicians, dentists and those working at hospitals.
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16AP5-10

Pseudocholinesterase deficiency: population screening and literature review

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Background and Goal of Study: Pseudocholinesterase (PChE) is an enzyme that is secreted into the plasma after intrahepatic synthesis. Although its physiological role is not well understood, it is responsible from the hydrolysis of ester bound drugs like mivacurium, procaine, chlorprocaine, tetracaine, cocaine, heroine and succinylcholine.
Duration of succinylcholine action, which is normally 5-10 minutes, is prolonged up to few hours in enzyme deficiency. With the evolution of rapid acting non-depolarizing neuromuscular blockers, the use of succinylcholine is decreased recently.
On the other hand, it is still routinely used for rapid sequence induction for the patients with full stomach, during electroconvulsive therapy. Some developing countries still use succinylcholine routinely for elective intubations.
The aim of this study was to demonstrate the incidence of PChE enzyme deficiency near Adiyaman city, Turkey and investigate the relation of this condition with hepatic and renal function tests.
Materials and Methods: Patients undergoing any elective operation in Adiyaman University Research and Educational Hospital between March and December 2013 were recruited for the study. Local Investigational Review Board approval, and written informed consents were obtained from all the participating patients. The patients' plasma PChE, ALT, AST, urea, creatinine, INR and aPTT values were analyzed. Relationship of PChE deficiency with other values was investigated. The reference values for PChE was taken as 4260-11250 U/L for the women of 16-40 years and 5320-12920 U/L for others. Single and multiple variable logistic regression analyses were performed for statistical analysis of the possible relationship.
Results and Discussion: The study was completed with 964 patients, of which 702 (72.8%) were females. The level of PChE enzyme was below the normal values in 7.2% of the patients. The relationship between AST and urea elevation and PChE deficiency was statistically significant ($P<0.05$). The risk of PChE deficiency was 4.5 times higher in the patients with elevated AST and 9 times higher in those with elevated urea, compared with normal values.
Conclusions: Pathological elevations in AST and urea, that are the part of routine preoperative blood biochemical analysis, should warn us about the possible pseudocholinesterase deficiency.
Acknowledgement: The authors want to thank the personnel of the Laboratory of Adiyaman University for their diligent work.

16AP5-11

Pulse rate (PR) performance in the neonatal intensive care unit (NICU)

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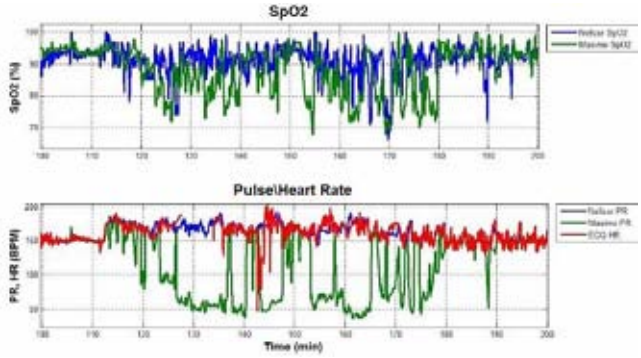
Background: According to the European Resuscitation Council Guidelines; when HR is <60 bpm in a newborn the resuscitation algorithm requires a clinical intervention[1].
This study compares the PR performance of two modern pulse oximeters compared to ECG in a NICU that may be relevant in both the CCHD screening and resuscitation cases.

Methods and Materials: The IRB approved study was conducted at BC Children's Hospital, Canada.
Nellcor and Masimo sensors were applied to either the foot and hand, and connected with their respective pulse oximeter modules.
E40 is the percentage of times that the reported PR from the test instruments differed from the ECG value by at least 40 bpm. Clinically significant errors (CSE) were considered >40 bpm differences that was sustained for more than 30 seconds, long enough to trigger an inappropriate clinical intervention [2].
Results: Twenty-nine subjects of data were included in the analysis. The figure below shows data for the outlier where the PR error for Masimo relative to ECG was >40 bpm continuously for greater than 2 minutes.



[Trend Plots]

Pulse rate performance data is shown in Table 1. When comparing Nellcor vs. Masimo, Nellcor out-performs Masimo.

-	Nellcor N-600x	Masimo SET® module	Significance
Overall Arms (bpm, mean ± SD) E40 (without outlier)	4.14 (0.16 ± 4.14)	10.48 (-1.26 ± 10.41)	p < 0.001
Outlier Arms (bpm, mean ± SD)	8.32 (0.21 ± 8.32)	49.88 (-24.94 ± 43.19)	p < 0.001
Arms without outlier (bpm, mean ± SD)	3.93 (0.15 ± 3.93)	5.07 (-0.44 ± 5.05)	p < 0.001
E40 (overall)	0.08%	0.89%	p < 0.001
E40 (outlier)	0.54%	22.46%	p < 0.001
E40 (without outlier)	0.07%	0.23%	p < 0.001

[Pulse rate performance]

Conclusion: Nellcor shows statistically significant better PR performance between the oximetry technologies that could have impact on clinical care. Masimo had 3 subjects in which CSEs occurred, and in 1 subject (Fig. above) PR crossed below 60 bpm. Nellcor had no CSE.
References:
1. Nolan, J.P et al., European Resuscitation Council Guidelines for Resuscitation 2010; originally published online 2010.
2. Omar, C. et al., Accuracy of clinical assessment of infant heart rate in the delivery room, Journal of Pediatrics, 2008;152:756-60
Acknowledgements: Special thanks to Dr. Mark Ansermino, Erin Cooke and Matthias Görges for study setup and data collection

Education

17AP1-1

Anaesthetic Trainees perception and experience of poster presentations

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Background and Goal of Study: Poster presentations are an integral part of scientific meetings. There are various reasons why trainee Anaesthetists become involved in presenting posters. Submitted abstracts can be delivered as oral or poster presentations. We decided to look into the perception of poster presentations by trainees and the reasons why we get involved in them. We also collected information on factors like costs and format of these posters which contribute significantly to the overall experience of poster presentation by trainee doctors.
Methods: A questionnaire was sent out to trainee Anaesthetists in mainly London Hospitals by e-mail. The survey was carried out with the help of a popular survey tool and results analysed.
Results and Discussion: In total, 83 questionnaires were completed and analysed. 32% of the respondents were ST7 trainees, 50% were at ST3 to ST6 level and the remaining 18% were at CT1 to CT3 level. 33% of trainees who completed the survey had not done a poster presentation in the past 12 months, 30% had presented 1 poster, 19% had presented 2 or 3 and 18% had presented 4 or more. More than 50% of respondents had presented a poster at a national or International meeting. 40% of respondents had spent £20 - £40 on the poster with 26% spending £40 - £60. 71% of trainees bore the cost of the poster with the department or hospital paying the cost in the rest. Majority of trainees got involved in poster presentations to enhance their CVs, some for scientific interest and only 20% got involved because of training requirement. 49% had attended meetings where electronic posters were used and 48% preferred paper to electronic based poster presentations for reasons which include cost and transportation. 47% agree that poster presentations contribute significantly towards training and education while 62% agree that they contribute significantly towards CV enhancement.
Conclusion: This survey highlights the importance of poster presentations to trainee Anaesthetists in education, training and CV enhancement. This however comes at a cost and hospitals and departments need to do more to reduce the costs. Poster presentations are widely used in scientific meetings and remain an effective way to share results of research to our peers (1).
We recommend that all trainee Anaesthetists get involved in this rewarding experience.
Reference: David C Shelledy. How to make an effective poster. Respiratory Care. October 2004; 49: (10) 1213 - 1216

17AP1-2

A numeric rating scale to assess stress levels of anaesthesiology residents on call

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Background and Goal of Study: Physician activity on call is a mental and physical hard work; it can generate stress and be underestimated. The aims of the study were to design a scale in order to assess stress levels of Anaesthesiology residents on call and to analyse their stress risk factors.
Materials and Methods: Over a period of one year, this prospective, descriptive, observational study collected daily stress levels of junior and senior Anaesthesiology residents (R) on call in a tertiary university hospital by using a numeric stress rating scale (NSRS) at the end of the shift (from 1 no stress to 10 maximum stress). Sleep deprivation and interruptions were also registered. Additionally, all participating residents (7 senior and 8 junior) were asked to rank in an anonymous and voluntary on-line questionnaire the following top ten stress generating issues (from 1 minimum to 10 maximum stress level): OR activity, ICU activity, obstetrics activity (O), trauma patients&Cardio-Pulmonary Resuscitation (T), pain management (P), activity outside of the OR (AO), sleeping time (ST), lack of knowledge/skills (L), relationship with specialists on call (RS) and other activities (OA). Data are presented as means, percentages or absolute numbers per shift.
Results and Discussion: A total of 313 records were collected and 52 missing (response rate 85.7%). The mean NSRS value/shift was 6.85 for the senior R (60% was >7). The mean NSRS value/shift was 6.93 for the junior R (55.7% was >7). The means of the stress generating factors in descending order were the following: relationship with specialists 8.5 (main stress factor for 57.1% of the senior R versus 37.5% of the junior R), sleep deprivation 7.93 (mean sleeping time 1.37 h/shift), O activity 6.53, OR activity 6.13 (mean of 7.75 h/shift), lack of knowledge/skills 5.87, P activity 5.33, trauma patients/CPR 5, ICU activity 4.53, AO activity 3.33 and OA 2.07. Junior residents were more affected by sleep deprivation than seniors.
Conclusion(s): The NSRS helped us to measure and be aware of the stress levels among Anaesthesiology residents on call in our department. Mean NSRS values for junior and senior residents were similar. The closer the residents are to become specialists, the more the relationship with the specialists becomes the main stress factor. It is crucial to analyse the relationship with specialists on call in detail, as it is the most stress generating factor.

17AP1-3

Anaesthetic quality indicators for trainees: do they receive feedback?

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Background: There is a growing body of evidence that suggests regular feedback of anaesthetic outcome data (for post-operative normothermia, pain and post-operative nausea and vomiting) which is benchmarked against peers, is associated with improved post-operative quality markers. The published evidence is for permanent members of departments, but there is no published evidence on the feedback of peri-operative outcomes to anaesthetic trainees. This audit assesses the current level of feedback of peri-operative quality metrics within a cohort of anaesthetic trainees.
Materials and Methods: A questionnaire was designed to ascertain if trainee anaesthetists had received feedback on peri-operative outcomes, how regularly it had been given, what the feedback was, and finally did they think feedback would benefit their practise. Plymouth Hospitals NHS Trust (PHNT), UK, is a 900+ bedded tertiary care university hospital. This was sent to 47 trainee anaesthetists in Plymouth Hospitals NHS Trust by email.
Results and Discussion: There were 25 (53%) responses from 47 trainees. 22 (88%) trainees had never received feedback related to their personal peri-operative outcomes. 14 (56%) trainees had never had feedback relating to departmental peri-operative outcomes. Only 1 (4%) had received any data comparing them to their peers. 24 (96%) of respondents felt that it would benefit their practise and allow improvement if they received data on their peri-operative outcomes.
Conclusion: Anaesthetic trainees at PHNT have not received regular feedback on their peri-operative outcomes. Trainees would value this information to allow them to demonstrate the quality of the anaesthetics that they give and to target improvements to facilitate the delivery of a quality anaesthetic service to their patients. We have started sending monthly feedback of peri-operative outcomes to all anaesthetic trainees at PHNT and will be assessing its impact on trainee performance.
References:
1. Benn J, Arnold G, Wei I, Riley C, and Aleva F. Using quality indicators in anaesthesia: feeding back data to improve care. British Journal of Anaesthesia. 2012 Jul;109(1):80-91

17AP1-4

Development of the European diploma of anaesthesia and intensive care (EDAIC) in Spain: a survey among Spanish anaesthesiologists

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Background: Since 2008, Madrid has opened a centre for the EDAIC exam, and has promoted its development in Spain. This survey proposed Spanish anaesthesiologists to evaluate their interest and motivation for the EDAIC.
Material and methods: Between September and December of 2014, a 10 questions survey evaluated through the SurveyMonkey® platform the seniority, position at present, personal experience with the EDAIC, mode of preparation, results at the different steps of the exam, and ideas of perspectives of future for the Spanish training model in anaesthesiology. Comparisons were performed depending on starting-years of training (before 2002 (G1), 2003-6 (G2), 2007-10 (G3) and 2011-14 (G4)) using Chi-Square tests. $p<0,05$ was considered significant.
Results: 231 anaesthesiologists answered the survey, 64 (27,7%) G1, 40 (17,3%) G2, 71(30,7%) G3 and 56(24,3%) G4. 91,3% worked in the National Health Service and 75,3% in university hospitals. By the time of their training, they progressively got to know better of the existence of the EDAIC (G1: 45,3%; G2: 75,0%; G3: 97,2%; G4: 94,6%; p=0,001). An increasing number of trainees had the possibility to prepare it (G1: 15,6% ; G2: 37,5%; G3: 60,7%; G4: 57,1%; p=0,001), and sat the exam during or after their training (G1: 9,4% ; G2: 25,0%; G3: 50,7%; G4: 37,5%; p=0,001), considering that G4 anaesthesiologists are still in formation.
In the mean time, their interest considerably grew with a progressive decrease of anaesthesiologists refusing to prepare the exam (G1: 23,0% ; G2: 10,0%; G3: 5,6%; G4: 1,8%; p=0,001). Those who prepared the EDAIC used local sessions (16,6%), text books (61,9%), MCQs books (37,3%), group work (4,2%) and preparation courses (36,4%), and few presented ITA exam(17,9%), OLA (2,6%) or both (1,7%).
Overall pass-rate in those who presented EDAIC-part 1 was 74,6%, with a pass-rate of 64,9% after the first attempt. Only 46,3% presented Part 2, with overall pass-rate of 81,8%. 87% of the responders considered necessary an exam at the end of the residency program, and 88,3% that the EDAIC could fill this gap, if not now, probably in the future.
Conclusion: The number of candidates presented in Spain to the EDAIC exam has grown exponentially and with good results. This survey is an interesting indicator that the EDAIC is starting to be considered as part of the curriculum of Spanish anaesthesiologists, and that some would see in it a future official final exam for specialists.

