

# INTRAPERITONEAL ONLY MESH REPAIR (IPOM) SURGERY IN INCISIONAL HERNIAS

## Intraperitoneal onlay mesh repair (IPOM) operácie hierní v jazve

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### Abstract

**Introduction.** Management of patients with ventral and incisional abdominal wall hernias remains controversial. Numerous techniques have been developed, among which the laparoscopic approach is viable and offers several advantages. However, it can also lead to serious complications.

**Material and Methods.** A retrospective analysis was conducted on 110 patients who underwent sIPOM surgery for incisional hernia during 4 consecutive years from 2016 to 2019 in our hospital with follow-up of at least one year after surgery. Outcomes of the study include demographic data, efficiency indicators, and surgical complications.

**Results.** Of the 110 patients included in the study, 49 were men and 61 were women. The average age was 60 years, average BMI 31, mean number of previous surgeries was 2, average length of operation was 84 minutes, average length of stay was 3,2 days, and mean diameter of defect was 9cm. Complications were assessed according to the Clavien-Dindo classification.

**Conclusion.** The surgical management of ventral and incisional hernias is continuously evolving. In recent years, numerous open and minimally invasive techniques have been developed, yielding varied outcomes. IPOM procedure is well established and mastered worldwide with expansion of minimally invasive techniques, but still with potentially serious complications (Fig. 3, Ref. 33). *Text in PDF www.lekarsky.herba.sk.*  
**KEY WORDS:** ventral hernia, incisional hernia, herniorrhaphy, miniinvasívna chirurgia, Clavien-Dindo classification.  
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### Abstrakt

**Úvod.** Manažment pacientov s ventrálnymi herniami a herniáciami brušnej steny v jazve ostáva kontroverzný. Bolo vyvinutých množstvo techník. Laparoskopický prístup je uskutočniteľný, ponúka viacero výhod, ale môže viesť k závažným komplikáciám.

**Materiál a metódy.** Retrospektívna analýza 110 pacientov, ktorí podstúpili procedúru IPOM pre herniu v jazve počas rokov 2016 – 2019 bolo uskutočnených v našej nemocnici so sledovaním aspoň 1 rok od operácie. Výsledky zahŕňajú demografické údaje, úspešnosť operácie a chirurgické komplikácie.

**Výsledky.** Zo 110 pacientov, ktorí boli zahrnutí, bolo 49 mužov a 61 žien, priemerný vek bol 60 rokov, BMI 31, priemerný počet predchádzajúcich operácií bol 2, dĺžka operácie 84 minút, dĺžka hospitalizácie 3,2 dňa, priemerná veľkosť defektu bola 9 cm. Hodnotené boli komplikácie podľa Clavien-Dindo klasifikácie.

**Záver.** Operačný manažment ventrálnych hernií a hernií v jazve sa dynamicky vyvíja. Za posledných niekoľko rokov bolo rozvinutých množstvo otvorených aj miniinvasívnych techník s rôznymi výsledkami. IPOM procedúra je dobre etablovaná zvládnutá po celom svete s rozvojom miniinvasívnych techník, ale stále s potenciálne závažnými komplikáciami (obr. 3, lit. 33). *Text v PDF www.lekarsky.herba.sk.*

**KLÚČOVÉ SLOVÁ:** ventrálna hernia, hernia v jazve, herniorafia, miniinvasívna chirurgia Clavien-Dindo klasifikácia.

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### Introduction

Ventral and incisional hernia repair is a common procedure performed daily by general and visceral surgeons. The right approach, surgical technique and global view on surgical or conservative management should be complex. Size, location, severity of assumed adhesions, pre-morbidity, and age have to be taken into account. Open approach, laparoscopic, endoscopic inside abdominal wall, or a hybrid approach can be feasibly achieved.

Incisional hernias represents a broad spectrum of morphological manifestations, from simple defects to complex multilobular defects with weakening of the abdominal wall with variability of sizes from small to a com-

plete loss of fascial structures (1). In contrast, most primary ventral hernias typically feature a single small defect surrounded by intact tissue. Results of the study demonstrate significant difference in base characteristics between the two types of ventral hernia. Recent studies have shown a strong preference for the laparoscopic approach over the open technique for incisional hernia repairs, distinguishing it from repairs of primary ventral hernias. (2). According to the International Endohernia Society (IEHS), it is recommended to differentiate between these two entities. Definitive results, due to lack of evidence, were not published until 2019 (3,4).

