Chirurgia (2023) 118: 654-665
No. 6, November-December

http://dx.doi.org/10.21614/chirurgia.2023.v.118.i.6.p.654

Open and Laparoscopic Surgical Approache in Incisional Hernias: A Descriptive Analysis

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Received: 14.10.2023
Accepted: 09.12.2023

Rezumat

Abordarea chirurgicală deschisă și laparoscopică în herniile incizionale: o analiză descriptivă

Context actual: Herniile incizionale, apar la 10-20% dintre pacienți după o intervenție chirurgicală abdominală, afectează în mod semnificativ calitatea vieții pacienților şi sistemele de sănătate. Acest studiu analizează două metode de reparare a herniei: hernioplastia laparoscopică cu plasă intraperitoneală onlay (IPOM) şi hernioplastia deschisă on-lay. Factorii cheie de analiză includ timpul operator, durerea postoperatorie, complicațiile, durata spitalizării, durata de recuperare şi ratele de recurență, cu scopul de a identifica cea mai eficientă şi benefică abordare pentru pacienți.
Materiale şi metodă: Am efectuat un studiu retrospectiv ce include 70 de pacienți cu defecte parietale postoperatorii în cadrul Spitalului Clinic de Nefrologie "Dr. Carol Davila", Bucureşti, în perioada ianuarie 2018 - decembrie 2021. Pacienții au fost supuşi intervenției laparoscopice IPOM (42 de pacienți) sau hernioplastiei deschise (28 de pacienți) pentru repararea herniei incizionale necomplicate. Am analizat datele demografice, comorbiditățile, dimensiunea şi localizarea defectului, intervențiile chirurgicale anterioare şi rezultatele chirurgicale.
Rezultate: Grupul laparoscopic a prezentat un timp operator mai

scurt şi niveluri de durere postoperatorie semnificativ scăzute, evaluate prin Scala Analogică Vizuală. Abordarea laparoscopică a dus, la spitalizări scurte şi la o revenire mai rapidă la activitățile de rutină. Complicațiile, precum seromul şi hematomul, au fost mai frecvente în grupul de chirurgie deschisă, nu au fost observate infecții ale plăgii sau respingeri ale protezei în niciunul dintre grupuri. Grupul de chirurgie deschisă a prezentat o rată de recurență mai mare (11%), comparativ cu absența recidivelor în grupul laparoscopic în decurs de 12 luni de urmărire.
Concluzii: Intervenția laparoscopică IPOM prezintă beneficii față de hernioplastia deschisă, înregistrându-se dureri reduse, spitalizare scurtă, recuperare rapidă şi rate de recurență redusă.

Cuvinte cheie: hernie incizională, recurenta hernie incizională, laproscopie IPOM, hernioplastie supraaponevrotică

Abstract
Background: Incisional hernias, occurring in 10-20% of patients post-abdominal surgery, significantly affect patient quality of life and healthcare systems. This study analyses two hernia repair methods: laparoscopic intraperitoneal onlay mesh (IPOM) and open on-lay hernioplasty. Key analysis factors include operative time, postoperative pain, complications, length of hospital stay, recovery speed, and recurrence rates, with the goal of identifying the most effective and beneficial approach for patients.
Methods: We conducted a retrospective study on 70 patients with postoperative parietal defects at the Dr Carol Davila Clinical Nephrology Hospital, Bucharest, from January 2018 to December 2021. Patients underwent either laparoscopic IPOM (42 patients) or open hernioplasty (28 patients) for uncomplicated incisional hernia repair. We analyzed demographic data, comorbidities, defect size and location, previous surgeries, and surgical outcomes.
Results: The laparoscopic group had a slightly shorter operative time and significantly lower postoperative pain levels, as assessed by the Visual Analog Scale. The laparoscopic approach also resulted in shorter hospital stays and quicker return to routine activities. Complications, such as seroma and hematoma, were more common in the open surgery group, but no wound infections or prosthesis rejections were observed in either group. Notably, the open surgery group showed a higher recurrence rate (11 %) compared to none in the laparoscopic group within a one-year follow-up.
Conclusion: Laparoscopic IPOM for incisional hernia repair shows benefits over open hernioplasty, with less pain, shorter hospitalization, faster recovery, and lower recurrence. Its growing preference and potential for further research are highlighted.

