

The Impact of Surgical Approach on Postoperative Recovery and Quality of Life in Obstructed Incisional Hernias

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Rezumat

Impactul tipului de abord chirurgical asupra recuperării postoperatorii și calității vieții în herniile incizionale complicate cu obstrucție intestinală

Introducere: Herniile incizionale reprezintă complicații frecvente după intervențiile chirurgicale abdominale deschise. Atunci când sunt complicate cu obstrucție intestinală, acestea necesită intervenție chirurgicală urgentă, ceea ce crește riscurile perioperatorii și prelungește perioada de recuperare. Studiul de față și-a propus să compare rezultatele clinice și calitatea vieții pacienților după intervenția chirurgicală deschisă versus laparoscopică a herniilor incizionale complicate cu obstrucție intestinală.

Metode: A fost realizat un studiu prospectiv de cohortă pe o perioadă de 6 ani (ianuarie 2019 - ianuarie 2024), incluzând 117 pacienți cu hernii incizionale complicate cu obstrucție intestinală. Pacienții au fost supuși fie intervenției chirurgicale deschise (n=91), fie celei laparoscopice (n=26). Durerea postoperatorie și calitatea vieții au fost evaluate prin Scala Analog Vizual (VAS) și chestionarul EuraHS-QoL al Societății Europene de Hernii.

Rezultate: Rata generală a complicațiilor a fost mai mică în grupul laparoscopic (23,1% vs. 38,5%), fără diferențe semnificative între gradele Clavien-Dindo. Pacienții operați laparoscopic au raportat scoruri mai scăzute ale durerii în prima zi postoperator și la externare și au înregistrat o calitate a vieții superioară, în special în ceea ce privește durerea legată de activitatea fizică și satisfacția cosmetică.

Concluzii: Laparoscopia în herniile incizionale complicate cu obstrucție intestinală este asociată cu un număr mai redus de complicații, durere postoperatorie mai mică și o calitate a vieții raportată de pacient superioară comparativ cu chirurgia deschisă.

Cuvinte cheie: hernie incizională, obstrucție intestinală, chirurgie de urgență, chirurgie laparoscopică, calitatea vieții

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Abstract

Background: Incisional hernias are a frequent complication after abdominal surgery, affecting a significant number of patients worldwide. When complicated by bowel obstruction, these hernias require urgent surgical intervention, which can lead to increased perioperative risks and prolonged recovery. This study aims to evaluate and compare the clinical outcomes and quality of life between open and laparoscopic surgery for incisional hernias complicated by bowel obstruction.

Methods: A 6-year prospective cohort study was conducted between January 2019 and 2024. A total of 117 patients who presented with incisional hernias complicated by bowel obstruction were included. Patients were divided into two groups: open surgery (n=91) and laparoscopic surgery (n=26). Pain and quality of life were assessed using the Visual Analog Scale and the questionnaire of the European Hernia Society.

Results: Complication rates were significantly lower in the laparoscopic group (23.1% vs. 38.5%), although no significant differences were found in Clavien-Dindo complication grades. Patients who underwent laparoscopic surgery reported significantly lower postoperative pain scores on day 1 and discharge, and they showed superior quality of life scores, especially regarding pain during physical activity and cosmetic concerns, as measured by the EuraHS-QoL questionnaire.

Conclusions: Laparoscopic surgery for incisional hernias complicated by bowel obstruction results in fewer complications, reduced postoperative pain, and improved quality of life compared to open surgery.

Keywords: incisional hernia, bowel obstruction, emergency, laparoscopic surgery, quality of life

Introduction

Incisional hernias are a common postoperative complication, affecting up to 20% of patients who have had midline laparotomies, depending on patient comorbidities, surgical technique, and wound healing factors (1,2). Although numerous hernias are reducible and treated electively, a considerable number may acutely complicate, resulting in bowel obstruction, incarceration, or strangulation; in these instances, emergency surgical intervention is needed, frequently under suboptimal physiological conditions that elevate the risk of perioperative complications (3,4).

