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COMPARISON OF ANESTHESIA MANAGEMENTS FOR KIDNEY TRANSPLANT- THROUGH CASE REPORT

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Abstract

End stage kidney disease manifest a broad specter of pathophysiological multi-organ dysfunction either generated by the primary disease or by the effects of the primary disease. Despite the important medical advances until bioartificial or laboratory-grown kidneys become available, renal transplant still remains the golden standard treatment for end sage kidney disease.Transplant surgeons must retrieve kidneys fromliving donors orcadaver.Patients with end stage kidney disease are challenging for the anesthesiologist on the one hand due to its significant pathophysiological changes that affects almost every organ system and on the other hand due to its high peri-operative morbidity and mortality. In the present article we compare two different anesthesia management protocols for kidney transplant presented through case report.

Key words: anesthesia management, anesthesia protocol, kidney transplant, cadaveric kidney transplant.

Introduction

Kidney transplant is the optimal treatment of patients with end-stage renal disease. It gives patients opportunity for better quality of life and is more efficient concerning patient contentment and outcome compared to long-term dialysis cost-effective treatment (1). In 1977 renal transplant was performed in Macedonia for the first time and since then it has been routinely performed with a high successful rate (2). On the other hand, although governmental, judicial, medical and information preliminaries are undertaken cadaveric renal transplant is still not yet adopted from the majority of population (3). However, these patients require a multidisciplinary team approach for preventing complication and improving graft survival.This article aims to compare two different anesthesia management protocols for kidney transplant presented through case report.

Case report

A 58-year-old male patient was admitted in Vienna General Hospital (AKH), for cadaveric renal transplant. Due to renal nephropathy he had end-stage chronic kidney disease and he was on dialysis for 8 years. The patient had a history of hypertension and was on therapy with: angiotensin II receptor antagonist, sympatholytic antihypertensive, calcium channel blockers, and a proton pump inhibitor. Because of the dialysis he was treated with Erythropoietin, Vitamin D_2, Lanthanum carbonate, and phosphate binding drug. He denied any family history of known diseaseand allergy and was a heavy smoker.

On admission to hospital, the patient was awake, oriented, and eupneic. CT of the heart showed normal findings with Agatston score I. On ECG there was sinus rhythm, without ST-T changes. Laboratory data included blood test results/hematology, clinical biochemistry, coagulation factors. Blood test results showed anemia(Hgb 12.8; Hct 37.8) (4), biochemistry showed increased Creatinin 9.9 mg/dL, blood urea nitrogen 60 mg/dL, and potassium 5.63 mmol/L. Patient was preoperatively dialyzed and his residual urine was 100ml/24h.

The patient underwent a surgery for cadaveric kidney transplant afterreceiving immunosuppression therapy: Tacni Transplant 4-0-4, 1. MMF Sandoz 500mg 2-0-2, 1. Simulect 20mg i.v. d0+d4. He also received therapy for Pneumocystis carinii prophylaxis (Trimethoprim / sulfamethoxazole) and Cytomegalovirus prophylaxis. In the operating room the patient was preoxigenated with FiO2 100%/18l/min. Standard monitoring: ECG, SpO2, non-invasive blood pressure, was provided. He got Fentanyl 300µg i.v. and Propofol 180mg i.v, as well as Rocuronium 60mg i.v. Intubation was done with Mackintosh laryngoscope and endotracheal tube No 8.0, cuffed. Then, mechanical ventilation was started (pressure controlled), with continuous capnography. Tidal volume was set from 6 to 8 ml/kg/tt, FiO_2% from 30 to 50%, I:E / 1:1.7, RR adjusted according to (E_TCO_2 -35-45mmHg), PEEP 7 cmH_2O. Two peripheral venous lines and one CVK were placed in the right jugular vein under sterile condition with echo guidance. Due to arterial fistula, arterial line was not placed and instead cardiac output monitoring system with transesophageal probe was placed (OMI+). Urinary catheter was also placed with a temperature sensor, as well as a nasogastric tube. For anesthesia maintenance entropy and neuromuscular monitoring were placed.

Anesthesia was maintained with Sevofluran MAC 1-1.5%, Fentanyl boluses and Rocuronium according to neuromuscular TOF monitoring.For antibiotic prophylaxis, the patient was given Amoxicillin/ Clavulanic acid and Ondasetron for prevention of postoperative nausea and vomiting. At the beginning of the surgery Dexamethason 40mg i.v. was also administered.Before vein clamp Heparin 2000i.e were given, and Manitol 20% - 20gr was started. Vein clamp time was 24 minutes and arteria clamp time was 16 minutes.

Fluid managementwas managed by isotonic crystalloids (Elo-mel isotonic): an acetate-buffered balanced crystalloid). The patient got 3L of crystalloids. In the beginning hemoglobin was 110g/L, and stabile on the successive measurements, so the patient did not receive blood transfusion. Therefore, after releasing of the arterial clamp due to hypotension and low flow time calculated on ODM+ monitor and low CVP (9 mmHg), bolus of fluids were administered and Noradrenalin prepared, althoughhe responded well to boluses of fluids and intermittently boluses of phenylephrine, noradrenalin was not started. On the third vein gas analysis, potassium was 5.7mmol/L.Therefore dextrose 30% with 10 i.e short acting insulin was administered and afterwards potassium show 5.1 mmol/L.Because this was a routine operation performed in a relatively healthy patient, and because there were no significant hemodynamic disturbances, the patient was waken up from anesthesia. He was brought to the postanesthesia care unit where he passed the first urine 2 hours after surgery and afterwards he was transferredto the ward.

