ISSN 2545-4366
www.e-mja.finki.ukim.mk

MJA

Macedonian Journal of Anaesthesia

A Journal on Anaesthesiology, Resuscitation, Analgesia and Critical Care

Vol. 4 No 2, June 2020

Journal of the Macedonian Society of Anaesthesiologists
and Macedonian Society of Critical Care Medicine

Publisher:
Department of Anaesthesia and Reanimation, Faculty of Medicine,
"Ss. Cyril and Methodius" University, Skopje, R.N. Macedonia

Macedonian Journal of Anaesthesia
A Journal on Anaesthesiology, Resuscitation, Analgesia and Critical Care

Editor-in-Chief
Mirjana Shosholcheva

Deputy Editors
Andrijan Kartalov
Biljana Kuzmanovska

Assistant Editors
Marija Sholjakova
Jordan Nojkov

Statistical revision
Beti Zafirova Ivanovska

Legal and Ethical Issues
Biljana Janeska

Associate Editors
Jasminka Nanceva
Biljana Shirgovska
Atanas Sivevski
Marija Jovanovski-Srceva

Production Editor
Vanja Gievski

Publisher
Department of Anaesthesia and Reanimation
Faculty of Medicine
"Ss. Cyril and Methodius" University
Skopje, R.N.Macedonia

Proofreading
Daniela Nacevska Stojcevska

Editorial Board:
Zorka Nikolova-Todorova (R.N. Macedonia)
Nikola Jankulovski (R.N. Macedonia)
Sonja Topuzovska (R.N. Macedonia)
Rozalinda Popova (R.N. Macedonia)
Karin Khuenl-Brady (Austria)
Quirino Piacevoli (Italy)
Radmilo Jankovic (Serbia)
Olegs Sabelnikovs (Latvia)
Jannicke Mellin-Olsen (Norway)
Meral Kanbak (Turkey)
Nebojsa Ladjevich (Serbia)
Zoran Karadjov (R.N. Macedonia)
Hristo Bozov (Bulgaria)
Zuhal Aykaç (Turkey)
Katarina Shakich (Hrvatska)
Jasmina Jakupovich-Smajich (BIH)
Vojislava Neskovic (Serbia)
Daniela Miladinova (R.N. Macedonia)
Paul Zilberman (Israel)
Antigona Hasani (Kosovo)
Hülya Bilgin (Turkey)
Sinisha Stojanoski (R.N. Macedonia)
Berrin Günaydin (Turkey)
Rudin Domi (Albanija)
Fatma Sarıcaoğlu (Turkey)
Slobodan Ristovski (R.N. Macedonia)

CONTENT

MYOCARDIAL INJURY AFTER NON-CARDIAC SURGERY: IS THERE A REASON FOR CONCERN?

Vavlukis Marija, MD, PhD, FESC
University Clinic of Cardiology, Faculty of Medicine, University Ss Cyril and Methodius, Skopje, Macedonia

Perioperative myocardial injury truly represents an “eclipsed epidemic”, especially because it is loudly “silent”, characterized by absence of the classical clinical symptom of chest pain due to anesthesia, sedation, or pain-relieving medications (1). Myocardial injury after non-cardiac surgery (MINS) is defined as a postoperative troponin elevation without a clear non-cardiac cause. The incidence ranges from 5 to 25% of the patients undergoing non-cardiac surgery, with about 90% of them being asymptomatic (2, 3). However, this condition is associated with increased post-operative mortality. The discovery of MINS is a new challenge for anesthesiologists, as well as for cardiologists, as a new opportunity to improve the outcome in surgical patients (4). Major non-cardiac surgeries, as defined by the Canadian Cardiovascular Society (surgeries requiring overnight hospital admission), are estimated to be >200.000.000/yearly/ worldwide and >10.000.000 of them are accompanied by some major cardiovascular (CV) complication: cardiovascular death, cardiac arrest, myocardial injury/infarction. Among all CV complications associated with non-cardiac surgery, perioperative myocardial infarction (PMI), and/or myocardial injury during non-cardiac surgery (MINS), have a leading role (5, 6).

What is the difference between PMI and MINS?