Key words: incisional hernia, incisional hernia recurrence, IPOM laproscopy, supraaponeurotic hernioplasty

Introduction

Although in recent decades the use of minimally invasive surgical techniques has led to a decrease in the incidence of incisional hernias, they remain one of the most common postoperative complications of abdominal surgery. The prevalence of incisional hernia development is estimated at 10-20% of patients after abdominal surgery (1,2,3). In addition to negatively influencing the quality of life, physical appearance and increasing

morbidity of these patients, incisional hernias prove very expensive for society and medical systems (1,2).

Incisional hernias usually manifest as swelling, with complications such as strangulation and incarceration being rare events that present with specific symptoms. In most cases, clinical diagnosis is sufficient and further specialized investigations are usually not required (4). Repairing incisional hernias is a commonly conducted surgical procedure, and its complexity varies based on factors such as the hernia's size and location, prior surgeries, and the patient's underlying medical conditions (5,6). The repair of incisional hernias can be undertaken using either an open or a minimally invasive approach. Open repair involves sufficient subcutaneous resection, flap elevation, and placement of drains, which contributes to a higher incidence of wound complications (7). The heightened risk of wound infection and complications associated with open hernia repair has prompted ongoing research to identify the best management method for incisional hernias. This has resulted in surgeons increasingly embracing the laparoscopic approach (7). The laparoscopic technique involves positioning an intraperitoneal mesh (IPOM) that covers the defect and is fixed in place using tacks in a double crown technique (8). This approach helps surgeons delimit the edges of the defect, identifying any issues overlooked during clinical assessment. Moreover, the laparoscopic procedure facilitates the detection and treatment of concealed hernias (7,8). The increasing popularity of laparoscopic surgery for ventral hernias is evident, with surgeons actively adopting this technique.

The objective of this study was a descriptive study regarding laparoscopic IPOM technique and open on-lay hernioplasty for uncomplicated incisional hernias, taking into account factors such as operative time, postoperative pain, complications, length of hospital stay, time to return to daily activities and recurrence.

Materials and Method

The study analyses 70 patients with postoperative parietal defects admitted to the surgical department of the Dr Carol Davila Clinical Nephrology Hospital, Bucharest, between January 2018 and December 2021, which underwent surgery for incisional hernia repair. This was a retrospective study with inclusion and exclusion criteria as follows:

Inclusion criteria

All patients admitted to our surgical department between January 2018 and December 2021 for uncomplicated incisional hernia repair using alloplastic laparaoscopic or open techniques.

Exclusion criteria

Hernias after open appendectomy, Spigelian hernia, lumbar hernia, complicated hernia. There were no exclusion criteria regarding the size of parietal defect.

We analyzed comorbidities, demographic data, size and topography of parietal defects, risk factors, and previous surgical interventions.

The patients were categorized into either the laparoscopic or open group. Comprehensive evaluations were conducted for all patients, encompassing a thorough medical history, detailed physical examination, and routine blood investigations. Additionally, a preanesthetic checkup was performed for each patient before the surgical procedure. Preoperative preparation involved the administration of intravenous fluids to address dehydration and correct any electrolyte imbalances. Prophylactic antibiotics were given appropriately.

Patients underwent one of two procedures: laparoscopic hernia repair, specifically the intraperitoneal onlay mesh repair (IPOM) was chosen in 42 patients (60%), or open hernia repair with on-lay Chevrel technique mesh placement (open hernioplasty) in 28 cases (40%). All patients were operated under general anesthesia with orotracheal intubation. All patients received preoperative mechanical bowel preparation and urethro-vesical catheter and nasogastric tube were inserted during surgery. Surgery in oncologic patients was conducted exclusively following preopera-

tive imaging evaluation (CT or MRI scan) to confirm the absence of neoplastic relapse. All cases were operated by the same surgical team. There were no differences in the two groups studied in terms of body mass index, anesthetic risk or size of parietal defects. Informed consent was obtained from all patients involved in the study.

