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Laparoscopic intraperitoneal onlay mesh with fascial repair (IPOM plus) for ventral and incisional hernia

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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

Abdominal wall surgery for ventral hernia is one of the commonest procedures performed by the surgeons.

The aim of the study is to evaluate short- and long-term outcomes in patients who underwent laparoscopic IPOM plus approach.

Materials and methods. This study describes 70 patients who underwent laparoscopic intraperitoneal onlay mesh repair plus (IPOM plus) for ventral and incisional hernia. These were then followed up for a period of a minimum of 12 months and a maximum of 5 years.

Results. Of the 70 patients, 8 (11.43 %) linea alba hernias, 28 (40.00 %) umbilical hernias, 34 (48.57 %) had incisional hernias. The distribution based on ASA score: I – 23 (32.86 %) patients, II – 39 (55.71 %), III – 8 (11.43 %). The mean age was 50.21 ± 0.89 years (M ± m). Male to female ratio was 1.19:1.00. Average defect size was 4.77 ± 0.21 cm (M ± m). Mean operating time was 58.27 ± 0.52 minutes (M ± m). Mean post-op hospital stay was 1.84 ± 0.06 days (M ± m). Intensity of pain by VAS pain score was 5.11 ± 0.92, 4.47 ± 0.31, 2.90 ± 0.72, 0.92 ± 0.81 (M ± m) after 6 hours, 24 hours, 1 week, 6 weeks respectively. No conversion to open laparotomy was required.

Reported complications were port-site seroma 3 (4.29 %), port-site hematoma 1 (1.43 %) over one year of follow-up. 62 (88.57 %) patients were evaluated over 21 months follow-up period, no complications have been reported.

Conclusions. Obtained results showed that the IPOM plus repair is safe and may be used for routine laparoscopic ventral and incisional hernia repair, the closure of fascial defect appears to give chance for good fixation of the mesh and decrease postoperative morbidity.

Key words: IPOM plus, laparoscopic surgery, surgical mesh, ventral hernia.

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Лапароскопічна інтраперитонеальна пластика з ушиванням грижових воріт (IPOM plus) у хірургії первинної вентральної та післяопераційної грижі

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Операція на черевній стінці при вентральній грижі є одним із найпоширеніших втручань, які виконують хірурги.

Мета роботи – оцінювання ранніх і віддалених результатів лікування у пацієнтів, яким виконали операцію IPOM plus.

Матеріали та методи. Викладено результати хірургічного лікування 70 пацієнтів, яким виконали операцію IPOM plus при вентральній і післяопераційній грижі. Пацієнти перебували під спостереженням від 12 місяців до 5 років.

Результати. З-поміж 70 пацієнтів, яких залучили в дослідження, у 8 (11,43 %) діагностовано грижі білої лінії, у 28 (40,00 %) – пупкові, у 34 (48,57 %) хворих – післяопераційні грижі. Розподіл за шкалою ASA: I – 23 (32,86 %) пацієнти, II – 39 (55,71 %), III – 8 (11,43 %) випадків. Середній вік становив 50,21 ± 0,89 року (M ± m), співвідношення чоловіків і жінок – 1,19:1,00. Середній розмір дефекту становив 4,77 ± 0,21 см (M ± m). Середня тривалість операції – 58,27 ± 0,52 хвилини (M ± m), середня тривалість перебування в лікарні становила 1,84 ± 0,06 доби (M ± m). Інтенсивність болю за шкалою VAS оцінили як 5,11 ± 0,92, 4,47 ± 0,31, 2,90 ± 0,72, 0,92 ± 0,81 (M ± m) через 6 і 24 години, 1 і 6 тижнів після операції відповідно. Необхідності в конверсії не було в жодному випадку.

Протягом одного року після операції зафіксували такі ускладнення: серома ділянки порту – в 3 (4,29 %) пацієнтів, гематома ділянки порту – 1 (1,43%) випадок. Протягом 21 місяця після операції обстежили 62 (88,57 %) пацієнтів, ускладнення не виявлені.

Висновки. Пластика IPOM plus безпечна, може бути використана в лапароскопічній хірургії первинної вентральної та післяопераційної грижі. Закриття фасціального дефекту дає змогу якісно зафіксувати сітку та сприяє зниженню післяопераційних ускладнень.

Ключові слова: IPOM plus, лапароскопічна пластика вентральної грижі, сітка, вентральна грижа.

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All hernias may lead to discomfort. Symptoms like pain, the increasing size of the protruding hernia due to straining, and others can be alarming to patients, along with impending risk of incarceration.