According to the fourth MI universal definition, PMI is defined as post-operative cardiac troponin (cTn) elevation, within a period of 30 days after non-cardiac surgery, with a typical rising and/or falling cTn pattern, with an underlying ischemic origin (absence of non-ischemic etiology such as rapid atrial fibrillation, pulmonary embolism, sepsis, etc.), accompanied by an ischemic ECG pattern, with or without symptoms (7). PMI represents a smaller proportion of ischemia/injury events that can develop as type 1 or type 2 MI. Type 1 PMI scenario describes a sudden rupture of a vulnerable coronary plaque (in 50 – 60% of patients), platelet aggregation or severe coronary vasospasm, causing either occlusive (ST-segment elevation, STEMI) or non-occlusive (non-ST-segment elevation, NSTEMI) thrombus, while type 2 PMI describes a scenario of supply-demand mismatch (2, 7). MINS is a myocardial injury based on ischemia, irrespective of developing necrosis, accompanied by an increased cTn level, but it does not fulfill the universal PMI definition (regarding cTn level/dynamic, and absence of typical ECG patterns and symptoms). The hs-cTn threshold for MINS diagnosis is either at least 5ng/L increase, when basal value ranges from 20 to 65ng/L, or hs-cTn level ≥65ng/L. A common criterion for both conditions is absence of non-ischemic etiology troponin elevation (pulmonary embolism, sepsis, renal failure,

75milligrams for rapid sequence intubation, followed by rocuronium bromide 40milligrams and Sevoflurane 1 Vol % and infusion of Remifentanyl 2milligrams diluted in 40ml, in rate of 5ml/h for anesthesia maintenance. Additionally, 1gram of Magnesium Sulfate was applied, as well as 1gram of Paracetamol and 100mg Ketoprofen. Hemodynamics during surgery was stable and BP was monitored via arterial line. The patient was extubated after the surgery and transferred to ward with no pain. The first time patient experienced pain was 7 hours after the surgery, and after receiving 100milligrams Ketoprofen, the patient was pain free for the following 24 hours. Until the discharge from the hospital, five days after the surgery, thetotal amount of analgesics that the patient received was 400 mg Ketoprofen and 100milligrams Tramadol.

Discussion

ESPB is a new interfascial block, introduced by Forero and his associates in 2016 for treatment of neuropathic pain (1). Since then, ESPB was used by many anesthesiologists as anesthetic technique for different kind of surgeries, expanding its use and its possibilities both in surgery and in pain management (2). So far, two studies were conducted using bilateral ESPB as supplement to general anesthesia for cholecystectomy, one in adults and the other in children (3,4). We used unilateral ESPB for urgent laparotomic cholecystectomy in patient with severe comorbidities and on antiplatelet therapy. The surgery went uneventful, with very low doses of opiates and inhalational anesthetic, and the patient was pain free for 7 hours after surgery. He received very little analgesics during his hospital stay and was discharged on the fifth postoperative day.

Conclusion

ESPB is safe regional anesthetic technique to use as supplement to general anesthesia for patients on antiplatelet therapy. Larger studies are needed to establish the value of ESPB as add – on anesthetic technique to general anesthesia for laparotomy.

References:

1. Forero M, Adhikary SD, Lopez H et al.The erector spinae plane block : a novel analgesic technique in thoracic neuropathic pain. RegAnesth Pain Med. 2016; 41 (5): 621-627.
2. ArazPourkashanian et al.The Erector Spinae Plane Block: A review of current evidence. Anesthesia tutorial of the week 414. December 2019.WFSA.
3. Karaca O, Pinar HU.Efficiancy of ultra sound guided bilateral erector spinae plane block in pediatric laparoscopic cholecystectomy. Agri.2019; 31 (4): 209- 213.
4. Tulgar S, Kapakli MS, Senturk O et al. Evaluation of ultrasound- guided erector spinae plane block for postoperative analgesia in laparoscopic cholecystectomy: A prospective, randomized, controlled clinical trial.JClin Anesth.2018; 49:101-106.