17AP1-5

Are surgery residents more motivated than anaesthesia residents?

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Background and Goal of Study: During their residence program, trainees are expected to acquire scientific skills with the help of their tutors and department in order to create a prolific research culture. The aim of this study was to analyze anaesthesia (AR) and surgery (SR) residents' research activity and compare it with their working environment characteristics.
Materials and Methods: We performed an observational transversal study based on a questionnaire proposed to 62 trainees (32 AR and 30 SR). We assessed gender, nationality, research activity during the previous year using the Scientific Activity Index (SAI) and their working characteristics. We compared variables using Kruskal Wallis and ANOVA, $p< 0.05$ was considered significant.
Results: AR had a median of 130 [0-835] of SAI point while SR had 201 [0-1398] (p=0.23). Female residents' SAI was 225[0-1398] versus 89[0-818] for men (p=0.01), with no difference in sex ratio depending on the specialty (p=0.16). Nationality was equally distributed and did not influence SAI points (p=0.67). AR and SR were similarly worried about their stress level (p=0.38). Both groups had the same number of night shifts per month (AR 5.3 vs AR 5.2 p=0.44), but SR worked 28 more hours per month than AR (p=0.00) because they did not respect the post night shift rest. 82% of AR and 83% of SR would not change their amount of night shifts (p=0.91). 39% of SR and 13% AR wanted to decrease their working hours (p=0.01). 96% AR versus 68% SR agreed that their department supported research activity (p=0.01). Finally, 22% of AR and 83% SR would appreciate a higher involvement from their tutors (p=0.00).
Discussion and Conclusion(s): Research activity was more prolific in SR as measured by the SAI, even considering their difficulties and less support from their department. This result let us think about the final motivation of residents when facing a research. In Spain AR have higher chances of finding a job, even with a modest curriculum, while surgeons need to demonstrate more than clinical skills to be recruited. Publications on the influence of personality on job performance describe surgeons as overachievers". Also, surgeons have higher support from the industry that facilitates their involvement in clinical and animal trials; and their research field is wider. In conclusion, anaesthesia departments and tutors should find a way to motivate their residents to overcome the difficulties in our field.

17AP1-6

Standardized versus unstandardized interviews for anesthesiology residency selection

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Background and Goal of Study: The selection process for admission in Medical School and residency in the United States is based upon interviews and application forms review. Although many large organizations use structured interview questions to screen applicants, these questions are used infrequently in residency selection contexts. In particular, few studies have evaluated the reliability of structured interviews in residency selection contexts. The goal of our study was to assess the correlation between our program's standardized and unstandardized interviews for residency selection.
Materials and Methods: The Anesthesiology Residency interviews at the University of Minnesota included standardized questions for the first time in 2014. The selection of candidates was done based on application forms revision, standardized interviews, followed by unstandardized interviews. The standardized interview questions were validated for inter-rater reliability prior to the unstandardized questions. Numeric scales were used for the standardized interview (1-7, where 7 is the highest), the unstandardized interview (1-20, where 20 is the highest) and ranking classification (1-4, where 1 is the best). Two faculty members interviewed each candidate. Data were analyzed using SAS version 9.4. The Spearman correlation coefficient (R) was reported, considering the variables were not normally distributed.
Results and Discussion: The responses of 116 candidates were assessed using the standardized and unstandardized interview scales. A ranking classification was employed after incorporating the application forms in the evaluation. The standardized interview questions were positively correlated with the unstandardized interview questions ($R = 0.613$, $p<0.001$). There was also a statistically significant correlation between the standardized interview questions and the ranking classification ($R = 0.546$, $p<0.001$) and between the unstandardized interview questions and the ranking classification ($R=0.649$, $p<0.001$).
Conclusion(s): The standardized interview correlated with the unstandardized interview and with the final ranking classification. A standardized interview is a reliable assessment tool than can be incorporated in residency candidates' selection.

17AP1-7

Psychological support program to medical anesthesia residents: case report of the program

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Background: The period of medical residency requires coping with many personal and professional challenges. Having a psychological support service may be interesting to help adaptation. Few programs have this service and frequently they are neither evaluated, nor reported. The objective of this study was to report the service provided and the resident perceptions.
Case report: Sixteen residents (60% male), 53% were single, aged 24 and

30 and mostly from the first year (47%) integrated the program. For data collection a questionnaire with ten questions (open and closed) was developed to collect the resident opinions of the service provided throughout the year. It was observed that 75% of respondents considered an important or very important service. The majority (58%) reported that the service, by nature, enables the development of new skills, but despite this 58% had little or no involvement in the program. Most respondents felt that the program was related to the residency program, that the time allocated was enough and partially fulfilled the original proposal. Regarding satisfaction most respondents were unsatisfied (66%) and 82% felt that the themes developed by the program were inadequate. None of the participants considered to be totally able to expose their personal and professional difficulties in the group. The strengths of the program were: space for dialogue and share opinions, create group cohesion, exchange experiences and exposure of personal difficulties. Weak points were low interaction from the psychologists with residents, low interest of residents, excessive subjectivity in the proposed activities, the need for greater understanding of the routine of residents and lack of clear objectives and feedbacks. The main suggestions for improvement were: need for more frequent feedbaks, strategies to encourage participation in activities, improving communication and participation of residents in the proposed activities.
Discussion: Reviewing the psychological support program, we were able to make some adaptations and corrections of the program in order to fulfill the residents needs.
References: Baur VE, Abma TA, Boelsma F, Woelders S. Pioneering partnerships: Resident involvement from multiple perspectives. Journal of aging studies 2013;27:358-67.
Learning points: A psychological support during anesthesia residency is a valuable program but needs to be tailored according to the residents opinions.

17AP1-8

Enhacing curriculum vitaes in an economic crisis enviroment: summaries of skills and procedures from a database by residents

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Background and Goal of Study: After finishing a resident's formation period, it comes to a moment where the curriculum vitae takes an important role in order to find a position according to the resident's acquired skills. Not only scientific production, congresses and courses are important, but also the procedures the just finished anesthesiologist has done during its formation. But it is really difficult to get an objective summary in order to attach it to a well done Curriculum Vitae in an economic crisis environment where unemployment among young doctors entering the labour market.
Materials and Methods: Residents at our hospital have been using a web-based form in order to track the kind of patients, surgical procedures, skills applied by the resident, complications and final state of the patients they see in the surgical room. This system, called SIRPA (Spanish acronym for Computerised System for Patient Data Stroraging in Anesthesiology), has gathered more than 5000 patients in a year and a half. Although our prime objective was to have an evaluating tool for residents, this amount of data from each resident allow us to create summaries with the work done. After importing all the data to a database manager program, created reports can be exported to a P.D.F. document with the number of procedures, number of technics (epidurals, central venous catheters,...) and other information relevant. As a safety measure, the information is randomly checked. After this, the report is signed by the chairman of anesthesiology and can be attached to the Curriculum Vitae. We also provided a satisfaction survey among the resdients.
Results and Discussion: After a year of data, the checking process was successful, and it was officially singed by the chairman of Anesthesiology. The residents also felt very satisfied with this system (average of 4'875 in a 1 to 5 scale) We also asked about the usefulness with a 1 to 5 scale question, being 5 ‚Very Useful'. We got an average of 5 as a way to get accurate information for the curriculum vitae, 4'875 as a way to show a better training period to future employers and a 4'875 as a way to get higher qualification positions.
Conclusions: In an economic crisis environment, where in May 2014 7700 doctors where unemployed in Spain, we believe that a good Curriculum Vitae showing in numbers the work done by our trained residents could be the difference between getting a job position or not, or even getting a new one.

17AP1-9

Foundation programme training posts in anaesthetics and intensive care: junior doctors' experiences and feedback

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Background and Goal of Study: In the United Kingdom Foundation Programme placements (or equivalent) in anaesthetics and intensive care (ICU) have been available since 1997 and are becoming increasingly common[1]. Anecdotal evidence indicates that many trainees are not aware of such placements and as such do not have an appreciation of the benefits which they can offer.
Our aims were to evaluate the experiences of junior doctors in order to identify the key benefits offered by such posts and to publicise these benefits to current and prospective junior doctors as well as hospitals that may be considering introducing such placements.
Materials and Methods: We conducted an online survey of doctors who had recently undertaken Foundation Programme posts in anaesthetics and/or ICU within the four Foundation Schools of London. A link to the survey was forwarded to all junior doctors who had completed such posts in the last 2 years for each hospital. Responses were automatically populated into a table and analysed.
The survey included questions regarding the organisation of the placement and how it could be improved, impact on career decisions and which aspects of the placement they found most valuable and useful in their subsequent clinical practice.
Results and Discussion: Our results suggest that the most valuable outcomes of such placements are acquiring practical skills and managing the critically ill patient. Junior doctors feel that as well as clinical skills, they are able to develop non-clinical skills that are widely applicable to other specialties. All respondents indicated enjoyment of the placement and have found it beneficial in their subsequent clinical practice.
Conclusion(s): The results of our study are extremely positive. Foundation doctors are able to develop essential skills including basic airway skills and assessing critically ill patients, which can greatly benefit their future practice, regardless of their chosen speciality. Through dissemination of this data we hope to educate current and prospective junior doctors as to the existence and benefits of anaesthetics and ICU placements for doctors of their grade. In demonstrating the numerous benefits of such placements we also hope to encourage hospitals and trusts to create posts as part of future Foundation Programme rotations.
Reference:
1. UK Foundation Programme Office. Foundation programme annual report 2014—UK summary. UK Foundation Programme Office, November 2014.

17AP1-10

Evaluation of three years of a programme aimed to present clinical and technical aspects of anaesthesiology and intensive care medicine to undergraduate medical students

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Background and Goal of Study: Few national training programmes of anaesthesiology and intensive care medicine (AICM) have a defined policy of presenting the specialty to undergraduate medical students (UMS). Such a programme could be helpful for both presentation of the specialty to future anaesthesiologists residents, for educating other specialties to the specificities of anaesthesiology and to teach technical skills. Such a programme was initiated in Romania in 2012 under the name « be a good doctor ». Our goals are:
(i) to describe the content of the programme;
(ii) and the evolution of the number of UMS that participated;
(iii) to analyse the evaluation performed at the end of the programme.
Materials and Methods: The programme was co-financed from the European Social Fund. It was presented to UMS through conferences and detailed information was posted on a web-page (www.undoctorbun.ro). Ten AICM aca-

demic clinicians and eight attending physicians were involved. Selection of the UMS was based on curriculum vitae and a motivational letter. Theoretical and technical knowledge goals included: to teach technical skills (e.g. venous access, airway management) and initial assessment and management of critically ill patients.
Results and Discussion: The number of UMS was 30 in 2012, 150 in 2013 and 200 in 2014 with median year in medical school of 4 (range 2-5). Ten AICM departments allowed acquisition of technical skills. Lectures and debriefings represented 30 hours for the duration of the programme. Final examination based on the predefined goals was performed. All UMS passed the examination and the best 10 % were offered one week of further improvement of their theoretical and technical knowledge abroad (Paris, France). Sixty UMS that participated to the programme graduated medical school and 7 chose AICM as a specialty.
Conclusion(s): This is the first structured programme initiated in Romania that allows UMS to understand the theoretical and technical skills of anaesthesiology. We estimate that given the number of applicants, this programme is a success. Further improvement will require investment into simulation. The impact of the programme for presenting the specificities of anaesthesiology to other medical specialties requires further work.

17AP1-11

Climbing social media during anaesthesiology residency training

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Background and Goal of Study: Medical education is constantly evolving by gradually shifting from traditional methods to a more comprehensive approach. Modern anaesthesiology residency programs comprehend didactic lectures, mentored clinical training, simulations, together with directed self-study. In the era of web-based technologies, content is no longer distributed by paper alone. Therefore, the use of social media (SM), as an innovative tool during anaesthesiology residency, has greatly expanded. In this study we aimed to investigate SM engagement among our Department's residents.
Materials and Methods: A total of 18 (90%) of 20 anaesthesiology residents from our Department completed an online survey. They were 15 female and 3 male, aged from 27 to 34 years (mean±SD:30±2). More than half were first year residents (61%), while 22% were on the second, 6% on the third, and 11% on the fourth year of training.
Results: Our residents are avid supporters (78%) of SM networks. Among them the majority have Facebook profile (79%), less than a half YouTube channel (43%), and Twitter account (7%). SM platforms most commonly used for personal purposes are YouTube (67%), followed by blogs (61%), Facebook (55%), Wikipedia (47%), and Twitter (22%). YouTube was the most commonly used medium for learning (100%), aside with Wikipedia (94%), blogs (47%), Facebook (41%), and Twitter (18%). When comparing our residents SM engagement for personal, learning or teaching purposes, we found that the ones who are mostly using SM for personal reasons, are also more frequently using them when it comes to learning (Facebook: $P=0.016$, $Rho=0.574$; Twitter: $P< 0.001$, $Rho=0.855$; Wikipedia: $P=0.001$, $Rho=0.726$; You Tube: $P=0.003$, $Rho=0.668$; blogs: $P=0.001$, $Rho=0.715$; Rank correlation).
Conclusion: Our results show new emerging SM technologies are widely used among anaesthesiology residents as a supplement to traditional medical education and training methods. Furthermore, we suggest that educational effectiveness of SM be investigated in future studies.