Historically, the only inappropriate candidates for pure laparoscopic wall repair were those with defects

too large to be covered by the available mesh size. (1). Laparoscopic intraperitoneal onlay mesh (IPOM) repair and open sublay mesh repair are currently the most common techniques globally for the treatment of primary and recurrent abdominal wall hernias. Currently, the IEHS recommends component separation techniques, such as transversus abdominal release, for patients with defects larger than 8-10cm. The exact size specifications have to be determined after further studies (5).

**Figure 1. Laparoscopic visualisation of Swiss-cheese hernia.**



### **Ventral vs. incisional hernia**

A significant difference in the duration of procedure was observed. There was a fourfold increase in the recurrence rate of hernias in obese patients. Studies suggest a higher complication rate after laparoscopic repair of incisional hernias compared to primary ventral hernias, with rates of 16,4-31,5% and 4,55% respectively (2, 6). The average hospital stay was similar, ranging from 2,3-3 days (7).

### **Classification and indications**

The classification of ventral and incisional hernia was successfully validated, but further implementation is required. While widely accepted by surgeons for descriptive purposes, it has not yet been fully utilized to tailor surgical procedures (8, 9). Petro et al. recently proposed a staging system, and time will determine its acceptance within the surgical community (10).

Indications should be established according to the defect size, type of hernia, symptoms, age, and comorbidity. Watchful waiting is safe for asymptomatic incisional and ventral hernias, but it leads to high crossover rates with significant increases of preoperative perforations, fistulas, and mortality during emergency surgery. It can be considered in patients with modifiable risk factors. Every symptomatic hernia should be treated surgically. Small hernia defect (2-7cm) predicts emergency repair. The European Hernia Society (EHS) advises reserving the laparoscopic technique for hernias with diameter of defect smaller than 15 cm. Long-term studies report 11% incidence of incisional hernias, with 33% symptomatic and 14% resulting in bowel obstruction

(11). A retrospective analysis of 155 patients, assessing contraindication of laparoscopic repair of ventral hernias based on the age limit of 65 years, did not prove significant difference in morbidity and mortality. Older patients tend to have poorer outcomes after emergency surgery (12,13). The International Endohernia Society (IEHS) suggests that only primary hernias smaller than 1 cm should be treated with open suture, due to higher recurrence rates associated with suture repair. Mesh reinforcement is recommended for all ventral hernias with a diameter more than 1cm in clean cases, with sublay mesh placement proving superior to onlay and inlay in terms of recurrence rates and surgical site infections (SSIs). Lavanchy compared open and IPOM techniques among 553 patients with at least 5,5-year follow-up. Almost the exact same recurrence was observed, but laparoscopy significantly reduced operation time, hospital stay, and complications (14).

### **Perioperative management**

There is no evidence-based medicine supporting the prophylactic use of antibiotics in ventral and incisional hernia mesh repairs. Consequently, routine administration of antibiotics is not recommended (15).

### **Recurrence after open repair of ventral and incisional hernia**

Reoperation due to recurrence of ventral hernias can be challenging. The laparoscopic approach offers some advantages: the access is in a different location than the previous surgery. In most cases surgery should be done with complete scar coverage. Typically, there is no need to remove the previous mesh or perform extensive dissection of the abdominal wall. Additionally, this method facilitates the identification of preoperatively unnoticed defects. Sharma published a study that revealed 16,3% of occult hernias during laparoscopic procedures (16).

### **Management of iatrogenic small bowel injury during ventral hernia repair**

Complications from laparoscopic procedures are less common but more severe compared to open surgery. LeBlanc reported a 1,78% incidence of iatrogenic enterotomy with 2,8% mortality rate when the lesions were preoperatively recognized. This rate increased dramatically to 7,7% when lesions went unrecognized. Large bowel injuries represent only 8,2% of injuries (17). Publications show incidence of enterotomy from 1,78 to 6%. Unrecognised perforations range from 0,68-2,9% (18, 19). Mortality rates range from 0,05 to 3,4%, escalating to 7,7% and as high as 100% under certain conditions. (17, 20, 21). Sharp dissection with use of electrocautery is recommended due to significant rise of morbidity and mortality (22). Management of conversion depends on the severity of the injury, the contamination level, and the surgeon's experience. If contamination is limited and the surgeon is sufficiently skilled, the procedure can proceed laparoscopically.