Ethics committee approval was also obtained for this study.

Open surgical procedure for incisional hernia repair

The On-Lay Chevrel technique was used for the open repair. The procedure involved making an incision in the skin, dissecting and opening the hernia sac, freeing the adherent viscera, and reducing the contents. Subcutaneous dissection was conducted around the parietal defect. The fascial defect was then closed using interrupted polypropylene sutures. A polypropylene mesh was then placed along the edges of the defect, ensuring a 5 cm overlap in all directions, and fastened with interrupted Prolene (2-0) sutures. A size 18 drainage tube was inserted above the aponeurosis, then the skin was sutured.

Laparoscpic IPOM surgical procedure for incisional hernia repair

Intraperitoneal access was established using the open method with small insicion lateral to the parietal defect establishing the pneumoperitoneum through a 10 mm trocar. Two other 5 mm trocars were placed under vision lateral to the hernia defect in terms of ergonomic adhesiolysis and mesh placement positioning. In some cases, additional trocar placement was necessary. Adhesiolysis was executed through a combination of sharp and blunt dissection, encompassing the entire incision from the prior surgery.

A dual-mesh of appropriate size, providing a 5 cm overlap around the margins, was introduced through a 10 mm port and secured to the anterior abdominal wall in a circumferential manner using absorbable tacks.

The postoperative pain was evaluated using the visual analog scale (VAS), and suitable analgesia was administered. Complications such as seroma, hematoma, flap necrosis, and infection were monitored in the postoperative period and managed as necessary.

Follow up

Following the surgical procedure, patients were motivated to return to their regular daily activities Subsequent evaluations took place at one month, three months, six months and one year postoperatively. Surgical wounds underwent careful examination for indications of seroma, infection, and wound dehiscence. The extended assessment included monitoring for persistent pain at the surgical site, resumption of daily routine activities, and the occurrence of any recurrences.

Statistical Analysis

Data analysis was conducted using IBM SPSS version 29 (SPSS Inc., Chicago, IL, USA). Continuous variables were presented as mean ± standard deviation (SD), while categorical variables were expressed as number (%).

Results

70 patients were included in the study. In total 42 patients (60%) underwent laparoscopic surgery while 28 patients (40%) underwent open on-lay hernioplasty. The youngest patient registered was 30 years old and the oldest was 80. The mean age of patients who underwent laparoscopic surgery was 55±17.63 years while the mean age of patients who underwent open surgery was 57±16.24 years respectively as shown in *Table 1.*

Table 1. Gender distribution and mean age

Gender distribution	Laparoscopic surgery group N=42	Open surgery group N=28
Male	19 patients (45%)	13 patients (46%)
Female	23 patients (55%)	15 patients (54%)
Mean±SD Age – Years	55 ± 17.63	57 ± 16.24

In the laparoscopic surgery group 19 patients (45%) were male while 23 patients (55%) were female resulting in a male-to-female ratio 0.8:1.21. Regarding the open surgery group there were 13 male patients (46%) recorded and 15 female patients (54%) resulting in a male-to-female ratio of 0.9:1.15.

Topography of Parietal Defects

In terms of the overall topography of parietal defects we recorded: 20 patients (29%) with supraumbilical parietal defects, 24 patients (34%) with subumbilical parietal defects and 26 patients (37%) at the periumbilical level. The distribution of parietal defects in the Open Surgery group is relatively uniform across the three locations. The percentages (32-36%) indicate no significant predominance of defects in any specific area, suggesting that the likelihood of a parietal defect occurring is almost equal in supraumbilical, subumbilical, and periumbilical regions. A different pattern emerges in the Laparoscopic Surgery group. Here, there is a noticeable inclination towards periumbilical defects, accounting for 41% of the cases. The supraumbilical defects are less common (26%), and subumbilical defects, while more common than supraumbilical, are still less frequent than periumbilical defects (33%). This suggests that in the context of laparoscopic surgery, periumbilical defects are more prevalent. In conclusion, the analysis of these two groups reveals a distinct pattern in the localization of parietal defects, with the Open Surgery group showing a balanced distribution and the Laparoscopic Surgery group demonstrating a higher prevalence of periumbilical defects. *Table 2* illustrates the location of parietal defects and the surgical approach chosen.