ORIGINAL RESEARCH UDK: 616.351-006.6-073.763.5

THE VALIDITY OF MAGNETIC RESONANCE IMAGING IN DETERMINING PREOPERATIVE T STAGE OF RECTAL CANCER

Lazarova A[1], Saliu V[2]
[1] University Clinic of Surgery St. Naum Ohridski, Skopje, Department for Radiology.
[2] University Clinic of Surgery St. Naum Ohridski, Skopje, Department for Abdominal Surgery

ABSTRACT

Introduction: The significance of preoperative staging of rectal cancer with magnetic resonance imaging is initial for the decision on further treatment of the disease, simple surgical or multimodal treatment at an advanced stage of rectal cancer.

Aim of the Study: This paper demonstrates the validity of magnetic resonance imaging in determining the T stage of rectal cancer preoperatively, in correlation to the findings from the operative pathohistological material.

Material and Methods: 82 patients aged from 43 to 87 years, with previously colonoscopy proven rectal cancer were treated in magnetic resonance imaging (MRI) – 1.5 T, standard pulls sequences were made: SAG T2, AX T1, AX T2, AX DWI and T stages were determinated.

Results: The results obtained for the T stage with magnetic resonance are correlated to the pathohistological finding taken postoperatively as the gold standard in determining the sensitivity and specificity of magnetic resonance imaging. The sensitivity of MRI in determining the rectal cancer at T1 and T2 stage carcinomas was 86.7% and the specificity was 98.5%. The sensitivity of MR in determining T3 stage rectal cancers was 89.1% and the specificity was 88.9%. The sensitivity of MR in determining the T4 stage rectal cancers was 91.7% and the specificity was 92.9%.

Conclusion: Magnetic resonance imaging is the gold standard in preoperative staging of rectal cancer.

Key Words: *magnetic resonance image, preoperative staging, rectal cancer.*

Introduction

Rectal cancer is an advanced malignancy with a high mortality rate in developed countries. There is a slightly higher predisposition to the male sex (on average 20% – 30% is higher in men than in women), and the percentage of the disease is higher than 50 years of age – the average age of the disease worldwide is 65 years (1).

However, although the incidence of the disease has increased, the mortality rate has decreased due to several significant factors (2). Firstly adenosis polyps that are considered precancerous lesions are detected by colonoscopy and can be removed (3). Also, preoperative staging of rectal cancer with magnetic resonance imaging (MRI) plays a significant role in the further multimodal and surgical treatment, which affects the reduction of extensive surgical treatment, increasing the 5-years survival rate, reducing the recurrence rate (4).

Rectal cancer prognosis has improved significantly over the past decade, largely thanks to advances in preoperative staging, which has reflected a therapeutic approach that has made significant changes from simple surgical treatment to multimodal treatment (5). The result is an increase in the five-year survival rate and a reduction in the recidivism rate, the percentage of multivisceral and more extensive resections in the surgical treatment of rectal cancer also decrease (6, 7).

The goal of neoadjuvant therapy is to reduce the size and stage of advanced rectal cancer, minimize the risk of distant metastases, and to provide less extensive surgical therapy and, preferably, sphincter reservation technique for tumors localized in low rectum. The question is whether a patient with rectal cancer is a candidate for surgery treatment alone or preoperative chemoradiotherapy followed by surgery (8).

MRI can answer this question because it is the most important tool in the staging of rectal cancer. Magnetic Resonance Imaging method plays a crucial role in preoperative staging of rectal cancer (3, 4).

MRI is the modality of choice for rectal cancer staging, which assists the surgeon in achieving the negative margins of resection (9, 10).

Material and Methods

This paper shows the results of 82 patients diagnosed with rectal cancer by colonoscopy. Magnetic resonance imaging was performed preoperatively to determine the stage of the disease that would further influence the decision on treatment of the disease, whether it would be only surgical, or preoperative neaodjuvant treatment then followed by surgery.

This paper demonstrates the sensitivity and specificity or validity, accuracy of magnetic resonance imaging in determining the preoperative T stage of rectal cancer. A comparison was made between the results for the T-stage performed by magnetic resonance imaging preoperatively to the results obtained from the pathohistological operative finding, which was taken as the gold standard on the basis of which the correlation was made.

The examination was made on a 1.5 T magnet in the University Clinic for Surgical Diseases St. Naum Ohridski, Skopje.

Inclusive criteria for participation in these series were: patients with colonoscopy proven rectal cancer in whom pre-operative staging with MRI was indicated.