17AP2-2

A simple epidural simulator for training a novice anesthesiologist

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Background and Goal of Study: Epidural anesthesia relies entirely on the feel and experience, which is difficult to be handed down to the trainee. We designed a simple and inexpensive epidural simulator for trainees to experience various degrees of pressure resistance at each lumbar structures as well as the feel of loss of resistance.
Materials and Methods: We recruited anesthesiologists from Asan Medical Center. A Perifix® Loss-of-Resistance syringe and 1, 5, 10, and 50 mL volume syringes were assembled with three-way stopcocks. For pressure resistance, the participants applied forces on the plunger of a Loss-of-Resistance syringe and chose only one layer (muscle, subcutaneous fat or interspinous ligament; ligamentum flavum; epidural space) that the needle tip was believed to be traversing. We realized the feel of a loss of resistance by a combination of 1mL and 50 mL syringes. They evaluated the visual analogue scale (VAS) score for a loss of resistance and for the applicability for training purposes.
Results and Discussion: Seventy-four anesthesiologists (24 residents, 14 fellows, and 36 staffs) completed the study. Participants regarded air pressure resistance to the 50 mL syringe as epidural space (86−96%), the 10 mL syringe as muscle, subcutaneous fat or interspinous ligament (83−92%),and the 1 mL syringe as ligamentum flavum (57−67%). The VAS scores for the applicability for training purposes were 8.6, 8.8, and 8.4 (resident, fellow, and staff, respectively)
Conclusion: Our epidural simulator is a simple and inexpensive device easily made with syringes by anyone. We believe this simulator may provide valid haptic feedback and seem to be a promising tool for training a novice anesthesiologist.
Acknowledgements: The authors would like to thank all members of Asan Medical Center for their support in performing this study.

17AP2-4

Bioprinting of human airway using 3 d printing - a concept for predicting difficult airway

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Background and Goal of Study: Bioprinting, or the process of printing simulated human tissues through three dimensional (3D) printers, is a highly researched area of technological innovation. It has expanded recently to allow printing and fabrication of body parts using a range of materials from soft hydrogels over polymer melts, to harder materials such as ceramics. In a clinical setting, patient CT scans are used to create stereolithography (STL) file formats to print solid 3D models which can then be used as templates for clinical needs.
Materials and Methods: We report a pilot case study for a known difficult airway in a patient who had surgery for maxillofacial trauma. The 3D model of the patient's airway from the oropharynx to subglottis was constructed and printed using his CT images. The facial tissues were constructed with low density silicone material. Multiple anaesthetists attempted fibreoptic intubation on the model to identify and compare the difficulties encountered with those documented in the anaesthetic chart.
Results and Discussion: A prospective pilot study is now underway to identify whether potential problems with intubation and face mask ventilation can be predicted using 3D models. With this we aim to have an accurate 3D model of the patient's airway, which can be used preoperatively to help plan an airway strategy. It may be possible to identify distorted anatomy, anticipated difficult laryngoscopy or difficult fibreoptic endoscopy. Furthermore it could be used for patient specific simulation for teaching. The model can be made from differing consistency materials to allow for variations in different tissues such as tongue, cartilages etc such that it reflects the density of live tissues and also allowing for bag mask ventilation under dynamic conditions.
Conclusions: 3D printing is essentially deposition of material in three dimensions using pressure. Materials used range from viscous paste to liquids, and are deposited using syringes moving in three dimensions. Air or mechanical pressure applied to the syringe, deposits the material for the length of movement and time the pressure is applied. The direction is changed for each layer producing a mesh with varied mechanical properties and porosity defined by the settings. The design of the interior of the object will strongly affect its mechanical properties, which may be changed to mimic the type of tissue it is replacing.

17AP2-5

Students embrace point of care ultrasound

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Background and Goal of Study: Point of care ultrasound is rapidly becoming essential for the modern medical practitioner (1) and is used widely in anaesthesia and critical care. Medical schools have been slow to recognise its potential value with only two UK centres reporting its incorporation into undergraduate curricula. We describe our pilot study assessing the feasibility and utility of including bedside ultrasound teaching in undergraduate medical education.
Materials and Methods: Our course taught abdominal ultrasound to undergraduate medical students at Swansea University in Wales. The course takes place over three hours, beginning with a ten minute formative test. This is followed by a twenty minute interactive presentation on bedside ultrasound. The students then break into groups of no more than five students for 130 minutes of experiential learning (including a ten minute break) guided by a facilitator. The course concludes with a ten minute summary of key points followed by a ten minute post course formative test.
Students are provided with a two page handout. Several methods assess the outcome of the course. Students evaluate their own understanding, the course experience and its utility to their ongoing practice using a feedback form. A pre and post course test assessed skill acquisition.
Results were analysed using Excel 2010, and statistical tests included Pearson's Chi-Squared Test and Student's T Test.
Results and Discussion: Twenty one students completed our course over a period of four months. All felt that there is a need for ultrasound in undergraduate curricula and all would recommend the course to colleagues. Mean test score increased significantly ($p<0.001$) from 57% pre-course to 95% following the course.
Each question was answered correctly by more students following the course, and this was significant ($p<0.01$) for four of the six questions.
Conclusion: Our students demand ultrasound education and our course is successful in delivering this. Based on our exciting pilot results we are now in the process of incorporating ultrasound both as an educational adjunct and as a diagnostic skill in its own right into our curriculum.
Anaesthetists are ideally suited to delivering point of care ultrasonography training, and ultimately our patients can only benefit - It is time to embrace the visual stethoscope.
Reference: 1. Soloman SD, Saldana F. N Engl J Med. 2014;370:1083-1085

17AP2-7

Intubation of a pediatric manikin in tongue edema and face-to-face simulations by novice personnel: a comparison of Glidescope and Airtraq

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Background and Goal of Study: Glidescope and Airtraq were designed to facilitate intubation and teaching the airway anatomy. We want to find their efficacy in normal airway, tongue edema and face-to-face orotracheal intubation models by novice personnel.
Materials and Methods: After Local Human Research Ethics Committee approval, thirty six medical students who were on the beginning of their third year were enrolled in this study. After watching a video about the intubation of one of these devices, they attempted to intubate a pediatric manikin in three different airway models in a random order; first in normal airway, second tongue edema and finally in an entrapped model by face-to-face approach with Glidescope or Airtraq. Intubation attempts, insertion and intubation times, success rates, Cormack-Lehane grades, the need of maneuvers of these devices were recorded.
Results and Discussion: Even though the insertion and intubation times were similar among groups, intubation success rate of Glidescope was higher in normal airway (100% vs 67%) and tongue edema (89% vs 50%) when compared to Airtraq ($p=0.008$ and $p=0.009$). Success rates in an entrapped pediatric manikin by face-to-face approach were similar among groups (50%) ($p=0.7$). The need of maneuvers in Glidescope were lower in normal and tongue edema model ($P=0.02$ and $p=0.002$). Esophageal intuabation were lower in control and tongue edema model with Glidescope too ($p=0.03$ and $p<0.001$).
Conclusion: Novice personnel could easily intubate the trachea with Glidescope rather than Airtraq. Intubation with Glidescope was superior to Airtraq in normal and tongue edema models by novice personnel. Face-to-face intubation success rates were both low with Glidescope and Airtraq.

17AP2-8

A comparison of the A.P. AdvanceTM video laryngoscope and C-MAC® video laryngoscope with the Macintosh blade for intubation of the difficult airway: a manikin study

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Background and Goal of Study: The use of video laryngoscopes has significantly increased in recent years. We compared the Macintosh 3 blade, against the AP.
AdvanceTM (APA VLS) which has a guide channel and foregoes the need for a stylet and also against the C-MAC® VLS which is non channeled. On the manikin we simulated three difficult airway scenarios.
Materials and Methods: On a Trucorp manikin, we simulated a difficult airway due to Cormack-Lehane grade III laryngoscopy, a difficult airway due to manual in-line stabilization and lastly due to tongue swelling (5ml air used in tongue manikin). Anaesthetic colleagues were asked to perform intubation in all three scenarios using MAC 3, APA and CMAC with standard and difficult airway (D) blades. Timings were
recorded for visualization of the vocal cords, number of attempts, use of bougie, dental damage and analysed with Wilcoxon paired t test (for time of intubation).
Results and Discussion: The results are tabulated below. There was no dental damage and the majority of intubations with APA were achieved on first attempt (18/20) with two attempts for the remainder (2/20).
Conclusion(s): In the difficult laryngoscopy scenario, the time to intubate was shortest with the CMAC-3 and longest with the CMAC-D. In the two scenarios of tongue swelling and manual in line stabilization, the APA 3 had the shortest times. Overall, the longer time to intubation was statistically significant with the CMAC-D. Interestingly VLS size 3 blades performed better than D blades. This could simplify our airway strategy if we focus on using the VDL's with their standard blades until more evidence is gathered. Consistent with previous studies [1,2] visualization of the vocal cords did not equate to speed of intubation.
References:
1. Byhahn C, Iber T, Zacharowski K, Weber CF, Ruesseler M, Schalk R, Meininger D. Tracheal intubation using the mobile C-MAC
video laryngoscope or direct laryngoscopy for patients with a simulated difficult airway. Minerva Anestesiol 2010, 76:577-583
2. Aziz MF, Dillman D, Fu R, Brambrink AM. Comparative effectiveness of the C-MAC video laryngoscope versus direct laryngoscopy in the setting of the predicted difficult airway. Anesthesiology 2012, 116:629-63

17AP2-10

Iatrogenic epidural empyema after peripheral venopuncture

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Background: Epidural empyema is rare accounting for only 1:10 000 within the causes of hospital admissions. Associated with a high rate of morbidity and mortality, its difficult diagnose almost always delays institution of adequate therapy. Also its symptoms may be hard to notice in the critical ill patient who might have several other conditions possibly explaining the same clinical presentation.
Case report: We hereby describe the case of a 62 year old man, with known history of ankylosing spondylitis under long term systemic corticosteroid therapy, admitted in an orthopedic ward for a D5 fracture with two months of evolution but without neurologic deficits.
One week after admission the patient was transferred to the ICU in septic shock with pulmonary cause.In the ICU the patient remained unstable despite vasopressor support even entering in cardiac arrest reverted within the first cycle of advanced life support.Multiple antibiotic schemes were prescribed

according to the microbiologic results with improvement of clinical status. Weaning was initiated but flaccid tetraparesia was noted. Differential diagnosis included Critical Illness Neuropathy but electromyography was unavailable in our institution.
MRI was then performed, revealing an extensive cervical and dorsal epidural empyema.Sample of the abscess was surgically collected with isolation of Staphilococcus epidermidis and despite multiple antibiotic schemes clinical status of patient continued worsening and he died after 3 months in the ICU.
Discussion: Differential diagnosis of tetraparesia in ICU environment is difficult and may sometimes include rare and almost unthinkable causes.
References:
Pilkington SA, Jackson SA, Gillett GR.: Spinal epidural empyema, Br J Neurosurg. 2003 Apr;17(2):196-200.
Learning points: Perhaps it's time to think how aseptic precautions should peripheral venous puncture of immunosuppressed patients be.

17AP3-1

Building international partnerships: a course for a course

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Background: Aneurin Bevan University Health Board (ABUHB) in South Wales has been supporting international health links for many years through organisations such as Mothers of Africa (MOA). ABUHB Critical Care Consultants recognised a need for an introduction to critical care course for Welsh trainees. In addition MOA had established a need for critical care training in Liberia. The BASIC (Basic Assessment and Support in Intensive Care) course developed by the Chinese University of Hong Kong (CUHK) and recognised internationally is aimed at junior doctors with little ICU experience.
BASIC has been adapted for developing health care systems (DHS). In August 2013 MOA ran a BASIC DHS course directed by Professor Charles Gomersall (CUHK) in rural Liberia.
As a result of this collaboration the concept of 'a course for a course' was suggested whereby Welsh BASIC courses fund the equivalent in the developing world. The first course was delivered in March 2014 at the Royal Gwent Hospital by ABUHB consultants.
Goal: To evaluate the BASIC course in terms of knowledge/skills and confidences gained. In addition to collect feedback on course content and delivery that will allow improvements.
Materials and Methods: 30 candidates completed a standardised feedback and evaluation form and a post course MCQ.
Results and Discussion: Candidates graded (on a scale of 1-10) usefulness, content/relevance and delivery/presentation of all lectures and skills stations. 99% were rated above 8 and 61% above 9. Subjectively candidates knowledge (rated on a scale of 1-10) improved from a mean of 5.7 before candidates read the manual and attended the course to 7.7 after the course. Similarly their confidence levels improved from 5.4 to 6.9. Mean post-course MCQ score was 63% (pass mark 50%) compared an average of 61.3% for all BASIC courses.
Conclusion(s): This evaluation has demonstrated subjective improvement in trainee knowledge, skills and confidence, and objective evidence that knowledge gained is equivalent to other BASIC courses. Further evaluation is required to demonstrate impact on patient care in Wales. Of note all candidates who undertook the BASIC DHS course in Liberia reported changes to their clinical practise giving examples of improved patient care. This model of a course for a course will strengthen critical care training in Wales and Liberia and demonstrates the value of international health links.