Table 2. Topography of parietal defect

Topography of parietal defect	Open surgery group N= 28	Laparoscopic surgery group N= 42
Supraumbilical	9 patients (32%)	11 patients (26%)
Subumbilical	10 patients (36%)	14 patients (33%)
Periumbilical	9 patients (32%)	17 patients (41%)

Previous Surgeries

The dataset consists of two groups: the Open Surgery group with 28 patients and the Laparoscopic Surgery group with 42 patients. The distribution of previous surgeries within each group varied. In the Open Surgery group, the highest number of patients had undergone primary hernia surgery, constituting 32% of the total patients in this group, while the Laparoscopic Surgery group had 26% of patients with the same surgical history. Both groups show a diverse range of previous surgeries, indicating a broad spectrum of underlying medical conditions and surgical interventions. The slight differences in percentages for each type of surgery between the groups may reflect patient-specific factors or surgeon preferences influencing the choice of open versus laparoscopic procedures. Patients who have undergone certain surgeries previously, such as total hysterectomy or hemicolectomies, might present anatomical or scar-related challenges that could influence the decision between open and laparoscopic surgeries. For instance, extensive adhesions from previous open surgeries might lead surgeons to opt for open procedures in subsequent surgeries.

The surgical history of a patient, particularly surgeries like total hysterectomy or hemicolectomies, can present unique challenges. For instance, anatomical changes or scar tissues resulting from these surgeries could significantly influence the choice between open and laparoscopic procedures.

One specific concern is the presence of extensive adhesions, often a consequence of previous open surgeries. These adhesions can complicate subsequent surgeries and might lead surgeons to favor open procedures, where they can better navigate and manage these complexities.

An interesting observation is the higher percentage of patients with a history of primary hernia surgery in the Open Surgery

group. This might suggest a correlation where such a history influences the decision to opt for open surgery in later interventions.

Conversely, in the Laparoscopic Surgery group, there is a slightly higher prevalence of patients who had undergone procedures like anterior rectal resection and sigmoid resection. This pattern might indicate a preference or suitability for laparoscopic approaches in these types of surgeries, possibly due to factors like reduced invasiveness or better postoperative recovery associated with laparoscopic techniques.

In summary, the descriptive analysis of the Open Surgery and Laparoscopic Surgery groups with respect to their previous surgical histories uncovers nuanced differences that could influence surgical decision-making as shown in *Table 3*. These findings underscore the importance of individualized patient assessment, taking into account the impact of past medical interventions on current surgical choices. Such an approach not only facilitates tailored surgical planning but also enhances patient care by aligning surgical strategies with each patient's unique medical background.

As depicted in *Table 4* the primary factors attributed to wound healing failure within our study group predominantly involved anemia and coagulation disorders, often associated with reduced blood volume (hypovolemia). This condition leads to diminished oxygen supply to tissues, hindering healing and contributing to recurrent incisional hernias. A noteworthy portion of patients also exhibited blood glucose imbalances, indicating poorly controlled diabetes mellitus. This condition significantly increases the risk of postoperative wound infections, further contributing to the recurrence of abdominal wall defects.

Moreover, hypercholesterolemia and diabetes mellitus contribute to microvascular damage, obstructing tissue oxygenation and adversely affecting the overall healing process. Leukocytosis, characterized by elevated white blood cell counts, predisposes individuals to prolonged inflammatory swelling, leading to delayed formation of granulation tissue and collagen maturation, thus impeding the healing process.

The increased percentage of patients with elevated creatinine values aligns with the nephrologic profile of our hospital. However, it also signifies a factor associated with impaired wound healing and acts as an independent risk factor for the recurrence of incisional hernias.These factors collectively underscore the complex interplay between various physiological imbalances and their significant impact on impaired wound healing and the recurrence of incisional hernias.

