

Comparison between intraperitoneal onlay mesh repair with closure of fascial defect (IPOM plus) and intraperitoneal onlay mesh repair (IPOM) for ventral hernias

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of the article

Aim. To evaluate the intraperitoneal onlay mesh repair with closure of fascial defect (IPOM plus) versus intraperitoneal onlay mesh (IPOM) for ventral hernias (VHs).

Materials and methods. A total of 89 patients with VHs with a defect between 3–12 cm who underwent a surgery from 2018 to 2023 years were enrolled in this study. All of them were randomly assigned to two groups. Group 1 included 45 patients after intraperitoneal onlay mesh repair with closure of fascial defect (IPOM plus), Group 2 – 44 patients after intraperitoneal onlay mesh (IPOM). The distribution of patients by age, sex, body mass index (BMI), hernia type (primary VH, incisional hernia), American Society of Anesthesiologists (ASA) score was studied.

Results. The differences in sex, mean age, patient distribution based on hernia type, BMI, ASA score and hernia orifice size were not statistically significant between the two groups. Therefore, both groups were comparable. The operative time in minutes was 73.17 ± 7.43 in Group 1 and 70.93 ± 8.84 in Group 2 (not statistically significant). The pain score 12 hours after surgery was 5.24 ± 0.60 in Group 1 comparing to 5.02 ± 0.45 in Group 2 (not statistically significant). The pain score 8 days after surgery was 2.88 ± 0.31 in Group 1 comparing to 2.75 ± 0.43 in Group 2 (not statistically significant).

There was no significant difference concerning the incidence of early complications between the two groups. 41 (91.11 %) patients of Group 1 and 40 (90.9 %) patients of Group 2 were examined during a 22-month follow-up period. No complications were noted.

Conclusions. Laparoscopic ventral hernia repair provides satisfactory results in terms of safety and efficacy. Thus, IPOM plus repair is safe, feasible and offers possible advantages over the standard IPOM technique as reported in the literature. Poor outcomes described in the literature are probably related to independent variables such as mesh and suture types as well as closure technique.

Keywords:

ventral hernia, incisional hernia, fascial defect closure with intraperitoneal onlay, intraperitoneal onlay mesh, laparoscopy.

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Порівняння внутрішньоочеревинної пластики сітчастим імплантом із закриттям фасціального дефекту (IPOM plus) і внутрішньоочеревинної пластики сітчастим імплантом (IPOM) у хірургії вентральних гриж

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Мета роботи – оцінити внутрішньоочеревинну пластику сітчастим імплантом із закриттям фасціального дефекту (IPOM plus) порівняно з внутрішньоочеревинною пластикою сітчастим імплантом (IPOM) в хірургії вентральних гриж.

Матеріали і методи. У дослідження залучено 89 пацієнтів із вентральними грижами з дефектом 3–12 см, які були прооперовані у період з 2018 до 2023 року. Пацієнтів випадковим чином поділили на дві групи. У 1 групі 45 хворим виконано внутрішньоочеревинну пластику сітчастим імплантом із закриттям фасціального дефекту (IPOM plus); у групі 2 – 44 пацієнтам виконано внутрішньоочеревинну пластику сітчастим імплантом (IPOM). Вивчали розподіл пацієнтів за віком, статтю, індексом маси тіла, типом грижі (первинна вентральна, післяопераційна), розподіл пацієнтів за шкалою ризиків Американського товариства анестезіологів (ASA).

Результати. Групи дослідження вірогідно не відрізнялися за статтю, середнім віком, розподілом за типом грижі, індексом маси тіла хворих, результатами за шкалою ASA, розміром грижового отвору. Отже, групи дослідження зіставні. Тривалість операції у 1 групі становила $73,17 \pm 7,43$ хвилини, у 2 групі – $70,93 \pm 8,84$ хвилини, різниця статистично не достовірна. Інтенсивність болю через 12 годин після операції в 1 групі становила $5,24 \pm 0,60$ бала, у 2 групі – $5,02 \pm 0,45$ бала, відмінності статистично не вірогідні. Інтенсивність болю через 8 днів після операції у 1 групі становила $2,88 \pm 0,31$ бала, у 2 групі – $2,75 \pm 0,43$ бала, різниця статистично не достовірна.

Вірогідна різниця за частотою виникнення ранніх ускладнень не виявлена. Протягом 22 місяців спостереження обстежили 41 (91,11 %) пацієнта з 1 групи та 40 (90,9 %) хворих із 2 групи, ускладнень не виявлено.

Висновки. Лапароскопічна пластика вентральної грижі забезпечує задовільні результати в аспекті безпеки й ефективності. Операція IPOM plus є безпечною, доступною у виконанні та має можливі переваги порівняно зі стандартною операцією IPOM. Незадовільні результати, що описані в науковій літературі, ймовірно, пов'язані з незалежними змінними, як-от тип сітки, тип шва та техніка виконання операції.

