

## POSTOPERATIVE PAIN AFTER VENTRAL HERNIA REPAIR: A PROSPECTIVE COMPARISON OF OPEN VERSUS LAPAROSCOPIC WITH INTRAPERITONEAL ONLAY MESH (IPOM) TECHNIQUE

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### Abstract

Laparoscopic ventral hernioplasty has many advantages over the open access hernioplasty, but patients suffer severe pain in the first few days.

Objectives of this study was comparison of early postoperative pain in Open and Laparoscopic approach in IPOM hernioplasty and whether there was statistically significant difference in the intensity of postoperative pain during resting and activity.

63 patients who met the inclusion criteria were included in a randomized, prospective, comparative study and were operated with the IPOM technique. They were divided into two groups: open and laparoscopic access (32 and 31 patient, consequently). In both groups, postoperative pain was compared at eight time intervals during rest and activity, quantified using VAS. The statistical analysis was done in the statistical programme SPSS version 23.0.

Patients undergoing laparoscopic hernioplasty had significantly higher pain intensities on the day of the intervention, the first and second day after the intervention ( $p < 0.0001$ ). On the third and seventh postoperative days, as well as one and six months after the intervention, there was no significant difference in pain intensity between the two methods during rest and activity.

Patients after laparoscopic ventral hernioplasty suffer from severe pain in the early postoperative period and it is the biggest challenge and problem after these operations. This originates from transfascial sutures for mesh fixation in both groups and additionally multiple lesions of the parietal peritoneum in the laparoscopic method due to the numerous mesh fixations with tackers.

**Keywords:** Laparoscopic IPOM, open IPOM, postoperative pain.

### Introduction

Laparoscopic approach for ventral hernia repair after its introduction in 1993 (KA LeBlanc), has become quite popular, due to its minimal invasiveness and many advantages over open access [1-5].

Beside the numerous advantages of laparoscopic hernioplasty over the open access, such as lower rates of early postoperative complications (surgical site infections, seroma, hematoma), better cosmetic effect, shorter hospital stay, the postoperative pain is unfortunately unacceptably high [6,7].

Although laparoscopic approach is considered as less painful, three randomized controlled trials comparing open with laparoscopic ventral hernioplasty, showed no difference in acute or chronic pain in both procedures [8-10].

Currently experience is that patients after laparoscopic ventral hernioplasty experience severe pain. Pain is an uncomfortable individual's subjective sensation [11] and most frequently used method for its quantification in clinical practice is VAS (Visual Analogue Scale) which is simple and quite effective method [12].

This study compares the two approaches- laparoscopic and open of IPOM technique (intraperitoneal “onlay” mesh) and examines the consequential pain that occurs after each type of ventral hernioplasty, during resting and activity.

## Materials and Methods

From March 2017 through December 2019, 63 patients undergoing ventral hernia repair at the CGH "8th September" – Skopje, were prospectively enrolled in the study. All included patients fulfilled the inclusion criteria: age over 18 years, uncomplicated hernias, ASA classification I-III, defect size 3 to 10 cm, BMI  $\leq$  40, signed informational consent.

They were preoperatively randomized by computer programme in two groups: 32 patients in *Open group* (Open IPOM technique) and 31 patients in *Lap Group* (Laparoscopic IPOM technique).

During treatment, patients adhere to the modalities of treatment included and elaborated in the EuraHS Protocols - the European Register of Abdominal Wall Hernias, the Ventral Hernia Working Group's (VHWG) assessment scale and the protocols for performing safe surgery according to the recommendations of the Ministry of Health.

Patients in *Open Group* were operated with open access and intraperitoneal placement of the mesh and fixation with transfascial sutures (on average 8 sutures) with overlap of 3 -5 cm, closing the defect (if possible), drainage in certain cases[13,14]. Patients in *Lap Group* were operated with laparoscopic approach and intraperitoneal placement of the mesh and fixation with the transfascial sutures and absorbable tackers ("Double -Crown") at a distance of about 1.5– 2.5 cm[15,16].

All patients were operated under general anaesthesia and in all patients polypropylene composite mesh - Parietene with absorbent synthetic film was used.

VAS scale (Visual Analogue Scale) was used for subjective quantitative gradation of pain intensity, on a scale of 0-10, where 0 means "no pain", and 10 indicates "high, unbearable pain", during rest and activity.

The pain in both groups was compared at eight different time points- before the intervention, on the day of the surgery 6 hours after the end of the intervention, the first, second, third, seventh, thirtieth day and six months after the intervention.

During the hospital stay for analgesia patients were administered Amp.Ketoprofen 2x100 mg and Amp.Tramadol 3x100 mg alternately, while at home it was recommended to take Tbl.Ibuprofen 400mg 2x1 and Tbl.Paracetamol 500mg as needed.