Parietal Defect Analysis

The examination of parietal defects among patients undergoing different surgical approaches revealed distinct findings. In the

Table 3. Previous surgeries

Previous surgeries	Open surgery group N=28	Laparoscopic surgery group N= 42
Right hemicolectomy	3 patients (11%)	4 patients (10%)
Left hemicolectomy	2 patients (7 %)	3 patients (7%)
Anterior rectal resection	2 patients (7%)	5 patients (12 %)
Sigmoid resection	1 patient (2 %)	2 patients (5 %)
Cholecystectomy	2 patients (7 %)	3 patients (7 %)
Urological surgeries	1 patient (4%)	2 patients (5 %)
Primary hernia surgery	9 patients (33%)	11 patient (25 %)
Total Hysterectomy with bilateral anexectomy	6 patients (22%)	8 patients (19%)
Radical gastrectomy	2 patients (7 %)	4 patients (10 %)

Table 4. Biohumoral profile

Biohumoral profile	Open surgery group of 28 patients	Laparoscopic surgery group of 42 patients
Anemia	11 patients (39%)	16 patients (38%)
Hypoglycemia	2 patients (7%)	2 patients (5%)
Hyperglycemia	7 patients (25%)	12 patients (29%)
Elevated creatinine values	8 patients (29%)	13 patients (31%)
Leukocytosis	9 patients (32%)	9 patients (21%)
Hypercholesterolemia	10 patients (36%)	11 patients (26%)
Coagulation disorders	11 patients (39%)	15 patients (36%)
Hyperbilirubinemia	2 patients (7%)	2 patients (5%)

open surgery group, 5 cases of small incisional hernias (<3 cm), 9 cases of medium-sized hernias (3-6 cm), and 14 cases of large hernias (6-10 cm) were observed, culminating in a mean defect size of 5.25 ± 2.42 cm. In contrast, the laparoscopic surgery cohort showcased 9 cases of small hernias, 20 cases of medium-sized hernias, and 13 cases of large hernias, resulting in a mean defect size of 4.95 ± 1.83 cm.

Duration of Surgery

Noteworthy differences were observed in surgical durations. Open surgery averaged 83,21 ± 9.93 minutes, while laparoscopic surgery averaged 73,64 ± 8.06 minutes. Initial laparoscopic cases exhibited longer durations but showcased a declining trend as the surgical team gained expertise. This diminishing trend aligned with the team's grow ing proficiency in employing laparoscopic approaches, approaching durations akin to open surgeries over time. In specific scenarios of uncomplicated small to medium-sized incisional hernias, experienced laparoscopic surgeons demonstrated potential for quicker interventions compared to open surgery, emphasizing the advantages of expertise in this method.

Recovery and Hospital Stay

Post-surgery, a significant disparity in routine activity duration was evident: laparoscopic surgery patients required an average of 8.61±1.77 days, contrasting with open surgery patients who needed a longer recovery time, averaging 13.46±1.53 days. Additionally, a difference was noted in postoperative hospital stays; open surgery patients had an average hospitalization period of 5,82±0.39 days, notably more prolonged than laparoscopic surgery patients, who averaged 3,04±0.31 days.

Various characteristics evaluated in laparoscopic and open incisional hernia surgery are depicted in *Table 5*.

VAS Pain Score

The data suggests that patients in the laparoscopic group generally experienced lower levels of pain post-surgery compared to those in the open surgery group. The high percentage of patients with VAS scores ≤ 3 in the laparoscopic group (83%) versus the open surgery group (39%) is particularly noteworthy.

The absence of high pain levels (VAS ≥ 6) in the laparoscopic group contrasts sharply with the 29% of open surgery patients experiencing such pain. This further emphasizes the potential benefits of laparoscopic techniques in terms of pain management.

The analysis of VAS scores in these two groups demonstrates a clear trend towards lower pain levels in the laparoscopic surgery group compared to the open surgery group as illustrated in the *Table 6*. This highlights the potential benefits of laparoscopic procedures in terms of postoperative pain management, a crucial aspect of patient recovery and overall satisfaction with surgical outcomes.