17AP3-2

Impact of 18 years of Benin-Belgium cooperation on anesthesiologists' demography in West Africa

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Introduction: Kester Brown, WFSA 1992: *Sub-Saharan Africa, the only region in the world with a decreasing number of anesthesiologists*. Need to restore "critical mass" to pass knowledge to the next generation. 1994 : French-speaking Belgian universities decide to support the Univ. of Abomey-Calavi (Benin) to start its residency program, open to MDs from all French-speaking African countries.
Methods: Financial & logistical supports for a total of ≈ 1 Million € over 15 years, from a) Belgian Cooperation grants **b)** 11 Belgian Hospitals **c)** 3 Belgian universities **d)** individuals **e)** pharmaceutical companies **f)** NGOs: Médecins Sans Frontières (Belgium) & Terre des Hommes (Switzerland). **Expenses:** 10 local scholarships + 37 for a 3^{d} year in Belgium + 3 doctorates. Computers, books, teaching and medical material. Secretary. North-South & South-South jury & teaching missions.
Results: A- Direct : in 15 years 124 candidates enrolled from 17 countries and 57 graduated from 11 countries; 80% of graduates work in Africa; 68% teach; rotations in Belgium for 37 candidates & 3 doctorates. On average training lasted 5.3 years. The Cotonou school for nurse anesthetists started in 2002 and already graduated >150, multiplying the impact of the new anesthesiologists. Alumni work(ed) in Darfour, Haiti and Porga crises. Two professors got CAMES certified + 1 ready for 2012.
B- Data for demographic studies: 15 years experience and number of candidates yielded data for African anesthesia workforce previsions: brain-drain (17%), drop-out (3%), mortality & incapacitation (12%), duration of studies, % of female specialists (17% and decreasing), etc
Discussion: A- With limited financial means, African leadership and avoiding humanitarian action, the project has succeeded in reversing the negative demographic trend in French-speaking West Africa + restored conditions for knowledge transmission. **B-** The future still depends on very few individuals. **C-** Brain drain remains a constant threat. **D-** Most African Countries should provide better reinsertion

17AP3-4

Pitfalls in reporting sample size calculation in randomised controlled trials published in leading anaesthesia journals: a systematic review

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Background and Goal of Study: We have evaluated the pitfalls in reporting sample size calculation in randomised controlled trials (RCTs) published in leading anaesthesia journals.
Materials and Methods: Medline database was searched for parallel group superiority RCTs in the 10 highest impact factor anaesthesia journals published in 2013. We checked for the frequency of reporting and availability of the basic components of sample size calculation. The sources estimating the expected effect size (delta) in the primary outcome were identified. The difference between the reported and replicated sample size was categorised. The differences between the expected and observed effect sizes (delta gap) were estimated. Post-hoc power calculation was performed for studies with negative outcome.
Results and Discussion: A total of 194 studies were enrolled and 37 did not fulfill the pre-specified inclusion criteria. Sixteen studies (8.3%) did not report any calculation for sample size, while 178 (91.7%) reported one or more of the essential parameters of sample size estimation. Replication of sample size calculation was possible in 143 (80.3%) studies. The replicated and reported sample sizes were identical in 67.8% of studies.and were different in 32.2% studies. The difference between the replicated and reported sample sizes exceeded 10% in 28.7% of studies. The expected and observed effect sizes were comparable in RCTs with positive outcomes [mean 95%CI delta gap -6% (-14.0-2.0%)], p=0.1. and were different in studies with negative outcomes, [mean 95%CI delta gap 42% (32-51%)], p<0.001. The mean 95%CI post-hoc power of studies with negative outcome was 20.1% (13.4-27.2%). The assumption for the expected difference was based on published reports in 92 (51.7%) studies and on pilot studies in 29 (16.3%) studies. While 57 (32.0%) of studies did not specify the source of the expected difference. The delta gaps were smaller for RCTs using pilot studies for estimating the expected effect size (P=0.008).
Conclusion(s): The transparency and integrity of reporting sample size calculation in anaesthesia journals needs to be improved. The discrepancy between the reported and replicated sample sizes and the frequent overestimation of the expected effect size in negative studies suggest that clinical investigators need to be more vigilant and consider cooperation with expert statistician to ensure appropriate calculation and reporting of sample size.

17AP3-5

Impact of advanced monitoring parameters on intraoperative clinical decision- making: an international survey

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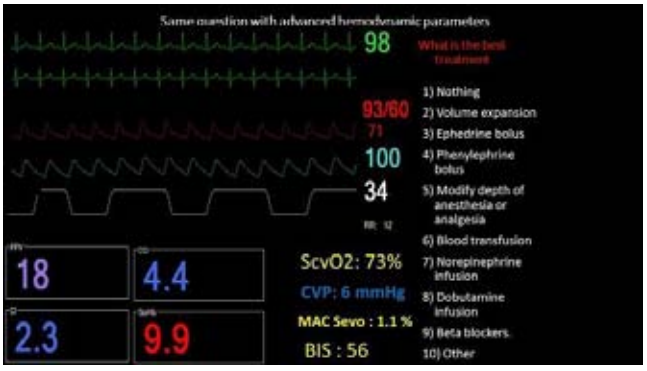
Background: Intraoperative monitoring has greatly improved over the years from "basic" to highly sophisticated technologies providing advanced parameters such as flow indices, depth of anesthesia and hemoglobin levels. These advanced parameters contribute to optimize patient's status through suitable therapy selection. However, their impact on clinical-decision making has not yet been demonstrated.
Methods: After IRB approval, a 10-questions survey was initially emailed to international experts and subsequently to physician members of 4 anesthesia societies (SFAR, SBAR, SCA, EACTA) using an online database (Qualtrics). This survey focused on ascertaining what actions clinicians would take in 3 real-life cases with case information & basic monitoring (T1) , followed by the addition of advanced parameters (T2) (Figure 1). The goal of the study was to assess the agreement (concordance rate of physician responses compared to experts) and the precision (using an Index of Qualitative Variation)of provided responses between both groups.
Results: The survey has been completed by 15 experts and 714 physicians (Table 1). Agreement between physician and expert responses increased from 51 % at T1 to 69 % at T2 ($p<0.0001$). Physician response variability remains high (IQS= 0.61 at T1 vs 0.55 at T2, p= 0.55). In contrast, expert response variability is low at T1 and decreased further at T2 (IQV:0.33 T1 vs 0.20 T2, p =0.04). The greatest shift in decision making was observed when both groups decide to base their treatment on a multimodal approach.
Conclusion: Our results demonstrate that the practical use of advanced parameters was of high benefit for experts but not for physicians for whom a better education on the appropriate use of these parameters is required. Since any parameters on its own provides limited information and is just one piece of a larger puzzle, therapeutic decisions have to rely on a multimodal approach.



[figure 1]

Characteristics	Physicians (%)	Experts (%)
Anesthesiology Position: Resident / attending / Head of dept.	15 / 67 / 10	0 / 20 / 65
Years of practice: < 5 y / > 5 y / > 10 y / > 20 y / > 30 y	16 / 21 / 21 / 28 /14	0 / 14 / 22 / 29 / 35
Types of hospital: University / District / Private	52 / 22 / 26	100 / 0 / 0
Region of practice: USA / Europe/ other countries	33 / 55/ 12	15 / 64 / 21

[Table 1]

17AP3-6

Nil by mouth - what does it really mean?

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Background and Goal: Nil by mouth (NBM) is commonly taken literally by patients and hospital staff, with complete starvation and omission of medications for an often excessive period prior to surgery, with potential implications on anaesthesia (1,2). This is contrary to published guidelines (3,4). We surmise that there is staff uncertainty as to the meaning of NBM and unfamiliarity with the guidelines.
Materials and Methods: With audit committee approval, we created a paper survey to explore staff understanding of current guidelines on pre-operative starvation and drug administration/omission in patients receiving planned surgical interventions. Over 7 days we visited every surgical ward in the hospital and surveyed nursing staff and junior doctors.
Results and Discussion: We received 56 responses (33 nurses and 23 doctors). The results are summarised below alongside the national guidelines.

	Guidelines (4)	Overall	Nurses	Doctors
Solid Food	***6 hours***	70%	70%	70%
Milky Drinks	***6 hours***	71%	76%	65%
Clear Fluid	***2 hours***	61%	61%	61%
Water	***2 hours***	64%	67%	61%
Liquid Medication	***Consume up to surgery***	36%	49%	17%
Tablets	***Consume up to surgery with ≤30ml water***	29%	30%	26%

[Percentage of correct answers by each group]

The majority of staff knew that food should be withheld for 6 hours (70%) and water for 2 hours (64%). However, understanding relating to the fact that oral medications could be given up to the point of surgery was poor (36% for liquid oral medication and 29% for tablets).
There was also poor understanding as to which classes of medication were usually omitted prior to surgery.
Conclusions: These results may go some way to explain why patients often arrive in the anaesthetic room dehydrated and having missed essential oral medication.
The majority of those surveyed (50 out of 56) stated that they would be interested in further education. We plan to produce posters with guidelines on and provide a teaching session for junior medical staff. We aim to repeat the survey after these interventions.
References:
1. Nil By Mouth: Best practice and patient education. Nursing Times 2010 Vol. 110, no. 26 p. 12
2. Kluger Mt et al. Peri-Operative Drug Prescribing pattern and manufacturers' guidelines. An audit. Anaesthesia 1991 Vol. 46, issue 6, pp. 456-459
3. Pre-Operative Assessment and Patient Preparation. January 2010, AAGBI Safety Guidelines
4. Perioperative Fasting in Adults and Children. November 2005, RCN Clinical Practice Guidelines

17AP3-7

Lessons from NAP5 - where do we stand?

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Background and Goal of Study: NAP5 has highlighted conversion of a volatile anaesthetic to TIVA and the transfer of paralysed patients outside theatres as high risk situations for awareness under general anaesthesia (AAGA). They recommend that all anaesthetists should be trained in the maintenance of anaesthesia with intravenous infusions. We set out to ascertain current levels of training amongst trainee anaesthetists on sedation for transferring intubated adults in the South East of England. We wanted to ascertain current practice and whether there was interest in further training.

Materials and Methods: We distributed an anonymous online survey via email to every anaesthetic trainee working in the South East of England. This 14 questioned survey covered two main topics:
1. Drugs used to sedate intubated adult patients and;
2. Monitoring of this sedation.
Results and Discussion: 67 trainees responded to our survey. 95.5% were senior trainees (ST3 or above) and 98.5% had been involved in transfers in the past 12 months. 85% had received training on sedating intubated adults. 74.6% of respondents routinely used muscle relaxants when transferring intubated patients. Most used propofol to sedate (95.5%) with 76.1% using opioids. Few used a combination of drugs (5.9%). 98.5% used clinical signs to monitor levels of sedation. 55.2% used the level of sedation prior to transfer to gauge the amount required. 32.8% routinely used a fixed TIVA infusion. 13.4% said they used TCI regimes. 50% of respondents expressed an interest in receiving more training.
This survey highlights the many techniques used for sedating patients. This is not surprising given the lack of available national guidelines. However, we question the need for routine muscle paralysis particularly for short internal transfers as this has been highlighted as a significant risk for AAGA in NAP5. Few trainees appear to use a combination of propofol and opioids that has been suggested as a way to minimise the cardiovascular side effects. Few use TCI infusion rates when transferring patients. It is not clear why this was found although lack of equipment may be a factor.
Conclusion: There is interest in obtaining further training in this area. We have devised and implemented a NAP5 simulation training session at our institution. We would encourage other institutions to provide additional training in order to explore these areas further.
Reference:
1. NAP5 executive summary and recommendations

17AP3-8
NAP 5 - from protocol to practice

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Background and Goal of Study: Accidental awareness during general anaesthesia (AAGA) is a complication feared by both patients and anaesthetists. The recent NAP 5 report[1] has provided us with many recommendations for preventing AAGA. NICE has published a document dedicated to the subject of changing practice[2].
Our aim was to use these techniques to highlight NAP 5 findings to a group of anaesthetic trainees and in doing so implement some of the recommendations highlighted in the report.
Materials and Methods: Initially the NAP 5 report was emailed to every anaesthetist in our department (60 people). This was followed by a PowerPoint presentation at the departmental Clinical Governance Meeting containing the main recommendations (22 people). Two weeks later we organised a NAP 5 simulation morning to a group of anaesthetic trainees (8 trainees).A short anonymous questionnaire was sent out 3 times to the group of anaesthetic trainees: prior to the PowerPoint presentation, prior to the simulation session and two weeks after the simulation session. These were completed at 2 week intervals and were designed to gauge knowledge of NAP 5 from 1. The initial email, 2. The PowerPoint Presentation and 3. The simulation session.
Results and Discussion:

	Questionnaire Yes (%)	Questionnaire Yes (%)	Questionnaire Yes (%)
Are you aware of NAP5 awareness pathway?	0	33.3	100
Do you consent for awake extubation when using ETT?	16.7	33.3	75
Do you consent for sedation level of consciousness when sadating patients?	66.7	100	87.5

[Questionnaire]

The greatest improvement was seen after the third questionnaire. In addition 62.5% of respondents said that simulation had encouraged them to read NAP 5 independently. 75% of trainees surveyed said they had changed their practice as a result of the simulation training. We used the techniques written by NICE in “How to change practice”and it proved that interactive meetings are more effective in changing behaviour”. Our NAP 5 simulation reached a small number of trainees (8) yet 75% changed their practice because of it.
Conclusion(s): Through various teaching methods and particularly via an interactive simulation session we have targeted and improved trainee awareness and knowledge of NAP 5 audit recommendations at our institution. The challenge is to extend this to the wider audience in order to successfully implement national audit recommendations.
References:
1. NAP 5 executive summary and recommendations
2. NICE guidelines - How to change practice, 2007.