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Alternatively, a two-stage approach may be adopted, with further observation during the same hospital stay. In case of the surgeon's insufficient laparoscopic skills, conversion is necessary. After severe contamination, mesh placement should be avoided (23).

### **SSI after laparoscopic ventral hernia repair**

Wound infection significantly increases morbidity and mortality. SSI incidence is 10% with the open approach, compared to 1,1% with minimally invasive approach. The laparoscopic approach reduces the size of the wound, hospital stay, and duration of the operation. Risk factors include smoking, immunosuppression, diabetes, malnutrition, obesity, and peripheral vascular disease (24).

### **Mesh infection**

One of the most important roles of laparoscopy in ventral and incisional hernia repair is lower incidence of wound and mesh infection compared to the open technique. According to a meta-analysis by Sauerland, the incidence of local infection in the laparoscopic group was 3.1%, significantly lower than the 13.4% observed following traditional invasive procedures. Furthermore, the need for mesh removal was required in only 0.7% of cases following minimally invasive approaches, compared to 3.5% after open surgery. (25).

### **Seroma: risk factors, prophylaxis, treatment**

The published incidence of seroma after laparoscopic ventral hernia repair ranges from 3% to 100%. Seroma appears one week after surgery in most cases and is usually reduced spontaneously within 90 days. However, chronic seroma arises in some cases. Risk factors include irreducible hernia, multiple incisions from previous surgery, and intraoperative technical factors. These problems should be discussed with patient (26).

### **Bulging**

Besides postoperative pain, IPOM surgery can often lead to bulging, which may result in unsatisfactory cosmesis. This potential problem should be discussed with the patient individually prior to surgery. Additionally, differentiating between true recurrence and pseudo-recurrence presents a diagnostic challenge that requires careful evaluation. (27).

### **Recurrence after IPOM in incisional hernia repair. Risk factors, mechanism, prophylaxis**

Recurrence rates after open repairs range from 50-60% with decrease to 32% with mesh repair (28). Some patients are prone to recurrence because of the inherited impairment of the soft tissue due to defection of collagen synthesis (29). Potential recurrence rates are increased by the growing size of the primary defect; defects 10 cm or larger in diameter have significantly higher recurrence rates. Risk factors include smoking, obesity, COPD, chronic cough, diabetics, and elevated

intra-abdominal pressure. Patients with a history of ventral or incisional hernias also show higher recurrence rates (30). The most frequent cause of recurrence include mesh reduction, dislocation, its invagination into the sac of the hernia, or insufficient overlap less than 3 cm (31). Other preoperative factors include insufficient coverage of the wound by the scar and the use of two meshes during one surgery. Postoperative factors increasing recurrence rate are SSI, other infections, and gastrointestinal complications. Moreno-Egea published a study with a 5-year follow-up after the IPOM procedure, revealing a 0,4% recurrence rate in patients with defects smaller than 10 cm, 20% in those with 10-12 cm defect size, and 41,2% in patients with defects larger than 12 cm. The study also noted a significant correlation between defect sizes larger than 10 cm and a body mass index (BMI) higher than 30 (32). Achieving a mesh-to-defect ratio of at least 1:16 is recommended. (33).

### **Methods**

This retrospective study involved 110 patients who underwent surgery at the authors' healthcare facility between January 1, 2016, and December 31, 2019. The study focused on patients who received sIPOM procedures. The years 2020 and 2021 were excluded from the analysis due to an insufficient sample size of patients during the COVID-19 pandemic. Patients with other, modified, or converted procedures to open surgery were excluded from our case series. Follow-up of at least one year was conducted. Demographic characteristics such as sex, age, and BMI were assessed. The study also evaluated the number of surgeries performed preoperatively, average surgery time, hospital stay duration, defect size, and complications, categorized according to the Clavien-Dindo classification.