Many of these patients are no more active in sport, profession or even daily life. Hence there is the need for surgery. This can be achieved either as an open or laparoscopic approach.

Ventral hernia repair is one of the most frequently performed surgical operations in the world [5].

Minimally invasive surgery using laparoscopy is the first treatment option for ventral hernias. Laparoscopic Ventral Hernia Repair (LVHR) was first described by Karl Leblanc in 1992 and has been gaining popularity in this present era of minimal access surgery [10].

Based on the updated international Endohernia Society (IEHS) guidelines, mesh repair is recommended for abdominal hernias with defects larger than 1 cm, and those larger than 4 cm should be considered for laparoscopic mesh repair [3]. Intraperitoneal mesh placement is an option through a laparoscopic approach.

Standard LVHR involves bridging the defect from the peritoneal side followed by placement of a composite mesh, known as the "intraperitoneal onlay mesh (IPOM) repair", wherein the mesh is placed in an "underlay" position via the laparoscopic intraperitoneal approach. These repairs are associated with a significant incidence of recurrence and seroma formation and also cause incomplete restoration of abdominal muscle function [12,20].

To deal with these problems, sutured closure of the defect in the fascia before intraperitoneal placement of a mesh, termed as the "IPOM plus repair" was recommended in the guideline of the International Endohernia Society [13,18].

Aim

The purpose of the study is to evaluate short- and long-term outcomes in patients who underwent laparoscopic IPOM plus approach.

Materials and methods

This retrospective study describes 70 patients who underwent laparoscopic intraperitoneal onlay mesh repair plus (IPOM plus) for ventral and incisional hernia at the clinic "Medikom" from 2015 to 2021 years. Follow-up information was obtained via the medical record for subsequent hospitalizations or clinic visits, and a questionnaire was administered to every patient. These were then followed up for a period of a minimum of 12 months and a maximum of 5 years.

Patients older than 18 years undergoing IPOM plus surgery for primary or incisional ventral hernia and having defect whose width did not exceed 12 cm were enrolled after informed consent.

Patients with cardiac disorders, also unfit for general anesthesia, patients fit for open repair or a hybrid approach (open reduction and closure of defect followed by laparoscopic IPOM repair), with incarcerated, obstructed or strangulated hernias were excluded from this study.

Information recorded for data analysis: age, gender, body mass index (kg/m^2), hernia type, location, ASA score, size of the defect, operating time, 10-balls postoperative pain score. The size of the defect was measured as the maximum distance between the medial edges of the defect in the fascia when the patient is in a resting supine position. The operating time was calculated from the insertion of the first trocar to exsufflation.

All patients underwent routine laboratory investigations, ultrasound soft tissue for establishing diagnosis (we used Esaote MyLab 6), detection size of defect, and chest radiography. First generation cephalosporin cefazolin 1 gram solution for intravenous injection was given for every patient before operation.

The procedure (laparoscopic IPOM plus) was done according to Patent of Ukraine No. 119299 with Parietene Composite mesh, it's important to reduce intra-abdominal pressure to 6 mm Hg in order to get accurate hernia orifice size, intracorporeal sutures with non-absorbable monofilament were applied on hernia orifice, it involved placement of a mesh with 4–5 cm overlap at the edges of the defect, mesh was anchored with two opposite corner tension free extracorporeal subcutaneous transfascial sutures, the mesh fixation was performed by absorbable tacks.

The patients were mobilized and liquids orally were allowed once they were fully awake and non-sedated, usually 3–4 h after the surgery. Patients were discharged once they were fully mobile and comfortable on oral analgesics.

Statistical analysis was obtained with the statistical software package. Quantitative data were presented as mean and average deviation from the mean (M ± m).

Results

There were 38 males and 32 females (*Table 1*). The range age was 29–60 years. Obesity is defined as a BMI greater than or equal to 30 kg/m^2 and morbid obesity also termed class III obesity as BMI greater than or equal to 40 kg/m^2. BMI ranged from 28 to 33 kg/m^2.

Incisional hernia was the most common hernia. Of the 34 incisional hernias which were recurrent, all of them undergone previous open repair using anatomical non-mesh techniques.

The operating time was 58.27 ± 0.52 (range from 48 to 69 minutes). There were no conversions to open.

The literature findings report a seroma rate of up to 12.2 % [2,13]; in our study, the seroma rate was 4.29 % (*Table 2*). The port-site seromas were punctured under sonography control.

In 1 (1.43 %) patient the port-site hematoma was punctured and successfully coagulated under sonography control. Hematoma prevalence is estimated to be between 0.4 % and 4.0 % in the literature [1,16].