Patients excluded from this study were those who, due to implanted metal parts were contraindicated in performing the examination and those who could not withstand the examination due to claustrophobia.

The standard MRI protocol included:

SAG T2 pulse sequence, which starts the examination and determines the localization of the tumor in the rectum. A tumor localized in the low rectum is up to 5 cm from the anorectal junction, a tumor localized in the middle rectum is 5 to 10 cm, and above 10 cm is a high rectum.

Based on the SAG T2 pulse sequence, AX T1, AX T2 and AX DWI were performed. In these pulse sequences, the T stage is determined first (11, 12).

It is not possible to determine the exact T1 and T2 stage of MRI, so it is not possible to say with certainty whether the tumor grows in the submucosa or invades the external muscularis.

T3 stage is when the tumor penetrates the rectal wall and grows into the mesorectal adipose tissue. This is a heterogeneous group in terms of division depending on the localization to the mesorectal fascia, which is the most important in preoperative staging to determine preoperative neoadjuvant treatment. If the tumor is less than 2 mm from the mesorectal fascia nearby, or infiltrates it, it is a potential seizure that requires preoperative neoadjuvant treatment. T4 stage is when the tumor grows in neighboring organs (vagina, uterus in women, prostate in men as well as in muscular and pelvic organs) (13, 14).

Statistics Analysis:

The obtained data are analyzed with statistical computer program SPSS 23.0 for Windows. Numerical marks are shown with arithmetic mean and standard deviation; Independent parameter and non-parameter tests (Chi-square test, Fisherexact test, test, Student t-test, Analysis of Variance) are used to compare the analyzed variables. Spearman's correlation coefficient is used to determine the correlation between certain variables. To determine the diagnostic performance of MRI in determining T status of rectal cancers, sensitivity, specificity, positive, and negative probability rates are calculated. The $p<0.05$ values are taken to be statistically significant.

Results

The study included 82 patients from the University Clinic for Surgical Diseases St. Naum Ohridski in Skopje, as well as patients from the Clinic for Abdominal Surgery at the University Clinic – Skopje, with colonoscopically confirmed rectal cancer.

The gender structure of the patients consisted of 58.5% (48) male patients, and 41.5% (34) patients were female. Patients ranged in age from 43 to 87 years, and averaged 66.65 ± 9.8 years.

According to the preoperative MRI finding, T3 stage was the most common finding in the respondents – 63.4% (52) patients, 19.5% (16) patients had T4 stage rectal cancer, 13.4% (11) patients had second stage rectal cancer, and in 3.7% (3) patients MRI detected malignant rectal disease in the first stage

***Table 1**. Distribution of the respondents by T staging – MRI*

MRI/T stage	n (%)
T1	3 (3.66)
T2	11 (13.41)
T3	49 (59.76)
T4	16 (19.51)
T3b	3 (3.66)

The pathohistology results presented 67.1% (55) rectal cancers in T3 stage, 14.6% (12) in T4 stage, much fewer patients had rectal cancer in the first and the second stage – 8.5% (7) and 9.8% (8) consequently.

***Table 2**. Distribution of the respondents by T staging-pathohistology*

Pathohistology stage	n (%)
T1	7(8.54)
T2	8 (9.76)
T3	55 (67.07)
T4	12 (14.63)

The Table 3 shows the cross-tabulated distribution of the T stage determined preoperatively with MRI and pathohistology. The results show that all 3 tumors were preoperatively diagnosed with MRI as T1 stage and were pathohistology confirmed. In the group of 11 tumors preoperatively with MR marked as T2 stage, 6 were also pathohistology confirmed. In the group of 52 tumors preoperative with MR detected as T3 stage, 49 were also pathohistology confirmed. In the group of 14 tumors, preoperative with MR detected as T4 stage, 11 were pathology confirmed.

***Table 3**. Distribution and correlation by T stage – MRI / pathohistology*

MRI T stage	Pathohistology T stage				Total
	T1	T2	T3	T4	
T1	3 (42.86)	0	0	0	3
T2	4 (57.14)	6 (75)	1 (1.82)	0	11
T3	0	2 (25)	49 (89.09)	1 (8.33)	52
T4	0	0	5 (9.09)	11 (91.67)	16
variable	correlation				
	N	Spearman – R	p-level		
T stage MRI& Pathohistology T stage	82	0.854	p=0.000000 sig		

A positive or direct correlation was confirmed between the preoperative MRI T stage and the pathohistology T stage (R=0.854). For a value of p<0.001, the correlation was statistically significant.