The information about the degree of pain during the hospital stay was obtained personally from the patients, and after the discharge from hospital, the information was obtained through a telephone conversation with the patient. This study was approved by the institutional review board.

Statistical analysis was performed in the statistical program SPSS for Windows 23.0. Pearson Chi-square test was used to compare the two groups in terms of quality marks, Student t-test and Mann-Whitney test were used to compare these groups in terms of quantitative marks. The values of  $p < 0.05$  were taken as statistically significant.

## Results

Sixty three patients were enrolled in this study, 32 in Open and 31 in Lap Group. Demographic and clinical characteristics are outlined in Table 1.

Both groups were homogenous in terms of their = age and BMI. There was no gender difference between the two groups, although female patients were the majority of respondents in both groups-58.1% vs 68.75%. Primary ventral hernia was diagnosed insignificantly frequent in patients undergoing laparoscopic hernioplasty- 41.9% vs 28.1%.

Patients with ASA score of 2- 64.5% and 53.1%, respectively, were most commonly included in the study.

The size of the fascial defect was insignificantly different between patients with laparoscopic and open hernioplasty ( $p=0.09$ ).

The average size of the fascial defect in the laparoscopic and open technique was 32 and 35 cm<sup>2</sup>, respectively.

**Table 1.** Demographic and Hernia Characteristics

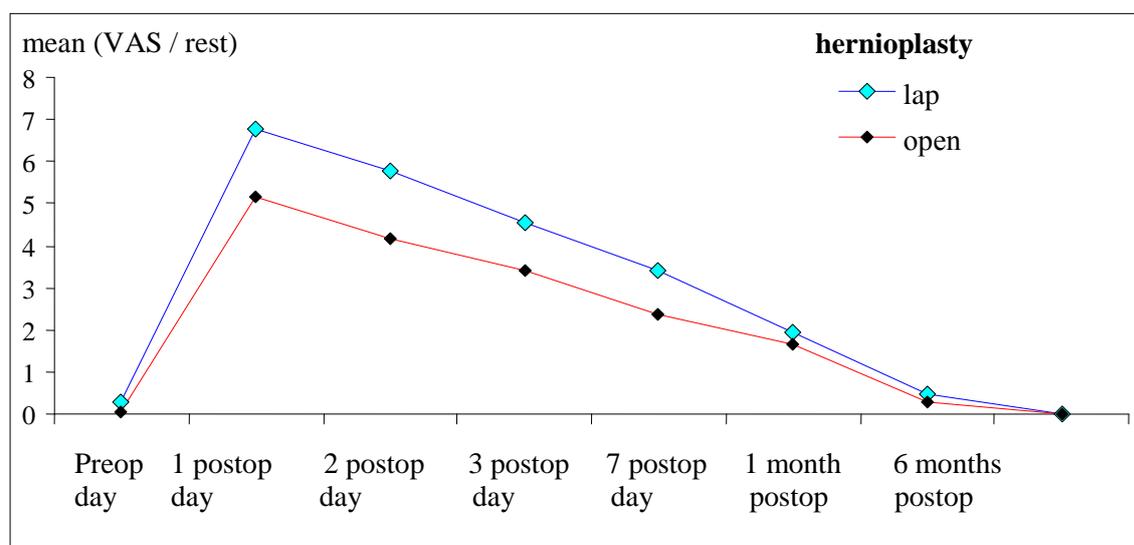
Variable	Hernioplasty	
	Laparoscopic	Open
<b>Gender M/F n</b>	13/18	10 /22
<b>Age</b> (mean ± SD)	53.64±13.7	54.65±9.5
<b>BMI</b> (mean ± SD)	29.05±4.2	28.99±3.4
<b>Type of hernia n(%)</b>		
Primary	13 (41.94)	9 (28.13)
Incisional	18 (58.06)	23 (71.88)
<b>Size of fascial defect /cm2</b> (mean ± SD)	(33.67±11.9)	(35.55±19.4)
median (IQR)	32(12-30)	35(18-48)
<b>ASA classification n(%)</b>		
1	5 (16.13)	6 (18.75)
2	20 (64.52)	17 (53.13)
3	6 (19.35)	9 (28.13)

$\chi^2$  (Chi-square test); t (Student t-test); Z (Mann-Whitney test)

We compared patients with laparoscopic and open hernioplasty in terms of subjective perception of pain intensity, quantified by VAS scale, at 8 time points (before surgery, on the day of intervention, first, second, third, seventh, thirtieth day and six months after the intervention), during rest and activity.

At rest, patients in both groups had significantly different pain intensities on the day of intervention, the first and second day after the intervention ( $p < 0.0001$ ). At all these time points, the pain intensity was significantly higher in patients undergoing laparoscopic hernioplasty.