17AP3-9
Brighton anaesthetic department App and smartphone survey (BADASS)

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Background and Goal of Study: Portable technology, smartphones and tablets, are becoming commonplace in the work setting and allow both access to guidelines and also improved communication. This project set out to identify the use of smartphones in the workplace, what they were being used for and if they improved access to guidelines.
Materials and Methods: This was a two part project. Initially a survey (Loop Survey) was sent out that asked 7 questions on smartphone ownership, what they were used for and limitations to use. The second part of the project was to use a targeted tutorial to test to see if educational intervention could improve the ability to access guidelines on a smartphone usage to aid clinical practice. We used time to access information as a measure of improvement.
Results and Discussion: 51 anaesthetists were surveyed across the Brighton and Sussex University Hospital Trust. Respondents included consultants (61%), registrars (27%) and SHO’s (12%). 96% owned a smart phone. Respondents replied that they used their phones at work for both work and leisure activities. Respondents felt that lack of phone reception (24%) and lack of Wi-Fi (39%) were the main barriers, followed by knowing available resources (11%), lack of time (6%), unprofessionalism (9%), screen too small (6%) and technology problems (4%). When completing the survey, 53% were completed on a portable device. Of these the majority were completed on an Apple iPhone.
For the second part of the project we found that the average time taken to access the guideline was dramatically improved after a technology tutorial. Access from a trust computer was 199.13 seconds (128-450) from login, on a smart phone using 3G or wifi was 147.57 seconds (31-500) and after a technology tutorial access from login was reduced to 15.75 seconds (3-34).
Conclusion(s): This project therefore acknowledges the use of smartphones in the workplace and supports better Wi-Fi access alongside tutorials in their use. It identifies that Apple iPhones are the predominant smartphone used. Given the transient nature of trainees through departments, a technology tutorial could be used as part of any departmental induction. This would allow new trainees to have access to the trust guidelines from the outset.
Reference: Dasari KB, White SM & Pateman J. Survey of iPhone usage among anaesthetists in England. Anaesthesia. 2011 Jul;66(7):630-1. doi: 10.1111/j.1365-2044.2011.06747.x.

17AP3-10
What patients know about us

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Background and Goal of Study: Published studies show a lack of knowledge by patients about the role of the anesthesiologist, including their responsibilities and medical education (1, 2). The goal of this study is to evaluate the knowledge of patients about anesthesiologists work.
Materials and Methods: We asked 100 patients, in the postoperative period, to answer a questionnaire to test their knowledge about the role of the anesthesiologist.
Results and Discussion: The mean age of the 100 patients that answered the questionnaire was 57.1 years, 49% were male. The education level of the patients was the following: 8% college (group A), 29% high school (group B), 56% elementary school (group C) and 7% no education (group D). 65% knows the surgeon’s name, against 8% who knows the anesthesiologist name. 100% of group A and 43% of D are aware that the anesthesiologist has other

tasks outside the operating room. 75% of group A and 43% of D know that the anesthesiologist makes outpatient visits. 57% of group D answered that the anesthesiologist knows how to do surgery. In what concerns the choice and administration of drugs used in anesthesia and analgesic practice, 40% of patients think it is the responsibility of the anesthesiologist, against 41% who thinks it is the surgeon responsibility.
With regard to perioperative monitoring: 41% thinks to be a surgeon task and 24% thinks to be responsibility of the anesthesiologist (group A - 63%; D - 0%). 70% say that the anesthesiologist is a doctor, 18% that is a health technician and 8% is a nurse. In descending order of need for education and training, of a suggested list, patients established the following order: surgeon, pediatrician, general doctor, anesthesiologist, pharmacist, nurse. 38% of patients reported that in the preoperative period the main concern relates to anesthesia and possible associated incidents.
Conclusions: The knowledge of the anesthesiologist functions is greater the higher the level of education. For patients, Anesthesiology remains a medical specialty with little need for education and training.
References:
1. J Clin Anesth 2006 Nov;18(7):504-9.
2. J Clin Anesth 2003 Sep; 15(6):451-4.

17AP3-11

What do medical students think about anaesthesiology?

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Background and Goal of Study: It is already known that the majority of general population do not recognize the role of anaesthesiologists, their areas of action and the responsibility they hold in health services.[1][2] The aim of this study is to determine, along a privileged population - medical students - what is their opinion about anaesthesiology.
Materials and Methods: This descriptive study resulted from confidential surveys applied to 5th grade medical students before and after an optional anaesthesiology course in a national medical school. The survey consisted of 9 statements to which students had to correspond answers from "strongly disagree" to "strongly agree", using a 5 itens Likert scale. Statistical analysis by SPSS20® software, using Sign test for non-parametric variables. Significant was set to a probability value of 0.05.
Results and Discussion: All students who attended the course were included: a total of 20 students, 60% females. The median age was 23,2±1,36 y.o.
After the anaesthesiology course, students positively changed their opinion about anaesthesiology with statistically significant difference in 5 of 9 statements. The most significant were statement (S)1 "I know what an anesthesiologist's activity on a day to day basis consists of". ($p<0,001$), S3 "The anaesthesiologist work is limited to the operating room" ($p=0,013$) and S6 "The anaesthesiologist has a secondary role in operating room" ($p=0,002$).
In relation to S9 "Anaesthesiology is a specialty that I want to work in the future", 7 students (35%) changed their opinion positively ($p=0,016$).
Conclusions: Medical students are a population group with better knowledge regarding medical specialties. Even within this group, it was clear the lack of knowledge about the role of anaesthesiologists, their areas of action and their responsibility. The anaesthesiology course contributed positively to change medical student's opinion and to clarify and increase their knowledge about this area of medicine. In the future we we will try to extend the course to all students by incorporating this course on medical school curricula, instead of keeping it optional.
References:
1. J Clin Anesth. 2006 Nov;18(7):504-9.
2. J Clin Anesth. 2014 Aug;26(5):375-82.

17AP4-2

A study examining the retention of knowledge and skills in use of the defibrillator during resuscitation amongst various grades of nursing staff and doctors in a large Cardiothoracic Intensive Care Unit (CTICU)

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Background and Goal of Study: Evidence suggests retention of basic resuscitation skills is poor[1].CTICU sees 1500 admissions of cardiac surgery and cardiology patients annually. Use of the defibrillator is a frequent occurrence. This study assessed the relationship between training and competency in recognising and managing cardiac arrest rhythms using defibrillation with correct energy levels across staff.
Materials and Methods: The study was conducted during October 2014. 14 questions compared qualifications with internationally recognized resuscitation courses and accurate recognition and management of the 4 cardiac arrest rhythms, further knowledge of defibrillation and cardioversion, and correct selection of energy levels. Questionnaires were distributed by 2 members of staff and collated using an anonymised central collecting box.
Results and Discussion: 44 out of 65 questionnaires were completed by 36 nurses and 8 doctors. 98% of staff had attended resuscitation courses. However, shortcomings existed in recognition of the 4 cardiac arrest rhythms and their management with defibrillation.(Table 1)

Rhythm	% of incorrect rhythm recognition	% incorrect of whether a rhythm was shockable/non shockable
VT	28	25
Asytole	14	9
VF	20	16
PEA	57	18

[Table 1]

30% of staff selected the incorrect energy level for defibrillation. Many junior nurses and doctors did not identify the need for synchronised cardioversion and junior doctors scored poorly in comparison to senior nurses. Inequalities between the numbers of answered questionnaires for the various staff existed but this is representative of how CTICU is staffed. It should be noted that the questionnaire was not validated and focussed on theoretical skills.
Conclusions: 98% of staff attended accredited resuscitation courses, but junior nurses and doctors had poor retention of knowledge and skills in use of the defibrillator, whereas senior nurses performed excellently. Junior doctor outcomes were particularly concerning as they often lead cardiac arrest calls in the absence of senior nurses. Retention of resuscitation skills are vital for improving patient outcome, consequently strategies are being implemented to improve this in CTICU.
Reference: Chamberlain D,Smith A,Colquhon M,et al. Comparison of CPR performance and skill retention using either staged instruction or conventional training.Resuscitation 2001;50:27-37

17AP4-3

Effects of lecture, simulation, or both on immediate and long-term learning in health care students

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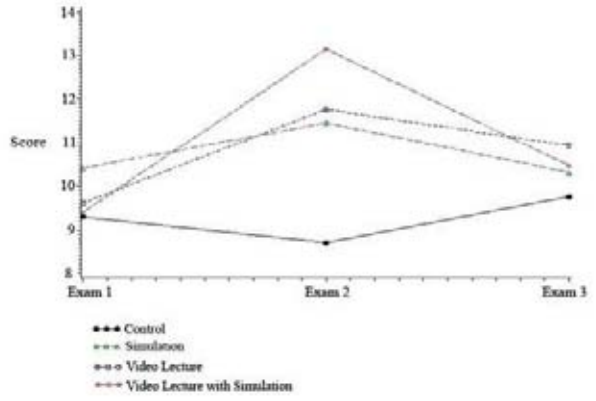
Background and Goals of Study: The primary aim of this study is to identify which teaching method or teaching method combination yields the greatest immediate knowledge gain and long-term knowledge retention in medical and nursing students.
Materials and Methods: Recruited students were randomized into four neonatal resuscitation teaching method groups: control, video-lecture, simulation, and a combination of video-lecture with simulation. Three exams were administered:

1) Pre-Intervention Baseline Knowledge Exam #1,
2) Immediate Post-Intervention Knowledge Gain Exam #2, and
3) Long-Term Knowledge Gain/Loss with Retention Exam #3.

Results and Discussion: Eighty-nine health care students were enrolled. All demographics were equally distributed across the four teaching methods. On average students had 17 years of schooling, had been working for 2.1 years and had been exposed to medical training for 1.4 years. In univariate and multivariate analyses, teaching method was significantly associated with differences in Exam #2 and Exam #1 scores (Difference 2,1; $p=0.0001$) and differences in Exam #3 and Exam #2 scores (Difference 3,2; $p=0.001$). Professional program was statistically significant only in univariate analysis ($p=0.02$) and borderline in multivariate analysis ($p=0.06$).

Results show immediate knowledge gain for all teaching methods except for the control group. The Video-Lecture and Simulation interventions showed a positive difference between scores on Exams #2 and #1 (2.1±2.4 and 1.0±2.2 respectively). The combination of Video-Lecture with Simulation showed the largest positive difference which was more than just additive (3.7±2.4 versus predicted value of 3.1±2.3). For long term knowledge gain, all three teaching methods were numerically better than control.

Conclusion: Teaching methods had an effect on immediate and long-term learning. For immediate knowledge gain, video-lecture with simulation performed the best. For long-term knowledge gain/loss with retention relative to baseline knowledge, video-lecture alone performed the best numerically. All three teaching methods were better than control for immediate and long term learning methods. (See Figure 1).



[Figure 1: Mean Exam Scores for Teaching Method]

17AP4-4

Effect of a simulation based training program for French intensive care residents on technical skills, leadership and stress

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Background and Goal of Study: In French intensive care units, residents are often in first line to manage critical ill patients. However they don't feel prepared enough, even though high levels of competence are require in those situations (use of knowledge, team management). Leadership and stress management are some pitfall challenging them in critical situation. Simulation training has been shown to improve non-medical performances in crisis medical situation, but has been poorly used for non-anesthesiologists residents. The aim of this study was to examine if simulation could improve technical skills (TS), leadership and decrease stress in residents of a gastroenterological intensive care unit (ICU).

Materials and Methods: This was a prospective randomized simulation study performed in Caen (France) after ethic committee agreement. ICU residents were evaluated just after 3 different scenarios (acute respiratory failure in acute pancreatitis, hemorrhagic shock in a cirrhotic patient and cardiopulmonary resuscitation after a gut bleeding) at baseline (M0), 1 (M1) and 5 month (M5). Primary outcome was improvement of TS (0 to 20 scale). Secondary outcome were stress (NASA task load index) and leadership (leader behavior description questionnaire (LBDQ) adapted) evaluation. Each scenario included a team composed with 1 resident, 2 nurses and 1 nurse's aide working in ICU.

Results and Discussion: Twelve residents were evaluated in 36 simulations. There were a significant improvement in TS (14.3 at M0 vs 16.3 at M5, p=0.03) (figure 1), leadership (27 at M0 vs 29 at M5, p=0.035), stress (346 at M0 vs 278 at M5 ; p=0.012), achievement scale (M0 vs M5, p=0.0055 and M1 vs M5, p=0.03) and a significant decrease in frustration scale (M0 vs M5, p=0.032 and M1 vs M5, p=0.045). There were no significant differences in TS, leadership and stress between the 3 scenarios. There was a significant negative correlation between TS and stress at M0 (p=0.019) but not at M1 (p=0.68) or M5 (p=0.41). There was a positive and significant correlation between TS and leadership at M5 (p=0.019). Simulation training improves skills (technical and non-technical) of residents. Improvement in leadership and decrease in stress were linked with improvement in TS.

Conclusion: Non-anesthesiologists residents may benefit from simulation training in order to improve the quality and management of intensive care in France.

17AP4-6

High-fidelity biomedical simulation in critical events: management of massive hemorrhage and its impact on self perceptive competencies. Retrospective study

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Background and Goal of Study: Massive hemorrhage (MH) is one of the most feared emergencies as its severity can have a catastrophic impact in patient prognosis. High-fidelity biomedical simulation allows training of this critical event, allowing practitioners to evaluate their skills, to prepare and improve their performance. The course of clinical management of massive hemorrhage (CMMH) was created to practice technical and non technical skills which cannot be trained in the daily practice. Our goal was to evaluate the impact of this course in the individual perception of competencies gained by each participant and the potential benefit for patients in clinical practice.

Materials and Methods: Retrospective analysis of anonymous questionnaires applied before and after the CMMH course in 2014. Each participant made a self evaluation about knowledge and experience in the management of massive hemorrhage filling a numerical scale from 0 to 10. Satisfaction and expectations before and after the course were also evaluated. Statistical analysis was made with SPSS 22.0®.