Complication Rates

In the group undergoing open surgery specifically employing the On Lay - Chevrel procedure, 5 patients (18%) out of the 28 individuals studied experienced seroma, emerging as the most

Table 5. Important parameters

Parameters	Laparoscopic group (Mean ± SD)	Open surgery group (Mean ± SD)
Defect size (cm)	4,93 ± 1.83	5,25 ± 2.42
Operative time (minutes)	73,64 ± 8.06	83,21 ± 9.93
Postoperative hospital stay (days)	3,04 ± 0.31	5,82 ± 0.39
Routine activity (days)	8,61 ± 1.77	13,46 ± 1.53

Table 6. VAS pain score

VAS score (visual analog scale)	Laparoscopic group N= 42 patients	Open surgery group N= 28 patients
≤ 3	35 (83%)	11 (39 %)
4-5	7 (17%)	9 (32%)
≥ 6	0	8 (29%)

prevalent complication. Additionally, 2 patients (7%) encountered hematoma, a consequence attributed to extensive dissections, necessitating surgical reintervention for hemostasis.

Contrastingly, within the Laparoscopic IPOM surgical procedure group comprising 42 patients, 2 individuals (5 %) developed seroma, while 2 patients (5 %) encountered smaller hematomas that did not necessitate surgical intervention. Notably, there were no reported incidents of wound infection or rejection of prostheses in either of the studied groups.

Among the patients examined, 9 % (6 patients) were afflicted with cardiovascular diseases such as hypertension, ischemic heart disease, cardiac arrhythmia, or heart failure, posing challenges in both preoperative and postoperative management.

The frequency of complications was notably higher in the open surgery group, encompassing 7 patients (25%) out of 28 individuals compared to 4 patients (10 %) out of 42 in the laparoscopic surgery group.

Concerning hernia recurrence, 3 patients (11 %) out of 28 who underwent open surgical techniques experienced hernia recurrence during the one-year follow-up period. Remarkably, none of the patients subjected to minimally invasive procedures encountered hernia recurrence. However, the lack of long-term follow-up might influence these percentages, warranting the necessity of a national registry for patients with recurrent incisional hernias to ascertain more conclusive data.

Discussions

Incisional hernias represent a prevalent complication following abdominal surgery, occurring in approximately 10-20% of cases, and are characterized by the protrusion of abdominal contents through a weakened or disrupted fascial layer at the site of a previous surgical incision (9). The localization of these hernias plays a critical role in determining the most effective surgical approach for repair. Understanding the relationship between hernia localization and the choice of surgical technique - whether laparoscopic or open - is essential for optimizing patient outcomes and reducing the risk of recurrence. Studies have highlighted that midline hernias are the most prevalent, accounting for a significant portion of cases, often presenting with larger defect sizes and increased risk of recurrence (10,11).

The choice between laparoscopic and open surgical approaches is influenced by multiple factors, including hernia size, location, patient comorbidities, and surgeon expertise. Laparoscopic repair offers advantages such as reduced postoperative pain, shorter hospital stays, and quicker recovery compared to traditional open techniques (4). However, its suitability for larger defects and certain locations, particularly midline hernias, has been a subject of debate due to concerns about increased recurrence rates and technical challenges in achieving a durable repair (11).

For instance, midline hernias pose specific challenges in laparoscopic repair due to limited access, difficulty in achieving adequate mesh fixation, and potential compromise in the restoration of abdominal wall integrity (12). On the contrary, open surgical approaches provide direct access to the hernia defect, allowing better visualization, easier mesh placement, and precise closure of the defect (13). This approach might be favored for larger midline hernias or cases where laparoscopic repair is deemed unsuitable.

The localization of incisional hernias plays a crucial role in determining the optimal surgical approach. While laparoscopic repair offers distinct advantages in terms of reduced morbidity and faster recovery, the feasibility and success of this approach may vary based on hernia size and location. Open surgical techniques remain valuable, particularly for larger midline hernias, ensuring adequate visualization and precise closure of the defect. A tailored approach considering hernia localization, patient factors, and surgical expertise is pivotal for achieving successful outcomes and reducing the risk of recurrence.