On the third and seventh day after intervention, patients in both groups had an identical mean VAS score for pain intensity (median 3;  $p = 0.15$ , median 2;  $p = 0.16$ ). At rest, more than half of the patients in both groups had no pain after one month of intervention, while at the end of 6 months follow-up after the intervention, no patient felt pain. (Figure 1)

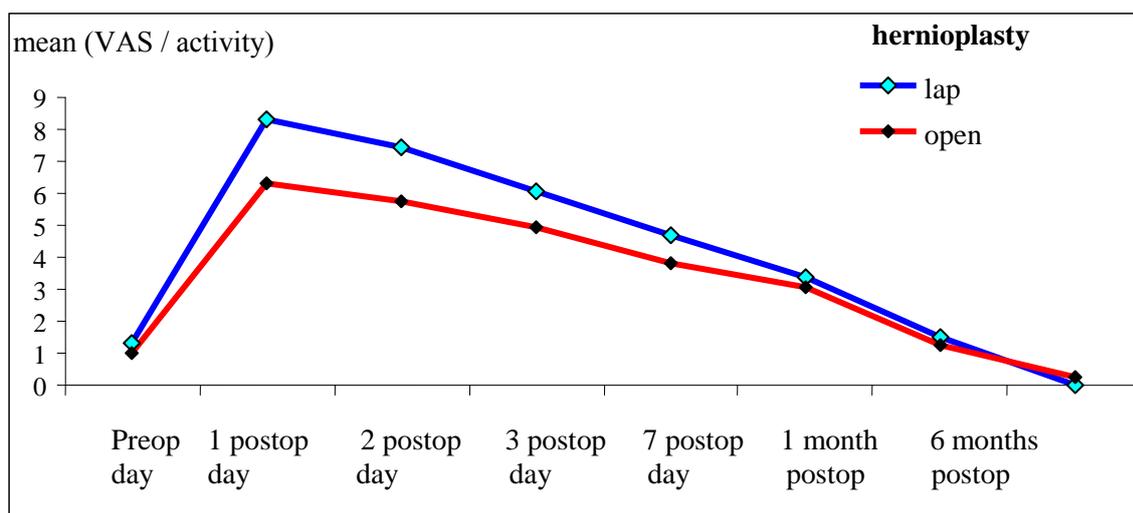


**Figure 1.**

In the state of activity, on the day of the intervention and two days later, the results presented a significantly higher intensity of pain in laparoscopic group ( $p < 0.0001$ ).

On the third and seventh postoperative days, no significant difference was observed in the intensity of pain between the two groups of patients (mean score was 5;  $p = 0.22$  and 3 in both groups;  $p = 0.16$ , respectively).

The difference was insignificant one and six months after the intervention ( $p = 0.19$ ,  $p = 0.25$ , consequently). (Figure 2).



**Figure 2.**

### Discussion

The results of our study show that there is a significant difference in postoperative pain in the early stage and it is more intense in laparoscopic than in open IPOM technique on the day of surgery, the first and second postoperative day at rest and during activity, while on the third and seventh day, as well as after one and six months postoperatively, there is no significant difference in pain intensity between the two methods.

These differences in pain intensity in the early postoperative period arise from the way of mesh fixation.

Transfascial sutures used for fixation in both methods, penetrate the entire thickness of the abdominal wall musculature and fascia and “entrapped” nerves and blood vessels. This can cause local muscle ischemia resulting in severe pain postoperatively [17].

Numerous sutures are needed around the perimeter of hernia defect with mesh overlap of 3-5 cm, the circumference around which sutures must be secured becomes quite large.

Today, there is sufficient evidence to suggest that the use of transfascial sutures results in significant postoperative pain [18-20].

Additionally, in laparoscopic method during fixation, tackers penetrate the abdominal wall and contribute to local tissue damage.

Hence, we can assume that the greater intensity of pain in the first days of laparoscopic approach is due to the cumulative effect of two mesh fixation techniques, on the one hand transfascial sutures and on the other hand multiple lesions caused from the tackers on parietal peritoneum.

### Conclusion

Patients after laparoscopic ventral hernioplasty, in the early postoperative period suffer from severe pain and it is the biggest challenge and problem after these operations.

Therefore, the use of adapted analgesia in patient with laparoscopic approach is imposed as a conclusion for the daily clinical practice.

Unfortunately, there is still a lack of detailed studies describing pain and its impact on reconvalescents and quality of life after laparoscopic ventral hernioplasty in the available literature.

Future research should focus on developing new atraumatic fixation methods.

### List of Abbreviations

ASA- American Society of Anesthesiologists

BMI- Body Mass Index

IPOM- Intraperitoneal Onlay Mesh

VAS- Visual Analogue Scale

VHWG- Ventral Hernia Working Group

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