Results and Discussion: Of the 37 participants, 33 were anaesthesiologists (17 specialist / 16 residents), 2 were Intensivists and 2 were immunohemotherapists (residents). There was an improvement of the results in the post-course survey with statistical significance ($p\leq0.05$): knowledge and experience in the management of MH (6.0 vs 7.7;$p< 0.001$) and (5.7 vs 6.5;p=0.02); knowledge and experience in the correct evaluation of coagulation in patients with MH (6.1 vs 7.9;$p< 0.001$) and (5.4 vs 6.7;p=0.003); knowledge and experience in the management of rotational thromboelastometry (4.3 vs 7.8;$p< 0.001$) and (3.5 vs 6.2;$p< 0.001$). About the simulated clinical cases with ROTEM®, mean classification was 8.6 (±0.180). Participants started this course with an expectation of 8.4 (±0.20) and assigned an overall assessment of the course of 8.8 (±0.153) (p=0,081).

Conclusions: After the course participants showed improved confidence in the management of MH, with a superior self perceptive evaluation of their competencies. High-fidelity biomedical simulation in this setting allowed the acquisition and training of basic knowledge, with "hands on" experience which improves medical performance in the presence of identical event. There seems to be great potential benefit in this course for anesthesiologists where patient safety and quality management is concerned.

17AP4-7

Impact of a teach the airway teacher course: does it really improve didactic competence?

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Background: Anaesthesiologists are involved in clinical airway management (AM) and directed interactive clinical 1:1 airway teaching in the OR is essential for residents to become skilled physicians. We evaluated the participants' self-

assessment on their specific airway teaching skills after the "Train the Airway Trainer" Course (TAT) at the 2013 European Airway Conference in Istanbul and at the 2014 Bern Hands-on Airway Workshops. We hypothesized that TAT increases the self-assessed rating scores of clinical airway teachers' teaching competence over the period of 6 months.

Methods: The TAT-course covers 1) basic of adult learning 2) learning climate 3) assessment and effective feedback 4) skill teaching of AM during daily routine 5) basics of simulation and 6) teaching of non-technical skills. TAT-facilitators delivered interactive lectures, small-group teaching workshops, microteaching, and observation of real airway skill teaching with structured debriefing. The TAT-design was derived from the Stanford University's Faculty Development Center for Medical Teachers course on Clinical Teaching. After the course, participants filled in a pre-post course self-assessment questionnaire (SFDP 26) on their teaching competencies. After six months another course self-assessment questionnaire was completed.

Results: So far, 32 TAT-attendees participated and gave informed consent; 14 (45%) were female, mean age 40±5. All participants rated their teaching competence substantially higher directly after TAT and six months later. Ratings after TAT compared to six months later stayed the same or decreased slightly. Details are presented as summary in the 7 teaching competencies and overall teaching ability in the table.

SF 26 summarized teaching competences Lickert scale: 1=very bad / 5=very good median (interquartile range)	Learning Climate	Control of Session	Communication of Goals	Promotion of Understanding & Retention	Evaluation	Feedback	Promotion of Self-Directed Learning	Overall teaching ability
Before TAT	3 (3, 4)	3 (3, 3)	3 (2, 3.5)	3 (3, 3.75)	3 (3, 3)	3 (2, 3.5)	3 (2, 3)	3 (2.5, 3)
After TAT	5 (4, 5)	4 (4, 5)	5 (4, 5)	4 (4, 5)	4 (4, 5)	4 (4, 5)	4 (4, 5)	4 (4, 4)
p-value before - after TAT	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6. month follow up	4 (3, 4)	4 (3, 4)	4 (3, 4)	4 (3, 4)	4 (3, 4)	4 (4, 4)	4 (3, 4)	4 (3, 4)
p-value before TAT - follow up	0.004	<0.001	<0.001	0.105	<0.001	<0.001	0.014	<0.001
p-value after TAT - follow up	<0.001	0.110	<0.001	0.006	0.001	0.140	0.006	0.097

[SF 26]

Discussion: A specifically tailored train the trainer course derived from a well-established faculty development program specifically addressing airway management teaching competence improved substantially these self-assessed competencies.

In general, these values remained high even six months after the TAT course, but significantly lower compared with the values right after the course.

17AP4-8

Interest of an auto-evaluation to assess performance of second-year residents in anaesthesiology in a Spanish university hospital

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Background and Goal of Study: Many teaching tools improve the level of preparation of future professionals (1). Auto-evaluation encourages trainees to improve their knowledge and behaviour in all the aspects of our profession (2).This study was conducted among second-year anaesthesia residents in a Spanish tertiary hospital.

Material and methods: Ten residents with no experience in auto-evaluation were included at the end of their second year of training. After each second-year rotation, the staff members at charge of the residents were required to evaluate them with a multidimensional score without communicating them the results.

It consisted of 5 criteria about knowledge and technical skills (KS), and 7 criteria about attitude (A), each one scored in a 0-3 numeric scale. The rotation mark was set as the sum of 70% of the mean for theorical and technical skills, and 30% of the mean for attitude criteria. The final year score (FYS) was calculated as the mean of all the rotations marks. At the end of the year, the residents were asked to perform an auto evaluation using the same score. The results were compared with the FYS and the lower rotation score (LRS) obtained during the year, using parametric test. Results were presented as mean ±SD. $p<0,05$ was considered significant.

Results and Discussion: Auto-evaluation scores (AES) were high, with no difference between KS, and A (KS: 2,34+0,35/3; A: 2,59+0,33/3; $p=0,14$). AES were significantly inferior to FYS (AES: 2,41+0,31/3; FYS: 2,86±0,14/3; $p=0,003$), but comparable to the LRS (AES: 2,86±0,14 /3; LRS: 2,35+0,34/3; $p=0,66$). Compared with FYS, one resident over-evaluated his performance with a difference of less than 0,3 points/3, three residents infra evaluated their performance with less than 0,3/3 points, three of them evaluated it with a difference of [0,3; 0,6] points, and three evaluated their performance with >0,6 points. Compared with LRS, 6 residents differed of <0,3 points, one overestimated his performance of [0,3; 0,6] points, 1 overestimated himself of >0,6 points, and two infra estimated themselves of [0,3; 0,6] points.

Conclusions: Second-year residents AES were acceptable. Score variations of less than 20% in 80% of the cases showed a good understanding of the educative objectives. The long-term impact of this type of evaluations should be measured.

References:

1: British Journal of Education, Society & Behavioural Science 4(1): 1-9, 2014
2: JAMA. 2009;302(12):1316-1326

17AP4-9

What makes face-to-face teaching effective for anaesthetic trainees: an evaluative study

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Background and Goal of Study: Face-to-face teaching is key to learning in anaesthesia. UK trainees have frequent one-on-one access to senior clinicians during routine work. This model is strongly endorsed by the Royal College of Anaesthetists [1] and felt by many to be one of the strongest aspects of education in anaesthesia and critical care. Learning and in the clinical environment is well established in medical education [2] and anaesthesia training requires integration of concepts of physiology, pharmacology and physical principles into a directly experienced setting; basic sciences teaching is relevant and often undertaken on-the-job [3]. This is incongruous to other areas of medical education where there is increasing emphasis on e-learning and distant learning methods [3]. This study aimed to describe the experiences of core trainees of their learning.

Materials and Methods: Twelve core trainees in a North-East London Trust were interviewed using a focus group format about their experiences of theatre teaching. Their responses were transcribed and subjected to immersive thematic analysis.

Results and Discussion: Trainees agreed ‚on-the-job' teaching was useful with teaching from more senior trainees particularly valued. Relevance to the case provided learners with powerful opportunities to create individualised case vignettes upon to assigned clinical and emotional significance. Barriers to effective learning included teacher disinterest and overwhelming clinical need, although even where clinical demands overwhelmed educational planning, trainees still found the opportunity to ‚debrief' events an excellent learning resource.

Conclusion: Face-to-face teaching is valued by junior anaesthetic trainees as the most powerful learning opportunity within core anaesthetic training in the UK.

References:

1. Royal College of Anaesthetists, 2010
2. Spencer J. BMJ, 2003; 15: 591-4
3. Harden RM. EMJ, 2005; 23: 798-802

Geriatric Anaesthesiology

18AP1-1

Effects of intraoperative goal-directed fluid therapy using arterial wave analysis on the outcome of high-risk elderly patients after major abdominal surgery: a pilot study

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Background and Goal of Study: Studies showed that for high-risk patients undergoing major surgery, goal directed fluid therapy during the perioperative period improves patients' outcome. However, the monitoring methods used were either invasive or expansive. Hemodynamic parameters based on the arterial wave analysis (FloTrac/Vigileo) are less invasive and easy to use. The purpose of this study was to investigate whether intraoperative fluid therapy guided by parameters of arterial pressure wave analysis could decrease the incidence of postoperative complications in elderly patients after major surgery.
Materials and Methods: This was a prospective, open-lable, randomized controlled trial. One hundred thirty-eight patients of 65 years or older who were scheduled for major abdominal surgery were randomized divided into two groups. In the control group, routine monitoring was performed and intraoperative fluid therapy care was administered according to conventional practice. In the goal directed therapy (GDT) group, hemodynamic monitoring was performed using the FloTrac/Vigileo system, the intraoperative goals were to maintain SVV <13% and CI >= 2.5 L/min/m^2.
Results and Discussion: The incidence of postoperative cardiovascular complications was significantly lower in the GDT group than in the control group (2/69 [2.9%] versus 8/69 [11.6%], p = 0.049). The incidence of postoperative infectious complications was slightly lower in the GDT group than in the control group, but the difference was not statistically significant (9/69 [13.0%] versus 18/69 [26.1%], p = 0.053). There were no significant differences between the two groups with regard to the overall incidence of postoperative complications as well as the time to ambulation, the time to oral nutrition, and the length of stay in hospital after surgery. The rate of rehospitalization within 30 days after surgery and all-cause 30-day mortality were also similar between the two groups.
Conclusion(s): For elderly patients undergoing major abdominal surgery, intraoperative goal directed fluid therapy using arterial pressure wave analysis decreased the incidence of cardiovascular complications and tended to decrease the incidence of infectious complications after surgery. However, it did not decrease the overall incidence of complications and improve the recovery after surgery. Its effects on the outcomes of elderly, high-risk surgical patients deserve further study.

18AP1-3

Hemodynamic changes during spinal anaesthesia at high age

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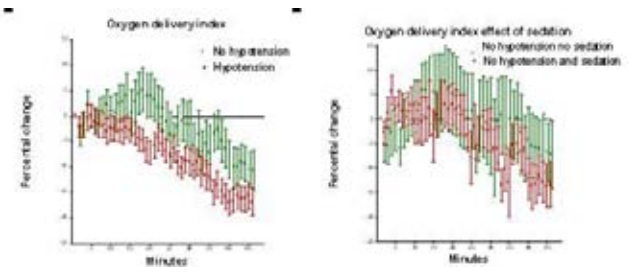
Background and Goal of Study: During our randomized controlled trial (NCT01141894) on per-operative Goal Directed Hemodynamic Treatment (GDHT) in patients with hip fracture[1] we observed that patients allocated to routine fluid care, reduced the oxygen delivery index (DO_2I) during the whole observation time (end of surgery). To explore this reduction we aim to describe the hemodynamic changes after the administration of the spinal anesthesia.
Materials and Methods: post-hoc analyses of hemodynamic data from routine group of an RCT.[1] Patients (≥70 years) with concealed allocation using computer-generated randomization, anesthetized by spinal anaesthesia. *Treatment:* Pre-anesthesia fluid loading by 300-500ml of Ringer's acetate, and Buffered Glucose 25 mg ml^{-1} at 1 $ml^{-1}kg^{-1}h$ and Ringer's acetate 2 ml kg^{-1} h^{-1}; *Monitoring:* LiDCOplus™ monitor, blinded to the attending anesthesiologist. *Data collection*: By LiDCOplus™ and ICU pliot software. Missing values were intrapolated.
Outcomes: percanteal changes of baseline hemodynamic parameters during 45 minutes.

Results and Discussion:

Age	85(70-101)
ASA* 1/2/3/4	2/17/38/7
P-POSSUM** physiology score	20(19-21)
Base line stroke volume index(ml m-2)	34(12-103)
Pre-anaesthesia fluid loading (mlkg-1)	1.2(0-12)
Vasoactive treatment for hypotension*	47

[Results]



[Responses during spinal anaesthesia]

Conclusion(s): A biphasic change of DO_2I after spinal anesthesia was seen in four clinical scenarios: normotension/hypotension/ sedation/ non-sedation. These changes need further research extended into the postoperative period including measurements of oxygen consumption to provide rationale target values to GDHT protocols.
References:
1. Bartha E et al. *Br J Anaesth* 2013; **110**: 545-53

18AP1-4

Hydroxyethyl starch 6%(HE)S intravasculare volume administration before spinal anesthesia prevent hypotension in elderly patients undergoing transvesical or transurethral resection of the prostate

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Background and Goal of Study: Hypotension is the most common cardiovascular response to spinal anesthesia. We compared the effects of Sol. Saline 0.9%versus HES administration before spinal anesthesia on cardiac output (CO) and mean arterial blood pressure in elderly patients undergoing transvesical or transurethral resection of the prostate.
Materials and Methods: Three hundred male ASA I-III .The age of patients was 65-80 years old .Patients were randomized three groups . G1(GC. controll group) one hundred patients that received no intravascular volume preload, G2 group(G.S) one hundred patients that received the normal saline and the G3(G.H) one hundred patients that received hydroxyethyl starch .GS group received 500 mL normal saline and the (G.H)hydroxyethyl starch (HES) group received 500 mL of 6% HES within 20 min before spinal anesthesia. Mean arterial blood pressure (MAP) and heart rate, CO, were monitored.
Results and Discussion: MAP significantly decreased from baseline in the control group (from 105 ±20 mm Hg to 82 ±10 mm Hg [P = 0.005]) and was significantly lower than in the HES group (from 106 ±12 mm Hg to 99 ±10 mm Hg [P = 0.001]).
In the saline group, MAP decreased (110 ±19 mm Hg to 82 ±18 mm Hg[P = 0.001] with significant lower than in the HES group (from 109±12 mm Hg to 97 ±12 mm Hg [P = 0.001]). CO decreased significantly in the control group (from 4.9 ±1.7 L/min to 3.9 ±0.9 L/min [P = 0.002]) and was significantly lower than in the HES patients in whom CO increased significantly after volume preload (from 5.2 ±1.2 L/min to 6.3 ±1.4 L/min [P = 0.003] and remained at baseline level until the end of the study.
Conclusion(s): Intravascular volume preload with saline or HES prevented a decrease of CO, but Sol Saline did`nt prevent hypotension after spinal anesthesia while 6%HES prevent and hypotension in elderly patients undergoing transvesical or transurethral resection of the prostate. [P = 0.001].