In our comprehensive study, we enrolled 70

patients presenting with incisional hernias, classifying them into two distinct groups based on the surgical approach employed: 42 patients underwent laparoscopic hernia repair, while 28 patients underwent open surgery. Our analysis revealed that the mean age within the laparoscopic group was 55 ± 17.63 years, marginally lower than the mean age of 57 ± 16.24 years in the open surgery group. In the laparoscopic surgery group 19 patients (45%) were male while 23 patients (55%) were female resulting in a male-to-female ratio 0.8:1.21. In the open surgery group there were 13 male patients (46%) recorded and 15 female patients (54%) resulting in a male-to-female ratio of 0.9:1.15.

The predominant complaint among all cases was the presence of a pseudotumoral swelling, which constituted 100% of the reported symptoms. Diagnostically, para-umbilical incisional hernias were the most prevalent at 37%, followed closely by sub-umbilical incisional hernias at 34%, with supraumbilical hernias accounting for 29% of cases.

Among the comorbidities observed in our cohort, anemia, glycemic disorders, and coagulation disorders were the most frequently encountered. These underlying health conditions underscored the complexity of the patient population studied and potentially contributed to postoperative considerations and outcomes.

The surgical interventions, whether laparoscopic or open repair, were meticulously evaluated and compared across multiple parameters. Operative time, a crucial metric, was assessed to ascertain any significant differences between the two approaches. Postoperative pain, measured using the Visual Analog Scale (VAS) score, provided insights into the immediate discomfort experienced by patients post-surgery. Additionally, we examined the duration of hospital stay, the time taken for patients to resume routine activities, and recurrence post-repair.

Our comprehensive evaluation aimed to provide a holistic understanding of the outcomes associated with laparoscopic and open on-lay surgical approaches in incisional hernia repair. This meticulous analysis across various parameters will contribute to the enhancement of clinical decision-making and optimize patient care in this prevalent surgical scenario.

The debate surrounding operative times in laparoscopic and open ventral hernia repair has been longstanding. It's conventionally believed that laparoscopic repair is quicker due to perceived complexities in open surgery, our study confirms this notion.

Our findings revealed that in our cohort, the mean operative time for open surgery was 83,21 ± 9.93 minutes slightly exceeding the 73,64 ± 8.06 minutes observed in the laparoscopic group. Notably, we noted a decreasing trend in laparoscopic operative times over time, as our surgical team's proficiency increased.

Our study underscores the impact of surgical expertise on operative times. Particularly in managing uncomplicated small to medium-sized incisional hernias, experienced laparoscopic surgeons showcased potential for faster interventions compared to open surgery, emphasizing the importance of surgeon skill in influencing efficiency.

Recent literature aligns with our observations, highlighting comparable operative times between laparoscopic and open approaches in ventral hernia repair (15,16). These studies emphasize the pivotal role of surgeon experience in influencing procedural durations, challenging the generalized assumption of laparoscopic surgeries being inherently quicker than open procedures.

Postoperative pain is a primary concern following hernia surgery, often assessed using the Visual Analog Scale (VAS). Our study reveals a distinct difference in postoperative pain levels between laparoscopic and open hernia surgery. Patients in the open surgery group reported higher postoperative pain compared to those undergoing laparoscopic procedures.

Recent studies align with our findings, indicating reduced postoperative pain in

laparoscopic hernia repair (17,18). This underscores the potential advantage of laparoscopic techniques in mitigating immediate postoperative discomfort. While laparoscopic procedures may offer advantages in minimizing postoperative pain, considerations of patient factors and hernia complexity remain pivotal in decision-making.

The paradigm of outpatient or short-stay surgery has significantly influenced patient care, aiming to minimize hospitalization durations. Our findings revealed a notable disparity: the median postoperative hospital stay was 3,04±0.31 days for patients undergoing laparoscopic hernia surgery, contrasting with 5,82±0.39 days for those undergoing open surgery. This substantial difference underscores the potential advantage of laparoscopic techniques in facilitating shorter hospital stays, aligning with the current trend towards reduced inpatient durations. Recent scientific studies have also investigated the impact of surgical approach on hospitalization durations in hernia repair, with consistent findings supporting shorter stays in laparoscopic procedures (17-19). These studies emphasize the significance of adopting minimally invasive techniques to promote accelerated recovery and early discharge.