Conversion to open surgery was not required among the 70 patients.

Discussion

In this series, mean operating time was 58.27 minutes (range 48–69 minutes), which is more than the study carried out by Gupta et al (45 minutes) but less than the study carried out by C. Palanivelu et al. which was 95 minutes [9,13].

There was no intraoperative visceral and vascular injury encountered in this study. Palanivelu C. et al. reported 0.3 % bowel injury in his study [13].

No patient needed conversion to open procedure in this study in contrast to other studies carried out by C. Palanivelu et al. (1 %) and Bassem M. Sieda et al. (4.3 %) [13,19].

Table 1. Baseline characteristics, n (%), M ± m

IPOM plus, n = 70		
Gender	Male	38 (54.29 %)
	Female	32 (45.71 %)
Age, years		50.21 ± 0.89
ASA score	ASA-I	23 (32.86 %)
	ASA-II	39 (55.71 %)
	ASA-III	8 (11.43 %)
Type of hernia	Linea alba	8 (11.43 %)
	Umbilical	28 (40.00 %)
	Incisional	34 (48.57 %)
BMI, kg/m^2		30.72 ± 0.18
Defect size, cm		4.77 ± 0.21

Table 2. Post-operative data (n = 70), n (%), M ± m

Features		Data
Pain (VAS)	6 hours	5.11 ± 0.92
	24 hours	4.47 ± 0.31
	1 week	2.90 ± 0.72
	4 weeks	0.92 ± 0.81
Port-site seroma		3 (4.29 %)
Port-site hematoma		1 (1.43 %)
Length of stay, days		1.84 ± 0.06

There was no incidence of mesh infection in this study compared to other studies [19].

Average hospital stay in this study was 1.8 days. Gupta P. et al. in their study showed mean hospital stay was 1.4 days compatible with our study [9].

No bulging or eventration of mesh was observed in this study comparable to other studies [19]. We agree that fascial closure has been recommended to prevent the bulging of the abdominal wall and seromas after bridging repair in laparoscopic IPOM repair [6,7].

On the other hand, authors concluded that LVHR with or without fascial closure, provided satisfactory results in terms of safety and efficacy, the discordant results in the literature are probably related to independent variables such as the type of mesh, the type of suture and closure technique [15].

Main idea of fixation is to keep the mesh in contact with the anterior abdominal wall in order to achieve fibrosis and to avoid landing of mesh in the peritoneal cavity to prevent complications.

We are in accordance with conclusions that the mesh overlaps of the borders of hernia ring is important as a factor, and depends on the size of the hernia defect, so the larger the gap – hernia ring, more overlapping of the mesh is needed [8].

The concern with laparoscopic IPOM is chronic pain. It has been defined as a pain that lasts more than 3 months. This complication has been reported in 2.0–9.5 % of cases of laparoscopic IPOM repair [20].

It was related to fixation systems, especially non-absorbable ones [11]. In our series, no cases of chronic pain or recurrence have been observed, we used only absorbable fixation tacks.

In the one year follow up time P. Gupta et al. reported 0.4 % and C. Palanivelu et al. 0.55 % recurrence rate respectively [9,13].

62 (88.57 %) patients were evaluated over 21 months follow-up period, major complications associated with laparoscopic IPOM, such as enteric fistulas or mesh migration, were not reported.

The 36-Item Short Form Health Survey questionnaire (SF-36) is a very popular instrument for evaluating Health-Related Quality of Life (HRQL) [18]. In this study 67 (95.71 %) of the patients were satisfied with the 1 year post operative results, 3 (4.29 %) of the patients were not satisfied with the 1 year post operative results because of co-morbidities only. Mental health showed no alteration. Therefore, it is correct to say that IPOM plus should improve the HRQL. As observed in our and other authors research, the QoL is not entirely influenced by the operation itself, but also by additional health problems [14].

The advantages of IPOM plus over open retro muscular hernia repair like Rives–Stoppa technique: first method does not disturb muscle compartments or the segmental nerve innervations, provides additional benefit as a complete exploration of the abdominal cavity, the possibility to add another procedure if needed, an easier adhesiolysis due to the magnification of the view, and a lower postoperative abdominal pain because no wide dissection is performed [4].

Conclusions

1. IPOM plus repair is safe and may be used for routine laparoscopic ventral and incisional hernia repair.
2. Closure of fascial defect appears to give chance for good fixation of the mesh and decrease postoperative morbidity. However, larger-scale studies are essential.

Conflicts of interest: authors have no conflict of interest to declare.
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