With MRI, 14 findings were detected as the first and the second stage, of which 13 were true positive, confirmed and pathohistologically, one result was false positive. The MRI finding presented 68 tumors that were not of the first and the second stage, of which 66 were true negative, confirmed also with pathohistology, 2 findings were false negative.

The sensitivity of MRI in determining rectal cancer at T1 and T2 stage carcinomas was 86.7% and the specificity was 98.5%

***Table 4**. MRI Validity for determination T1 and T2 stages of rectal cancer*

MRI T staging	Pathohistology T staging		Total
	first and second stage	the rest	
first and second stage	13	1	14
the rest	2	66	68
Total	15	67	82
Estimate	95% CI		
Sensitivity	0.867	[0.621 to 0.963]	
Specificity	0.985	[0.92 to 0.97]	
LR+	57.8	[8.217 to 410.335]	
LR-	0.135	[0.037 to 0.492]	

The Table shows the results of the examined MR validity in detecting the third stage rectal cancers.

With MRI, 52 findings were detected as the third stage, of which 49 were true positive, confirmed and pathohistologically, 3 were false positive. With MR 30 results were not marked as the third stage, of which 24 were truly negative, so confirmed and pathohistology as another stage, 6 findings were falsely negative.

The sensitivity of MR in determining T3 stage rectal cancers was 89.1% and the specificity was 88.9%.

***Table 5**. MRI Validity for determination T3 stages of rectal cancer*

MRI T staging	Patohistology T3 stage		
	third stage n (%)	the rest n (%)	total
third stage	49	3	52
the rest	6	24	30
total	55	27	82
Estimate	95% CI		
Sensitivity	0.891	[0.782 to 0.949]	
Specificity	0.889	[0.719 to 0.961]	
LR+	8.027	[2.748 to 23.396]	
LR-	0.123	[0.057 to 0.264]	

The Table shows the results of the examined validity of MRI in detection of rectal cancer in the fourth stage. With MRI, 16 findings were detected as the fourth stage, of which 11 were true positive, confirmed and pathohistology, 5 findings were falsely positive. With MRI, 66 of the results were not marked as the fourth stage, of which 65 were truly negative, so confirmed and pathohistology as another stage, 1 result was falsely negative. The sensitivity of MRI in determining T4 stage rectal cancers was 91.7% and the specificity was 92.9%.

***Table 6**. MRI Validity for determination T4 stages of rectal cancer*

MRI T4	Patohistology T4 stadium		total
	T4	others	
T4	11	5	16
others	1	65	66
total	12	70	82
Estimate	95% CI		
Sensitivity	0.917	[0.646 to 0.985]	
Specificity	0.929	[0.843 to 0.969]	
LR+	12.915	[5.421 to 30.379]	
LR-	0.089	[0.014 to 0.587]	

Discussion

This study shows that MRI is an ideal tool in preoperative staging of rectal cancer. It is the gold standard in preoperative evaluation of the stage of the disease. The anatomical localization of the rectum, its fixation on the pelvic floor and fat tissue, as well as the absence of peristalsis, which avoids moving artifacts, makes it an ideal organ for recording with the MRI imaging method. This method is extremely important in the diagnosis and staging of rectal tumors (15, 16).

What is the most significant in preoperative staging of rectal cancer with MRI is its accuracy or sharpness, validity in relation to the T stage, which was actually one of the main motives for making this study.

The postoperatively obtained pathohistology finding was taken as the gold standard in relation to which correlation was made with the findings from MRI with respect to T stage. In this study of 82 treated patients, out of which 14 patients are in T1 and T2 stage, 13 of them are positive and confirmed pathohistology, one is false positive. The sensitivity of MRI in determining the first-and the second-stage rectal cancer is 86.7% and its specificity is 98.5%.

This result correlates to paper from Torricelli P (2007), where the endorectal coil MRI in local staging of rectal cancer, was mentioned with the sensitivity of 86% and specificity is 97%.