Our study compared the time taken to return to routine activities between patients undergoing laparoscopic and open hernia surgeries, revealing a substantial discrepancy in resumption timelines.

Patients in the laparoscopic surgery group exhibited a notably shorter mean duration to resume activity, averaging 8.61±1.77 days compared to the open surgery group, where the mean time was 13.46±1.53 days.

Recent studies consistently reporting shorter resumption periods in patients undergoing laparoscopic hernia repair compared to open procedures (17-22). These studies reinforce the notion that minimally invasive laparoscopic approaches contribute to swifter recovery and faster return to normal activities for hernia patients.

Postoperative complications significantly impact patient recovery, even in surgeries classified as clean, such as hernia surgery. Regarding seroma as the most frequent complication, our study aligns with existing research to some extent. Literature on seroma after hernia surgery suggests varying incidence rates, with studies reporting ranges from 2% to 30%, depending on factors like surgical technique and patient characteristics (23). Our study's observed seroma rates of 18% in the open surgery group and 5% in the laparoscopic group fall within these reported ranges. Similarly, hematoma occurrences in both groups, as the second most encountered complication, are in line with existing literature that indicates hematomas as relatively common postoperative issues in hernia surgery (24-26). However, the need for surgical reintervention due to hematomas in the open group contrasts with conservative management in the laparoscopic group, highlighting potential differences in management approaches across surgical techniques. The significance of these findings echoes the variability in complication rates reported in scientific literature, emphasizing the importance of careful patient selection, surgical technique, and postoperative management in minimizing complications.

The absence of wound infection or prosthesis rejection in both laparoscopic and open surgery groups align with the generally low reported rates of these specific complications in hernia surgery literature. Studies often note wound infection rates below 5% and infrequent occurrences of prosthesis rejection, supporting the favorable outcomes observed in our study across both surgical approaches (27,28).

The presence of cardiovascular diseases in 9% of patients highlights the importance of specialized care for those with pre-existing conditions undergoing hernia surgery. Scientific literature emphasizes how comorbidities, particularly cardiovascular issues, can impact postoperative outcomes (27,28). Managing these patients demands thorough preoperative evaluation, optimized medical treatment, and attentive perioperative care to reduce risks and improve results (26).

The recurrence rates reported in our study, specifically 11% in the open surgery group and

none in the laparoscopic group, highlight a significant finding. However, it's essential to contextualize these rates in relation to existing literature on incisional hernia recurrence. Studies evaluating hernia recurrence rates post-surgery often report variable rates, influenced by factors like patient characteristics, surgical techniques, and follow-up durations (27). Reported recurrence rates typically range between 3% to 20% in open surgery and can be lower in laparoscopic procedures, sometimes even reaching 0% in short-term follow-ups similar to our findings (11,24). The absence of recurrences in the laparoscopic group corresponds with studies indicating lower short-term recurrence rates after laparoscopic repair. Yet, the study's one-year follow-up might limit the observed percentages, as some recurrences appear later.

Another important limitation of the present study was that due to the low number of cases and short period of follow up only a descriptive analysis could be performed and no significant correlation to be found.

Suggesting a national registry for monitoring recurrent incisional hernias echoes literature supporting databases to gather long-term data. Registries aid in comprehending recurrence patterns and long-term postsurgery outcomes (29,30).

Conclusions

Laparoscopic surgery has emerged as the preferred approach for incisional hernia repair. Our study demonstrates the superiority of laparoscopic repair over open surgery, showcasing reduced postoperative pain, shorter hospital stays, quicker resumption of normal activities, and a lower incidence of surgical complications like seroma hematoma and surgical site infections.

Author's Contributions

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Conflict of Interest

All authors declare that they have no conflict of interest.

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