Discussion

We want to discuss the anesthesia management in renal transplant patients by comparing it between the General Hospital Vienna - AKH and our University Clinical Center "Mother Theresa".

According to many studies in the literature renal transplantation prior to dialysis leads toimproved outcomes (5). In our country every patient is dialyzed prior to kidney transplant and thus the living donor kidney transplant (LDKT) allows shortening the dialysis time.

LDKT decreases the time of cold ischemia and enables patients to be on immunosuppressive therapy for several days before transplantation which prevents acute graft rejection. In our case the cadaveric donor kidney transplant (CDKT) had ischemia of 11 hours and 30 minutes and according to literature review the average time of cold ischemia is 1.5 h for LDKT and 18 hours for CDKT, and longer cold ischemia time has been reported with negative impact on kidney transplant (6).

Sevoflurane is known as a volatile anesthetic that produces nephrotoxicity due to production of Compound A and inorganic fluoride ions although no literature reports on permanent worsening of renal insufficiency have been found (7). However, Nieuwenhuijs-Moekeand coauthors published increased concentrations of kidney injury molecule-1 (KIM-1), N - acetyl-β- d -glucosaminidase (NAG) in a LDKT patient in spite of the fact it had no influence on renal graft outcome (8). There is no difference in practicing anesthesia management between the AKH and the University Clinical Center 'Mother Theresa'; it usually depends on the decision of the anesthesiologist in charge. If sevoflurane is used is has to be with high flow anesthesia more than 4L. On the other hand total intravenous anesthesia with propofol is a choice.

A question is to be addressed on the reliability of the central venous pressure (CVP) for guidance of fluid management in kidney transplant, although it was considered as a model for many decades (9,10). On the other hand, there is a lack of studies that have compared the novel techniques with the CVP-guided fluid therapy in kidney transplant patients and their relation to the outcome (11). Alternatively,for CVP the literature recommends cardiac output monitoring devices for management of fluid therapy in renal transplant. The margin of safety is narrowed; kidney transplant patients are at risk of: delayed graft function, acute kidney injury and fluid overload (12). Delayed graft function still remains one of the important complications in kidney transplant, therefore optimizing the anesthesia and fluid management is of significant importance.

Not enough data exist about the beneficial effect of diuretics and Mannitol used intraoperatively in kidney transplant, which might be the reason why there are significant variations in clinical practice. Among clinicians in England 13 of 40 use diuretics, although their role of decreasing acute tubular necrosis and delayed graft function is uncertain (13). The study by Hanif and colleagues did not show any relation between the use of diuretics and improvement in renal graft survival (13). In the case presented, diuretics were not used, but on the other hand, the administration of diuretics intraoperatively in our country still exists.

In terms of catecholamine used in kidney transplant the data are clear that norepinephrine infusion increases the survival of the graft in CDKT, since norepinephrine and dopamine are not harmful for the graft infect and they enable hemodynamic stability and improved renal graft function (14). There are randomized trials about pretreatment with Dopamine in donors, and a significant improvement in graft survival (15). Although in the presented case inotropes were not used, norepinephrine is preferred drug in the AKH while in our country we usually use dopamine.

As for the preferred fluids in the perioperative management of kidney transplantation we generally use normal saline 0.9% over potassium containing solutions, but on the other hand isotonic crystalloids (an acetate-buffered balanced crystalloid) is still not available in our country. According to the review article by Pfortmueller and coauthors, complications arising from hyperchloremia triggered from the normal saline can be overcome with Elo-mel isotonic crystalloids, beside the fact that he is containing potassium. It will improve the acid base status although it was thought it will produce alkalosis; however, no studies on humans have been reported, but many studies have shown hemodynamic benefits and improved cardiac output without inotropic support (16, 17,18).

Pain management in the presented case and generally in the AKH was without epidural analgesia, but, on the other side, in our country epidural catheter is placed in every patient without contraindication. According to literature, both modes of performing anesthesia are acceptable; differences from center to center are observed regarding hemostasis abnormalities in renal failure patients and heparin usage intraoperatively. But, the study of Hamidioglu has shown that epidural analgesia, besides excellent analgesia that is superior over i.v. analgesia, provides earlier mobilization, shorter hospital stay and attenuates stress response in renal transplant patients (19).

Conclusion

In our country living donor kidney transplant has become a well-established practice and has shown its indisputable benefits, on the other hand CDKT is in up-growth process. This condition has resulted in a decreased number of patients on the waiting list for kidney transplantation, and hence the shorter time on dialysis has lead to an improved quality of life.

Despite notable increasing in the number of LDKT and intention to develop CDKT, the organ deficiencystill remains an essential problem.

Although it is hardly possible that standardized protocol and algorithm will be universally adopted everywhere, it is more likely that individualized evidence-based approach will give an improved outcome.

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