Ключові слова:

вентральна грижа, післяопераційна грижа, внутрішньоочеревинна пластика сітчастим імплантом із закриттям фасціального дефекту, герніопластика, лапароскопія.

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Abdominal wall defects are a common surgical presentation and indication for surgery worldwide with an estimated prevalence of about 5 % in the general population [1,2].

The rising incidence of ventral hernias (VHs), basically, is driven by an increasingly obese population, a larger number of abdominal surgeries and ageing. VHs may be asymptomatic. VH symptoms such as pain and discomfort can significantly impact quality of life and definitely be associated with impaired body image. In addition, there are risks of bowel obstruction, incarceration, and strangulation.

Since Karl Leblanc introduced laparoscopic VH repair (LVHR) in 1993 [3], it has steadily gained recognition as an alternative to open VH repair due to better postoperative outcomes [4,5].

Aim

To evaluate the intraperitoneal onlay mesh repair with closure of fascial defect (IPOM plus) versus intraperitoneal onlay mesh (IPOM) for VH.

Materials and methods

A total of 89 patients with VHs with a defect between 3-12 cm who underwent a surgery in Private Enterprise "Clinic "Medicom" (Kyiv) from 2018 to 2023 years were enrolled in this study. All of them were randomly assigned to two groups. Group 1 included 45 patients who underwent intraperitoneal onlay mesh repair with closure of fascial defect (IPOM plus), Group 2 – 44 patients who underwent intraperitoneal onlay mesh (IPOM). The distribution of patients by age, sex, body mass index (BMI), hernia type (primary VH, incisional hernia), American Society of Anesthesiologists (ASA) score was studied. The patients with other serious underlying diseases as well as incarcerated hernia or emergency cases were excluded in this study. Before a surgery, each patient was evaluated by physical examination and abdominal sonography to measure the size of the defect. The width of the hernia orifice was measured as the maximum distance between the medial edges of the fascial defect in the supine position of patients at rest.

The most common was incisional hernia. Previous open repair using anatomical non-mesh techniques was applied for 45 recurrent incisional hernias.

All procedures were performed under general anesthesia. We evaluated operative time, postoperative pain level, complications. We used Visual Analogue Scale (VAS) to grade the pain level from 0 to 10 points (painless to severe pain). The pain scores were assessed in 12 hours and on day 8 after surgery. Ketorolac 30 mg intravenous drip was administered for postoperative pain relief if the pain score was 4 points or less; an opioid analgesic was used if the pain score was more than 4 points.

The IPOM plus procedure was performed according to Patent of Ukraine No. 119299, the hernia orifice was sutured, the Parietene Composite mesh overlapping the defect by at least 5 cm in all directions was intraperitoneally placed using an onlay technique and fixed to the abdominal wall using two transmural 2/0 prolene sutures, the mesh fixation was performed with absorbable tacks. The IPOM procedure in Group 2 was performed according to the LeBlanc technique [3], the Parietene Composite mesh overlapping the

defect by at least 5 cm in all directions was intraperitoneally placed using an onlay technique and fixed to the abdominal wall using two transmural 2/0 prolene sutures, the mesh fixation was performed by absorbable tacks.

Post-discharge follow-up visits for the patients were appointed on day 8, month 1 and month 3. The patients were informed about their follow-up visits via telephone, that ensured monitoring all the operated patients. The follow-up of the patients ranged from 4 months to 22 months.

Chronic pain was defined as pain that lasted for >6 months with a need for analgesic medication.

The independent t-test was used to compare age, BMI, hernia orifice size, operative time, severity of postoperative pain 12 hours and 8 days after the surgery. Descriptive statistics included mean, median, standard deviation (SD). The distribution of patient by sex, hernia type, ASA score, postoperative complications was analyzed by Chi-square test (χ^2). Differences were considered statistically significant at $p < 0.05$.

Results

There were 45 males and 44 females. *Table 1* shows that differences in sex, mean age, distribution of patients based on hernia type, BMI, ASA score, hernia orifice size were not statistically significant between the two groups. Therefore, both groups were comparable.

Surgical outcomes are shown in *Table 2*.

The operative time in minutes was 73.17 ± 7.43 in Group 1 and 70.93 ± 8.84 in Group 2, demonstrating a statistically non-significant difference. It means that the IPOM plus approach takes up an average equivalent time to the IPOM technique. The pain score 12 hours after the surgery was 5.24 ± 0.60 in Group 1 as compared to 5.02 ± 0.45 in Group 2, showing a statistically non-significant difference. The pain score 8 days after the surgery was 2.88 ± 0.31 in Group 1 as compared to 2.75 ± 0.43 in Group 2, also indicating a statistically non-significant difference.