18AP1-5

Correction hemodynamics and oxidative disorders in the elderly patients with hip fracture during anaesthesia and surgery

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Background and Goal of Study: Preloading (Prl) is a basic method for prevention arterial hypotension during Epidural anaesthesia (EA). For profilactic oxidative disorders needs to add drugs with antioxydative effect, like Emoksipine (metilethilpiridinol).
The Goal of our Study: To compare effect of different intravenous solutions for Prl before EA on hemodynamics and concentration MDA (malanic dialdehyde) like marker of oxidative system.
Materials and Methods: Pts 80ASA 2-3 were scheduled for hip surgery. Mean age 69,1±3,7, m/f 29/51. Pts were randomized into two groups: the 1-st (n=40) was operated under EA (ropivacain 0,75% 2,0-2,5mg/kg) level Th-12 L-1 with catheter. The 2-nd group (n=40) was operated under caudal epidural block (CEB) with ropivacain 0,5% 1,5-2,0 mg/kg+general anaesthesia (GA: propofol+sevofluran). Every group was randomized into 4 subgroups (10 Pts in each): A-without Prl, B-Prl with refortan10% 6-8ml/kg, C-Prl with Ringers solution 6-8ml/kg, D-Prl with emoksipine 3-4 ml/kg, 10-13 mg/kg.
Investigations of hemodynamics (CO, SV, SVR and other) were performed non-invasively on following steps: 1.before Prl, 2.after Prl, 3.after start of anaesthesia, 4. one hour after start of surgery.5.15-20 min after surgery. Concentration of MDA was studed before and after surgery.
Results and Discussion: All Pts had hemodynamic changes (decreasing CO, SV - 10-12% (P<0,05) and increasing MAP, SVR, HR - 11-14% (P<0,05) from normal range), level of MDA was increased to 2-2,5 times before Prl. High level of MDA is sign of activation of oxidative system. After Prl hemodynamics normalized in D subgroups, subnormalized in B and C subgroups both groups. After start anaesthesia all hemodynamic parameters decreased in both groups, but more in 1-st group A subgroup (-40%), minimal- in 2-nd group D subgroup (-20%) compare with preoperative level (P<0,05). Greatest changes ofhemodynamics have been registered in Pts with EA without Prl (step 4). Minimal decreasing of hemodynamics were in Pts with CEB+GA with preloading. After surgery hemodynamic parameters returned to preoperative level in Pts with CEB+GA and Prl with Emoksipine, but in Pts with EA were below that it was before operation (-12-15%, P<0,05). Level of MDA, as a marker oxidative stress, decreased on -5-8% (P<0,05) only in Pts with Prl with emoksipine and CEB+GA.
Conclusion: Preloading (Prl) with emoksipin and CEB+GA is optimal combination for elderly Pts with hip fracture during surgery.

18AP1-7

Relative / friend escort of the elderly patient to the operating room; a feasibility study. Preliminary results

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Background: The elderly population has the highest growing rates among the general population. Consequently, the health system is required to address its unique needs. While physiological aspects of the elderly during surgery received attention in many recent studies, the psychological dimension has not been adequately addressed. In the pediatric population much attention is given to minimize the child and family anxiety. Such a major advancement has not been accomplished in the geriatric population. We hypothesized that the presence of a relative or a close friend in the operating room (OR) till induction of anaesthesia will help to decrease their anxiety without causing any discomfort for the OR staff members.
Methods: Following IRB approval, consenting patients above the age of 70 and accompanying person (AP, a friend or relative) above 18 years old were given a thorough explanation of what is expected to occur in the OR. The AP remained in the OR till induction of anaesthesia. Patients and AP were interviewed prior and following surgery regarding their incentive to participate in the process and their experience during the process, while the medical team was asked about their attitude towards it.
Results: Twenty five patients and relatives were recruited. The patients' average age was 78±6 years and the majority were females (n=18, 72%). Twenty four (96%) AP stated they chose to escort their relative in order to lower the patient's level of anxiety. Of the 25 attendees, none left the OR before completion of the process. Twenty two (88%) patients remembered the AP attendance in the OR prior to the induction of the anesthesia. Two third of the patient reported that it decreased their level of anxiety. Seventeen (68%) patients and 20 (80%) AP recommended the process to become part of the OR routine for all elderly patients. About half of the medical team (52% of the nurses and 44% of the anaesthesiologists) were uncertain whether this should become a routine. Nevertheless, none claimed any disadvantages.
Conclusions: The preliminary data from the current feasibility study suggests that the presence of an AP who escorts the elderly to the OR helped to decrease the patient's level of anxiety. The majority of patients and AP recommended this process to be a routine. In order to implement this process, the OR staff, who is not thoroughly familiar with this process, should be advised about the potential benefits for the patient and his/her family.

18AP1-8

Gastric perforation due to successful cardiopulmonary resuscitation following non-invasive mechanical ventilation in elderly patient; a case report

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Background: Medical treatment with NIMV is the gold standard for elderly patients with acute exacerbation of COPD who may develop respiratory failure.However,patients needing high-pressures,NIMV may lead to gastric distension(GD). There are very few cases in literature of gastric perforation developing secondary to GD. In these patients, CPRincreases potential risks by engendering an increase in intrathoracic and intra-abdominal pressure.
Case report: An 84-year old patient with COPD presented at the ER with respiratory problems. In the room-air SpO_2 was 45%, ABGvalues were pH:7.27 pO_2:55 mmHg pCO_2:86 mmHg,GKS:15 and the patient was treated with nebulized broncho-dilators and IVsteroids.The patient was attached to BIPAP device (EPAP:6 IPAP:12)for 2 hours. As the hypoxemia, hypercarbia and respiratory acidosis levels had not improved, NIMV was continued with a mechanical ventilator in CPAP (PEEP:5, PS:15)mode.Throughout 4 hours of CPAP, the general condition did not improve, consciousness gradually lessened,hypoxemia, hypercarbia and respiratory acidosis continued in the ABG,it was decided to intubate the patient.As the patient then had a cardiac arrest,crush intubation was applied and CPR was started. The patient could only be intubated at the second attempt and at the 5th minute of CPR, normal sinus rhythm was restored. As the development of subcutaneous emphysema and abdominal distension were noticed,an emergency Chest X-Ray and thoracho-abdominal CT were taken.On the CT"an appearance of widespread air in the abdomen (3-4 lts.) and mediastinum" was determined. With a diagnosis of pneumomediastinum and pneumoperitoneum secondary to tracheobronchial rupture, the patient was admitted for surgery classified as ASA IVE.
In the OR, perforation was determined in the lesser curvature of the stomach and during the exploration, a right morgagni hernia was seen and repaired. Both rectus muscles were seen to be ruptured totally from the midportion
The patient was attached to a MVin the ICU and in the 2nd h, regained consciousness,GKS:14.At 48h postoperatively,as haemodynamics were stable and ABG levels were pH:7.47pO2:81.7mmHg pCO2:55 mmHg SpO2:97% and spontaneous respiratory effort was sufficient, the patient was extubated
Discussion: When life-saving protocols such as NIMV or CPR are applied to geriatric patients, it should not be forgotten that, complications developed may be related to age just as much as the frequency of the procedure,duration and pressure applied.

18AP1-9

Role of mitochondrial permeability transition pore (mtPTP) channel protein VDAC1 in middle-aged rodents exposed to midazolam

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Background and Goal: The impact of short-term midazolam exposure on neuroinflammation and cognitive function in advanced age for non-surgical procedures will be presented in this study. Chronic neuroinflammation contributes to neurodegeneration, affecting hippocampus-dependent learning and spatial memory formation. MR diffusional kurtosis imaging (DKI) estimates microstructural integrity of neuronal tissue. Expression of VDAC1, voltage gated channel protein associated with mtPTP, is an early intracellular trigger of neuroinflammatory and apoptotic cascades.
Material and methods: 14 male Fischer 344 rats 5 months old were randomly assigned to rodent chew with or without exposure to midazolam. Animals were aged until 11 months old or advanced adulthood/middle-age. Animals were injected either with midazolam,1mg/kg ip or placebo ip twice daily for two days, to mimic a clinical model of anxiolysis, followed by brain imaging in a 7T rodent MRI scanner. All animals underwent cognitive testing over 12 days in aquatic radial arm maze. Postmortem collected hippocampal tissue was assessed using immunoblotting to detect mtPTP VDAC1.
Results: Rodents exposed to midazolam have a significant higher incidence of memory impairment compared to middle-aged rodents exposed to placebo. Animals presenting with spatial memory dysfunction had significantly higher degree of neuronal tissue alterations in hippocampus in MRI. Midazolam exposed animals had significantly increased expression of VDAC1.
Discussion: Neuroinflammation plays a major role in neurodegeneration leading to cognitive impairment when exposed to anxiolytic drugs. Aging includes increased cellular inflammatory processes. Western blotting showed increased expression of VDAC 1, a trigger of apoptosis leading to neuroinflammation and cell death. In vivo obtained MR DKI detects significant microstructural neuronal tissue alterations in ventral and dorsal hippocampus in aged animals exposed to midazolam . Age and midazolam exposure have an unfortunate synergistic effect shown in memory function testing. Unfavorable imaging results, poor behavioral testing and VDAC1 overexpression all overlap in midazolam exposed rodents compared to control.
Conclusion: mtPTP protein VDAC1 overexpression plays an important early role in hippocampal dysfunction. These results should lead to re-assessing the clinical use of benzodiazepines in the middle-aged and elderly individual undergoing non-surgical procedures.

18AP2-1

Patient empowerment improved perioperative quality of care in cancer patients aged ≥ 65 years - a randomized controlled trial

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Purpose: This randomized controlled trial (ClinicalTrials.gov: NCT01278537) was aimed to explore the effect of patient empowerment on short- and long-term outcomes after major oncologic surgery in elderly cancer patients.
Methods: A randomized controlled interventional trial of patients in two tertiary medical centers in Germany including 652 patients undergoing elective surgery for gastro-intestinary, genitourinary, and thoracic cancer. Patients were randomly assigned to patient empowerment in terms of information and diary keeping or to usual care. The primary outcome in short-term was postoperative length of hospital stay (LOS) and in long-term global health related quality of life (HRQOL) one year post-operatively as assessed by the EORTC QLQ C30 questionnaire. Secondary outcomes encompassed post-operative complications and predictors of HRQOL at 12 month.
Results: Mean age was 72 ± 4.9 years. The majority of patients were male (68.6%, n= 447). Median length of postoperative stay was 9 days (IQR 7-14 day). There was no significant difference between the intervention and the non-intervention group (p=0.99). Global HRQOL after one year did not differ between the intervention and the non-intervention group (p>0.05) either and was comparable to the preoperative global HRQOL. Overall complications and major complications occurred in 72% and 23% respectively. Frequency and severity of complications did not differ significantly between intervention- and control-group (p=0.48 and p=0.23, respectively). Patients in the interventional group had significant less postoperative pain (p=0.03) and postoperative nausea and vomiting (p=0.02) than in the control group. Severity of surgery, length of anesthesia, major postoperative complications, nutritional state, age, preoperative physical functional capacity measured by TUG, and length of ICU stay were independent predictors for LOS in multiple robust regressions.
Conclusion(s): Patient empowerment in terms of information and diary did not shorten the postoperative length of stay in elderly onco-surgical patients but improved quality of care regarding postoperative pain and nausea and vomiting. Postoperative length of stay was influenced by preoperative nutritional state, preoperative functional impairment, and severity of surgery as well as length of anesthesia.
Acknowledgements: Funding: This was an investigator-initiated trial supported by the German Cancer Foundation (Deutsche Krebshilfe), (Grant DKH-108474).

18AP2-2

Patient age influences the relationship between the Surgical Apgar Score and postoperative major complications

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Background and Goal of Study: The Surgical Apgar Score (SAS) is a 10-point-score calculated using three intraoperative parameters: estimated amount of blood loss, lowest heart rate, and lowest mean arterial pressure (1). SAS strongly correlates with postoperative major complications and mortality. Although elderly patients are more vulnerable to postoperative complications than younger patients, patient age is not included in SAS. The impact of patient age on the predicting power of SAS is not clear.
The goal of this study was to evaluate the validity of SAS in different age groups.
Materials and Methods: After obtaining Institutional Review Board approval, we retrospectively collected data of adult patients who had undergone laparotomy between November 1, 2012 and December 31, 2013 from medical records in our hospital. SAS and major complications during 30 days after surgery were evaluated. We categorized patients in three age groups; non-elderly adults aged 20-64 (group A), young old aged 65-74 (group B), and old old aged 75 or more (group C). Then, the relationship between patient age and the validity of SAS was evaluated.
Results and Discussion: This study included 259 patients (n=69 in group A, n=102 in group B, and n=88 in group C). In all groups, postoperative complications occurred less frequently in high-scoring patients whose SAS was 7 or higher, than in low-scoring patients whose SAS was 6 or less (p<0.01). Among high-scoring patients (n=218), the incidence of major complications in group C patients (15.3%, median SAS value was 8) was higher than that in group A patients (1.6%, median SAS value was 8; p<0.01). Similarly, the incidence of major complications in group C patients with a low SAS (81.3%, median SAS value was 5) was higher than that in group A patients (37.5%, median SAS value was 5.5; p<0.05). In contrast, no significant differences were observed between groups A and B concerning major complications.
Conclusions: Among patients with the same risk levels in terms of SAS, elderly patients aged 75 and older are more likely to develop postoperative complications than younger patients during 30 days after laparotomy.
References: (1) J Am Coll Surg 2007; 204: 201.