With MRI, 52 findings were detected as the third stage, out of which 49 were true positive, confirmed and pathohistology, 3 were false positive. With MRI 30 results were not marked as the third stage, out of which 24 were truly negative, confirmed and pathohistology as another stage, 6 findings were falsely negative.

The sensitivity of MRI in determining the third-stage rectal carcinomas was 89.1% and the specificity was 88.9%.

According to the results from the paper of Klessen C at all (2007), the sensitivity ranges between 85%-89% and the specificity around 94% for T3 stage.

With MRI, 16 findings were detected as the fourth stage, out of which 11 were true positive, confirmed and pathohistology, 5 findings were falsely positive. With MRI, 66 of the results were not marked as the fourth stage, out of which 65 were truly negative, confirmed and pathohistology as another stage, 1 result was falsely negative. The sensitivity of MRI in determining the fourth-stage rectal carcinomas was 91.7% and the specificity was 92.9%.

Therefore, the results obtained in this study on the sensitivity and specificity of preoperative T-staging with magnetic resonance imaging show great validity, significance, and accuracy of preoperative T-staging of rectal cancer with magnetic resonance imaging, thereby confirmed this method as great diagnostic tool for preoperative staging of rectal cancer.

Conclusion

MRI is a high-precision imaging method for detection of transmural tumor invasion, invasion of the mesorectal fascia, involvement of adjacent organs, insight into nodal status, and visualization of a positive extra mural vascular invasion. MR as an ideal imaging method for preoperative staging for local or advanced stage of rectal cancer, allows the evaluation of extramural expansion, determines the mesorectal involvement and seizures margins of resection.

This is evidenced by the high sensitivity (83% – 89%) and specificity (up to 96%) for T-staging. Knowledge of these factors is essential in the treatment of rectal cancer. The aim of staging of rectal tumors with MRI imaging method is to identify patients in the T3 stage with potentially involvement in resection margins and T4 stages in order to benefit from radiation and radiotherapy.

References

1. Watson AJ, Collins, PD (2011). “Colon cancer: a civilization disorder”. *Digestive Diseases* **29** (2): 222 – 8.
2. Kim SH, Lee JM, Gupta SN, et al. Dynamic contrast-enhanced MRI to evaluate the therapeutic response to neoadjuvant chemoradiation therapy in locally advanced rectal cancer. *J Magn Reson Imaging* 2014; 40:730 – 737 [Crossref] [Medline] [Google Scholar].
3. Huang J, Papadopoulos N, McKinley AJ et al. APC mutations in colorectal tumors with mismatch repair deficiency. Proc. Natl Acad. Sci. USA 1996; 93; 9049 – 9054.
4. Heald RJ, Moran BJ, Ryall RD, et al. Rectal cancer: the Basingstoke experience of total mesorectal excision, 1978 – 1997. *Arch Surg* 1998; 133:894 – 899 [Crossref] [Medline] [Google Scholar].
5. Kosinski L, Habr-Gama A, Ludwig K, et al. Shifting concepts in rectal cancer management: a review of contemporary primary rectal cancer treatment strategies. *CA Cancer J Clin* 2012; 62:173 – 202 [Crossref] [Medline] [Google Scholar].