Recent health statistics in Romania indicate that abdominal wall hernias constitute 12-15% of all general surgery admissions, with an increasing incidence of these cases manifesting as emergencies due to bowel obstruction (5). The Romanian National Health Insurance House and the Ministry of Health have emphasized that late presentation, comorbidities, and restricted access to specialized hernia hospitals contribute to the elevated incidence of acute cases, especially among elderly and polymorbid individuals (6).

Open surgical repair has always been the method of choice in emergency situations for incisional hernia repair since it is accessible and well-known (7). Even in certain emergency situations, laparoscopic procedures - such as intraperitoneal onlay mesh (IPOM) repair - are becoming

more and more popular according to data that suggest they can speed recovery, minimize postoperative pain, and lower the risk of wound infections (8). The use of laparoscopy in acute incisional hernia repair is still restricted in many locations despite these potential benefits, in part because of its technical complexity and safety concerns when intestinal obstruction is present (9).

Additionally, patient-reported outcomes like pain intensity and quality of life are rarely assessed, particularly in emergency surgical settings, but clinical outcomes like length of stay and complication rates are regularly recorded (10,11). Tools such as the Visual Analog Scale (VAS) and the European Hernia Society's EuraHS-QoL questionnaire provide standardized measures to assess postoperative recovery from the patient's perspective, yet their use remains underreported in the Romanian surgical literature (12-14).

The aim of this study was to evaluate and compare the clinical outcomes and quality of life in patients undergoing open versus laparoscopic repair of incisional hernias complicated by bowel obstruction, based on a single-centre cohort in Romania.

Material and Methods

Study Design and Population

A 6-year prospective cohort study was conducted

between January 2019-2024 involving patients who presented with incisional hernias to the Emergency Department and underwent surgical intervention at the Department of General Surgery, Emergency Hospital of Constanța (Constanța, Romania). The inclusion criteria were as follows: 1) Patients diagnosed with bowel obstruction due to incisional hernia; 2) hospitalization through the Emergency Department; 3) patients who underwent surgery. The exclusion criteria were as follows: 1) elective surgeries; 2) incisional hernias with L4 location: lumbar; 3) incarcerated omentum or intestine that has not retained its vascularization and required resection. Based on operative strategy, patients were classified into two groups: open surgery (OS, n=91), laparoscopic surgery (LS, n=26). A flow chart is available (Fig. 1).

Surgical Intervention

The choice between open and laparoscopic surgery was individualized for each patient, taking into account the clinical and biological status, hernia characteristics (size, location, content), history of previous surgeries, and the surgeon's experience with emergency laparoscopic procedures. No formal scoring system or randomization protocol was applied, as the emergent nature of obstructed incisional hernias requires clinical judgment and patient-tailored decision-making. All surgeries performed were with the use of meshes, mounted in different types. Laparoscopic surgeries were IPOM. All procedures were performed or directly supervised by the same core surgical team, with extensive experience in both open and laparoscopic hernia repair. While certain aspects of the operative technique were adapted to the individual patient's anatomy and hernia characteristics, standard principles were consistently applied, including mesh type, fixation method, and IPOM technique for laparoscopic cases. Patients who required conversion from laparoscopic to open surgery were excluded from the study cohort to ensure a homogeneous comparison between the two surgical approaches.

Data Collection

Clinical records were reviewed to extract data on demographics (age, gender), comorbid conditions (e.g., diabetes, obesity, cardiac disease, previous surgery), behavioral risk factors (smoking, alcohol), intraoperative findings, and immediate

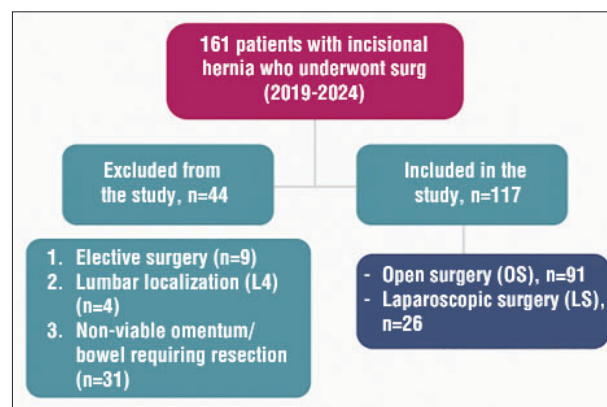


Figure 1. Flowchart visualizing recruitment of participants. Of 161 interested subjects, 117 were eligible for study inclusion.