There were no significant differences in the incidence of early complications between the two groups. In Group 1, 1 (2.22 %) patient developed port-site seroma, it was punctured under sonographic guidance. In Group 2, postoperative complications occurred in 2 (4.55 %) cases, in one of these, a patient developed port-site hematoma, which was punctured under sonographic guidance and coagulated; the other one developed port-site infiltrate, which was successfully treated conservatively. There were no cases of conversions to open surgery in both groups.

41 (91.11 %) patients of Group 1 and 40 (90.9 %) patients of Group 2 were evaluated over 22 months follow-up period. No complications were recorded.

Discussion

Older adults are at increased risk of developing VH due to weak anterior abdominal wall and impaired mechanisms of tissue repair.

Hence, S. G. Parker et al. [6] have identified three patient variables (female sex, age 65 years or less, and BMI higher than 25 kg/m^2 , 30 kg/m^2 , 35 kg/m^2 or 40 kg/m^2), 5 patient co-morbidities (smoking, diabetes mellitus, chronic obstructive pulmonary disease, ASA grade III–IV, steroid

Table 1. Patient demographics and hernia characteristics

Parameter, units of measurement	Group 1, n = 45	Group 2, n = 44	p-value
Male / female	23 / 22	22 / 22	0.9170
Age, years	48.84 ± 6.73	50.02 ± 5.99	0.3850
Primary linea alba / primary umbilical / incisional hernia	3 / 19 / 23	4 / 18 / 22	0.9130
BMI, kg/m ²	27.99 ± 1.92	28.8 ± 2.36	0.0789
ASA I / II / III	11 / 27 / 7	10 / 26 / 8	0.9400
Hernia orifice size, width in cm	5.88 ± 1.78	5.22 ± 1.42	0.0567

Table 2. Surgical outcomes

Parameter, units of measurement	Group 1, n = 45	Group 2, n = 44	p-value
Operative time, min	73.17 ± 7.43	70.93 ± 8.84	0.1987
VAS score 12 h after the surgery	5.24 ± 0.60	5.02 ± 0.45	0.0540
VAS score 8 days after the surgery	2.88 ± 0.31	2.75 ± 0.43	0.1049
Short-term postoperative complications	Developed port site seroma – 1	Developed port site hematoma – 1; Developed port site infiltrate – 1	0.4795

usage), two hernia-related variables (incisional / primary, recurrent / primary), six intraoperative variables (biological mesh, bridged repair, open as opposed to laparoscopic surgery, suture as opposed to mesh repair, onlay / retrorectus, intraperitoneal / retrorectus) and six postoperative variables (any complication, surgical-site rate, wound infection, seroma, hematoma, wound dehiscence) as significant prognostic factors for VH recurrence. Progressively increasing risk of VH formation with each increase in BMI above 25 kg/m² has also been documented [7].

However, there is some controversy over different approaches to LVHR. The popular laparoscopic approach is IPOM repair, when IPOM is placed with at least a 5 cm overlap to cover the hernia defect (without a defect closure) [3]. Nevertheless, this approach creates space between the mesh and the overlying hernial sac, which is believed to be the cause of seroma formation [8]. Age had no effect neither on seroma nor on recurrence in the study of F. Muysoms et al. [9], but was associated with a longer length of hospital stay in patients over 65 years.

In a study by Dimitrios Prassas et al. [10], laparoscopic IPOM combined with electric cauterization of the hernia sac significantly reduced the rate of postoperative seroma compared to the IPOM technique in patients with ventral and incisional hernias, which is inconsistent with our study results.

Postoperative hematomas are considered among the most serious complications. In our study, we have observed one port-site hematoma case (1.12 %) in an obese patient who was successfully managed by cauterization. Hematoma prevalence is estimated to be between 0.4 % and 4.0 % in the literature [11,12].

We agree with S. G. Parker [13] that a significant increase in VH defect width is positively correlated with higher recurrence rates.

LVHR is a preferred procedure to correct abdominal wall defects. Seroma and recurrence are the main postoperative complications which are related to obesity. Other complications, such as chronic pain, ileus, and hematoma occur less frequently and can be avoided by following the guidelines for LVHR.

Closure of fascial defect appears to decrease postoperative morbidity and give chance for good mesh fixation. Several reports have indicated the effectiveness

of IPOM plus [14,15,16], and a recent systematic review has concluded that IPOM-plus was more effective than IPOM [17,18].

The underlying mechanism that causes tension on the suture line of the fascial closure is the nonfunctioning central portion of the abdominal wall that can protrude into the hernia sac due to intraabdominal pressure. To circumvent these problems, the International Endohernia Society guidelines suggest that IPOM-plus may produce less tension on the suture line of the fascial closure [19,20].

Conclusions

1. Laparoscopic ventral hernia repair provides satisfactory results in terms of safety and efficacy. Thus, IPOM plus repair is safe, feasible and offers possible advantages over the standard IPOM repair as reported in the literature.

2. Inconsistent results in the literature are probably related to independent variables such as the type of mesh, suture and closure techniques.

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