6. Beets-Tan RG, Lambregts DM, Maas M, et al. Magnetic resonance imaging for the clinical management of rectal cancer patients: recommendations from the 2012 European Society of Gastrointestinal and Abdominal Radiology (ESGAR) consensus meeting. *Eur Radiol* 2013; 23:2522 – 2531 [Crossref] [Medline] [Google Scholar].
7. Fernandez-Esparrach G, Ayuso-Colella JR, Sendino O, et al. EUS and magnetic resonance imaging in the staging of rectal cancer: a prospective and comparative study. *Gastrointest Endosc* 2011; 74:347 – 354 [Crossref] [Medline] [Google Scholar].
8. Intven M, Reerink O, Philippens ME. Dynamic contrast enhanced MR imaging for rectal cancer response assessment after neo-adjuvant chemoradiation. *J Magn Reson Imaging* 2014 Aug 14 [Epub ahead of print] [Google Scholar].
9. Kim SH, Lee JM, Gupta SN, et al. Dynamic contrast-enhanced MRI to evaluate the therapeutic response to neoadjuvant chemoradiation therapy in locally advanced rectal cancer. *J Magn Reson Imaging* 2014; 40:730 – 737 [Crossref] [Medline] [Google Scholar].
10. Gollub MJ, Gultekin DH, Akin O, et al. Dynamic contrast enhanced-MRI for the detection of pathological complete response to neoadjuvant chemotherapy for locally advanced rectal cancer. *Eur Radiol* 2012; 22:821 – 831 [Crossref] [Medline] [Google Scholar].
11. Slater A, Halligan S, Taylor SA, et al. Distance between the rectal wall and mesorectal fascia measured by MRI: effect of rectal distension and implications for preoperative prediction of a tumour-free circumferential resection margin. *Clin Radiol* 2006; 61:65 – 70 [Crossref] [Medline] [Google Scholar].
12. Furey E, Jhaveri KS. Magnetic resonance imaging in rectal cancer. *Magn Reson Imaging Clin N Am* 2014; 22:165 – 190, v – vi [Crossref] [Medline] [Google Scholar].
13. Maier A, Fuchsjager M. Preoperative staging of rectal cancer. Eur J Radiol. 2003;47:89 – 97. [PubMed] [Google Scholar].
14. Purkayastha S, Tekkis PP, Athanasiou T, et al. Diagnostic precision of magnetic resonance imaging for preoperative prediction of the circumferential margin involvement in patients with rectal cancer. Colorectal Dis. 2007;9:402 – 11. [PubMed] [Google Scholar].
15. Fielding LP, Stewart-Brown S, Dudley HA. Surgeon-related variables and the clinical trial. Lancet. 1978;2:778 – 9. [PubMed] [Google Scholar].
16. Klessen C, Rogalla P, Taupitz M. Local staging of rectal cancer: the current role of MRI. Eur Radiol. 2007;17:379 – 89. [PMC free article] [PubMed] [Google Scholar].
17. Torricelli P. Rectal cancer staging. Surg Oncol. 2007;16:49 – 50. [PubMed] [Google Scholar].

CASE REPORT UDK: 616.381-007.43-089.819

IPOM PLUS – AN EFFECTIVE METHOD IN TREATMENT OF VENTRAL HERNIA

Mitevski A[1], Antovic S[2], Markov P[3]
[1] General Hospital RE-MEDIKA, Skopje, Macedonia. Assistant professor at "Goce Delcev" University, Shtip, Macedonia.
[2] Clinic for Digestive Surgery, Medical Faculty Skopje.
[3] General Hospital Strumica, digestive surgery resident, "GoceDelcev" University, Shtip, Macedonia.

ABSTRACT

Introduction: Abdominal wall surgery for ventral hernia is one of the commonest procedures performed by surgeons. Hernias that occur after previous abdominal surgery - incisional hernias - appear in 11% to 20% of the cases, and the recurrence of ventral hernia is related to the presence of abdominal rectus muscle diastasis.

Case: A patient who had two previous operations for ventral hernia with prosthesis was admitted. Hernia bulging and partially reducing content of the hernia sac when pressure applied was present. Intraoperative, a recurrent hernia was observed and pseudohernia – bulging out of the previous implanted prosthesis was noted, cephalic from the clinically diagnosed defect. Also a rectus muscle diastasis was present caudally.

Discussion: The laparoscopic IPOM repair is associated to a high incidence of post-operative bulging or eventration of mesh, seromas, recurrences and non-restoration of abdominal muscle function. To overcome these problems, sutured closure of the defect in the fascia with intra-peritoneal mesh reinforcement has been described, known as the IPOM plus repair. This repair is the recommended procedure in the guideline of International Endohernia Society.

Conclusion: In patients who are presented with diastasis of the abdominal rectus muscles in addition to the ventral hernia, plication of the diastasis can be done in order to help support of the ventral hernia and improve outcomes or can be sutured with transfascial non-absorbable single sutures along the diastasis. It brings considerable esthetic advantages and reduces the recurrence of hernias.

Key Words: *IPOM plus, laparoscopic ventral hernia repair, mesh repair, rectalis muscle diastasis, ventral hernia,*