18AP2-3

Inmediate and mid-term survival in the extreme old undergoing elective surgery

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Background and Goal of Study: The number of extremely elderly patients scheduled for elective surgery is constantly growing. This population is considered to be at increased risk for immediate and mid-term complications and mortality; however, few studies have addressed this issue.
The aim of this study is to examine the effect of comorbidities and postoperative complications on short- and mid-term survival among a 4th age group.

Materials and Methods: We included all patients aged 85 years and above admitted for elective surgery between 2011 and 2014. We collected demographic data, comorbidities, ASA score and surgical complexity, as well as the most prevalent postoperative complications. The main outcome variable (days of postoperative survival) was studied at 0 to 6 months interval after surgery. First of all, the Kaplan-Meier survival curve (KMsc) was calcuted. To analyse the bivariate relationship between each comorbidity, postoperative variables and mortality we used X^2 and Fischer's test. Finally, we performed a stepwise Cox regression analysis and developed a model for the time interval. P values ≤0.05 were considered significant.
Results and Discussion: 95 patients undergoing elective surgery of diverse complexity were included. Overall, the 6-months mortality rate was 17.9% and they survived a mean of 163 days
(CI 95%, 153.58-172.81). Regarding preoperative comorbidities, obstructive sleep apnea (OSA) and poor functional capacity (METS < 4) were associated with a reduced mid-term survival (p< 0.05). In terms of postoperative complications, our results showed an association between electrolyte disorders and cardiac events (spec. congestive heart failure, cardiac ischemic event and atrial fibrillation) with a higher mortality rate (p< 0.05). Finally, according to the Cox model, the presence of OSA, a previous poor functional capacity, electrolyte disorders and postoperative cardiac ischemic event were strong predictors of reduced mid-term survival.
Conclusions: Except for the functional capacity, the other preoperative conditions associated with poorer outcomes were fairly unexpected. In their light, we should be extremely careful with patients diagnosed with OSA. Regarding our postoperative results, cardiac complications reduced consistently the mid-term survival among the extreme old. This fact should lead our efforts towards an early diagnosis and an aggressive treatment of these complications during the postoperative period.

18AP2-4

Relevance of multidimensional geriatric assessment in elective surgery

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Background and Goal of Study: With an increasingly aging population, accurate preoperative assessment of the elderly becomes essential in order to determine potential risk and benefits. The aim of this study was to investigate the impact of certain conditions -particularly common amongst elderly patients- on postoperative outcomes.
Materials and Methods: Patients over 85 years undergoing different kinds of elective were enrolled. We used several tools from the Multidimensional Geriatric to assess: frailty (with Fried's scale), mental and nutritional status (with the Mini-mental state examination and Mini-nutritional assessment respectively), dependence (with Katz's index for activities of daily living). We also looked at the ASA and Carlson scores, the number of co-morbidities and poly-pharmacy and the functional reserve. The main outcome measures were 30-day survival and in-hospital mortality.
Results and Discussion: 95 subjects (≥85 years) were studied. Preoperative frailty was associated with increased 30 day-survival (non-frail 24.2%, pre-frail 14.7%, frail 7.4%, p=0.019) and correlated with a longer hospital stay (rho=0.257, p=0.12). Nutritional status, measured with MNA scale, was also associated with 30-day survival rates (malnourished 66.7%, nutritional risk 94.1%, normal nourished 96.6%, p=0.04). Functional reserve was not associated with 30-day survival, but with 6-months survival (< 4METS: 35,4%, >4METS: 64,6%, p=0.045). None of the variables was significant for in-hospital mortality. ASA, Carlson index, mental status, poly-pharmacy and dependence were not associated with mortality in this series.
Conclusion(s): The association found between frailty and nutritional status with mortality should encourage the preoperative assessment of such parameters. Not only can they provide a more accurate picture of the risks and benefits of the procedures, but the nutritional status might also enable us to optimize the patients pre-operatively.

18AP2-5

Predicting prolonged postsurgical intensive care stays in elderly patients

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Background and Goal of Study: To identify elderly patients at risk of prolonged stay in postsurgical intensive care unit (PsICU) is required to optimize treatment and use of PsICU resources. The aim of our observational research was to identify the incidence and risk factors of prolonged intensive care stay (5 or more days) in those patients over 80 years of age who were admitted to our postsurgical unit.
Materials and Methods: Observational retrospective cohort research. The data from the variables of the study were collected prospectively and were analyzed retrospectively. Postsurgical patients up to 80 who were admitted to the unit between June 2011 and December 2013 were included in the study. Diverse clinical variables were collected during the first 48h of hospitalization. A general description of the different variables was undertaken. Subsequently, a univariable and multivariable stepwise logistic regression analysis was carried out in order to identify the risk factors for prolonged PsICU stay. P values less than 0.05 were considered statistically significant. All statistical analysis was conducted using SPSS 20.0 for Windows.
Results: A total of 186 consecutive patients were recruited, average stay 2,93 ± 8,4 days with a range 0-105 days (P25=1; P75=2 days). 20 (10,8%) presnted prolonged PsICU stay. Multivariate logistic regression analysis showed that the vasoactive drugs in the first 24 hours OR 8,761 (95%CI 1,851-41,467, p=0,006) and mechanical ventilation during the first 48 hours OR 104,114 (95%CI 13,824-784,110, p< 0,0001) were risk factors. Surprisingly the ASA grade represented a protection factor.
Conclusion(s): The ongoing evaluation of the perioperative process allows recognition and management of suboptimal care. Taking into account the existing variables during the early days of hospitalization in our unit, patients who need mechanical ventilation over 48h or vasoactive drugs during de first posoperative day could be at a higher risk of prolonged PsICU stay. Our study reveals that higher ASA grades may protect against mortality. This could be explained by the perioperative optimization among those patients who seem to be more fragile or what is more important by a planned surgical strategy for those patients with less functional capacity.

18AP2-6

Mortality after hip fracture in the elderly: a retrospective analysis of 150 patients

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Background and Goal of Study: Hip fractures are the leading cause of hospitalisation for injuries among the elderly. The risk of mortality after hip fracture is increased especially during the first year (1). Nevertheless, morbidity and mortality after hip fracture surgery in elderly patient over 65 year-old remained controversial (2). The purpose of this retrospective observational study is to determine the effect of patient and surgical factors on mortality after hip fracture.
Materials and Methods: One hundred and fifty patients 65 years or older, suffering hip fracture between 2006 and 2012 were identified. A review of the medical records was performed to determine demography, ASA status, type of fracture and surgical procedure, time-to-admission to surgery, and mode of anaesthesia. The primary outcome was mortality rate within the first month and the year after hip surgery. Postoperative complications were registered. The association between potential predictors and mortality was determined with regression model in multivariate analysis.
Results and Discussion: The demographic data and clinical features of patients are summarised in Table 1. The mortality rates during the first month and during the first year were 11% (n=18) and 21% (n=15) respectively. There was a correlation between mortality rate and age (r^2 = 0.947; p<0.01), ASA score (r^2 = 0.994; p=0.07), renal insufficiency (r^2 = 0.974; p=0.01) and coagulopathy (r^2 = 0.796; p=0.03). No difference was observed regarding mode of anaesthesia. Eighty three patients (56 %) suffered postoperative infection, mainly pulmonary.

Gender (M/F) (n)	117 (81 ±6 yrs) /33 (81 ± 7 yrs)
ASA II/III/IV (n)	28 (19%)/95 (63%)/27 (18%)
Time to surgery (h)	58 ± 62
Surgery duration (min)	127 ± 48
Type of anaesthesia (GA/LR) (n)	45 (30%) /105 (70%)
Osteosynthesis/ arthroplasty (n)	78 (52%) /72 (48%)

[Table 1. Clinical features]

Conclusion(s): Older patients have the highest risk of mortality within the first year. Patients with ASA ratings of class III or IV need to be evaluated carefully because they appear to be at higher risk of early mortality. Some biological factors seem to predict higher risk of mortality. Implementation of clinical pathways, i.e. evidence based clinical guidelines, might influence patients outcome.

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18AP2-7

Risk factors for postoperative complication in patients undergoing bipolar hip hemi-arthroplasty

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Background and Goal of Study: With increasing of the elderly patients, the femur neck fracture and bipolar hemi--arthroplasty has increased rapidly. Most of these patients have multiple co-morbidities and were predicted high incidence of postoperative complication. The aim of study was to identify the risk factors of postoperative complication using multiple logistic regression method.

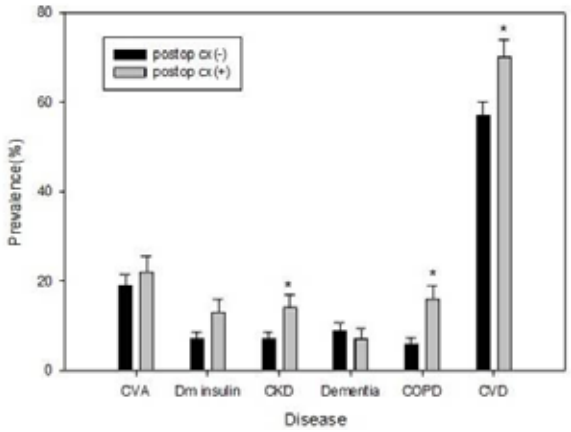
Materials and Methods: We conducted a retrospective study where we included patients underwent bipolar hemi-arthroplasty for acute femur neck fracture during 2011-2013 (n=389). We recorded co-morbidity, patient's data such as echocardiography, pulmonary function test, the level of albumin, creatinine and hemoglobin, blood loss, fluid and blood intake, urine output, operation time, anesthesia type and emergency or not and postoperative complications. Multiple logistic regression with backward elimination method was applied for identify the significant risk factors.

Results and Discussion: About 1/3 patients developed postoperative complication.

Diaease	Number of patients (%)
Pneumonia	67 (17.2)
Pulmonary thromboembolism	31 (8.0)
Acute renal failure	15 (3.9)
Cerebrovascular accident	12 (3.1)
Myocardial infarction	12 (3.1)
Overall	128 (32.9)

[Postoperative complications]

The complication (+) group has more co-morbidity.



[Comparison in co-morbidity between the groups]

Significant risk factors for postoperative complication were evaluated using logistic regression model.

	OR	95% CI	P-value
Age (> 80 year)	2.26	1.41-3.63	0.001
Cement (+)	1.61	1.00-2.60	0.049
Hemoglobin (<10 g/dL)	0.57	0.34-0.96	0.034
Diabetes mellitus-insulin treated	2.17	0.90-4.01	0.093
Chronic kidney disease	1.90	1.09-3.50	0.025
Chronic pulmonary obstructive disease	2.86	1.34-6.14	0.007
Cardiovascular disease	1.76	1.08-2.86	0.022

[Significant Risk Factors by Logistic Regression]

Conclusion(s): Age, hemoglobin, cement use, comorbidity including insulin tx DM, CKD, COPD and CVD were the significant risk factors for predicting postoperative complications in patients underwent bipolar hip hemi-arthroplasty.

18AP2-8

In-hospital mortality in critical postsurgical elderly patients

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Introduction: It is estimated that in 2050 around 9.6% of the European population will be over 80. The aim of our observational research was to identify the incidence and risk factors of in-hospital mortality in those patients over 80 years of age who were admitted to our postsurgical critical care unit.

Materials and Methods: Observational retrospective cohort research. The data from the variables of the study were collected prospectively and were analyzed retrospectively. Postsurgical patients up to 80 who were admitted to the unit between June 2011 and December 2013 were included in the study. Diverse clinical variables were collected during the first 48h of hospitalization. A general description of the different variables was undertaken. Subsequently, a univariable and multivariable logistic regression analysis was carried out in order to estimate the power of the association between the in-hospital mortality and the independent variables. P values less than 0.05 were considered statistically significant. All statistical analysis was conducted using SPSS 20.0 for Windows.

Results: 186 patients were recruited, 9(4,8%) died in the critical care unit and 22(11,8%) died in wards during the hospitalization, therefore in-hospital mortality was 31(16,7%). Death occurred at a median time of 8 days (p25=4; P75=16). A total of 12 patients (38,7%) died in the first week post-surgery, 11 patients (35,5%) in the second week and 8 (25,8%) from the 15 day post surgery onwards. In the multivariable analysis, the only variable from those analyzed in the first 48h of hospitalization which proved to be an in-hospital mortality risk factor was the need for mechanical ventilation over 48h with an OR 5,323 (95% CI 0,956-29,649, p< 0,56). The post-surgical variable risk grade ASA represented a protection factor from hospital mortality.

Conclusion: The ongoing evaluation of the perioperative process allows recognition and management of suboptimal care. Taking into account the existing variables during the early days of hospitalization in our unit, patients who need mechanical ventilation over 48h could be at a higher risk of in-hospital mortality. Our study reveals that higher ASA grades may protect against mortality. This could be explained by the perioperative optimization among those patients who seem to be more fragile or what is more important by a planned surgical strategy for those patients with less functional capacity.

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Euroanaesthesia

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