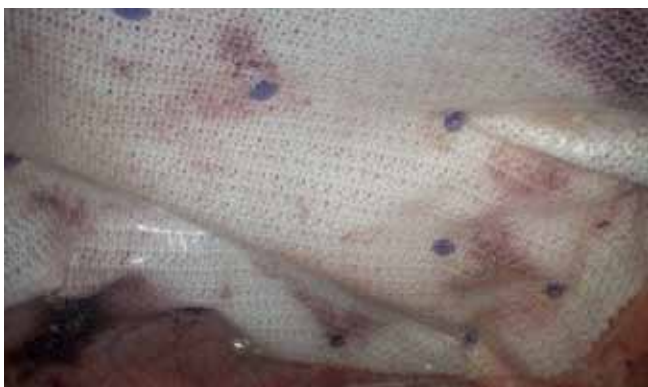
### **Results**

During the study period, 112 procedures were performed on 110 patients: 49 males and 61 females. The mean age was 60,5 years, with a range of 34 to 80 years with 60 as an average. The average BMI was 31, with a range of 17 to 39. According to surgical statistics, the median of surgeries preoperatively was 2, ranging from 1 ending with the patient who underwent 7 surgeries. The most common surgery in our study with the complication of the incisional hernia was cholecystectomy, performed both openly and laparoscopically. The average length of operation was 84 minutes, ranging from 20 to 186 minutes. The average hospital stay was 3,2 days, ranging from 2 to 14 days. The mean diameter of the defects was 9 cm, ranging from 2 to 22 cm. Out of all, 10 patients had Swiss-cheese hernia (Fig. 2, 3).

Figure 2. Port placement and measurement of defect size.



Figure 3. Mesh placement and fixation by absorbable tacks.



### Discussion

Complications were assessed according to Clavien-Dindo classification. Among the patients, 13 (11.8%) experienced Grade 1 complications; of these, 12 (10.9%) developed seromas. Eleven were treated conservatively (91,7%), one was aspirated with a thin needle. The results are comparable to findings from previous studies (26). One patient (0,9%) had port-site larger hematoma treated conservatively. Complications that needed antibiotics (Grade 2) occurred in three patients (2,7%). Interestingly, one patient had diagnosed wound chronic abscess six months after the procedure. Treatment was successful with drainage under local anesthesia with broad-spectrum antibiotics. One patient (0,9%) had a radiologically confirmed small bowel obstruction cured by conservative treatment. Grade 3 complications occurred in three patients (2,7%), two of them (1,8%) had small bowel lesions. The results are almost the same as findings from recent studies (17,18,19). In one case, the lesion was sutured perioperatively, and the IPOM surgery was completed successfully. Another patient (0,9%) had an unrecognized perforation that necessitated re-surgery, including mesh removal, debridement, drainage, and antimicrobial treatment. A third patient underwent surgery due to peritonitis, though no specific lesion or origin was identified. Early recurrence was diagnosed in three patients (2,7%) after two, three and

six months respectively. Pseudo-recurrence was not assessed. Grade IV and V complications did not occur.

### Conclusion

The IPOM technique is feasible and relatively easy to handle by experienced laparoscopic surgeons. Over the years, many variations have been developed, each with its own pros and cons. While the minimally invasive nature of IPOM offers several advantages, it also comes with limitations. Large defects should not be treated by IPOM itself. The complexity of ventral and especially incisional hernia, along with rising treatment costs, requires thorough understanding of many specialisations across the board. As the rise of the minimally invasive approach grows, so does the interest of surgeons. According to these facts it is vital to follow the recommendations of guidelines on the closure of abdominal wall incisions to prevent or minimize the formation of incisional hernia.\*

**\*Vyhlasenie o lud'skych pravach:** Autori vyhlasuju, ze vsecky pouzite postupy boli v sulade s etickymi normami prislušnej etickej komisie pre klinicku pracu s ludmi a pracu bola realizovana v sulade s Helsinskou deklaraciou.

**Informovany suhlas:** Autori publikacie vyhlasuju, ze od vseckych ucastnikov studie bol ziskan' informovany suhlas.

**Konflikt zaujmov:** Autori vyhlasuju, ze nemaju ziadeneho konfliktu zaujmov.

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