postoperative course. Comorbidity burden was assessed using the Age-Adjusted Charlson Comorbidity Index (ACCI). Postoperative follow-up up to 3 months was performed through clinical visits or by telephone. To evaluate postoperative pain and patient-reported outcomes, we employed two validated instruments: the Visual Analog Scale (VAS) and the EuraHS Quality of Life (QoL) questionnaire.

The VAS is a widely accepted tool for quantifying subjective pain intensity. VAS scores were collected at standard postoperative intervals (first postoperative day and at discharge) to monitor pain progression and treatment response. The VAS was applied prior to the administration of standard analgesic treatment to capture a more accurate assessment of postoperative pain. Patient-reported quality of life was assessed using the European Hernia Society Quality of Life questionnaire (EuraHS-QoL). This validated instrument evaluates four domains: pain at rest, pain during activity, limitations in daily activities, and cosmetic satisfaction. Each domain is scored on a scale from 0 to 10, with 0 indicating no pain or no limitation and 10 representing the worst pain or greatest limitation. The questionnaire was administered preoperatively and during postoperative follow-up at 30 and 90 days. This approach allowed us to track changes in patient-reported outcomes over time and to compare recovery between open and laparoscopic surgical approaches. Together, these instruments provided a comprehensive evaluation of both the subjective pain experience and the functional and aesthetic impact of surgery from the patient's perspective.

Study Endpoints

The primary endpoint was to analyze the postoperative outcomes and to perform a comparison between open and laparoscopic surgery in patients with bowel obstruction due to incisional hernias.

The secondary endpoint was to determine the existence of statistical differences regarding the clinical and biological characteristics between the study groups.

Ethical Approval

In compliance with the Declaration of Helsinki on human testing, the study was authorized by the Local Ethics Committee for the Approval of Clinical and Research Developmental Studies. All patients gave their informed consent when they were enrolled (approval no. 14/01.2019).

Statistical Analysis

SPSS version 28 was utilized for statistical analysis. Categorical variables are represented as counts, and the results are displayed as a median with range or

mean $\pm$ standard deviation. The Mann-Whitney U test and Kruskal-Wallis H test were used to assess the mean and median for ordinal data. The clinical and biological parameters were compared using the χ^2 test. A statistically significant difference was defined as $p < 0.05$.

Results

A total of 117 patients with incisional hernia and bowel obstruction met the inclusion criteria and underwent surgical intervention, of whom 91 (77.8%) underwent open surgery (OS) and 26 (22.2%) underwent laparoscopic surgery (LS). Demographics and comorbidities are summarized in Table 1. The mean age was similar between groups (OS: 57.63 ± 10.82 years vs. LS: 62.15 ± 11.25 years, $p = 0.301$). There were no significant differences in gender distribution or body mass index (BMI). Notably, patients in the LS group had a significantly higher prevalence of diabetes mellitus ($n = 12$, 46.2% vs. $n = 29$, 31.9%, $p = 0.017$) and lower proportion of patients with regular physical activity ($n = 1$, 3.8% vs. $n = 25$, 27.5%, $p = 0.011$). Recent weight loss was more frequently

Table 1. Baseline demographics and comorbidity of the patients depending on the type of surgery

Variables	OS (n=91)	LS (n=26)	p-value
Age (y)*	57.63 ± 10.82	62.15 ± 11.25	0.301
< 50 years	18 (19.8)	2 (7.7)	
50 – 59 years	32 (35.2)	7 (26.9)	
60 – 69 years	31 (34.1)	12 (46.2)	
70 – 79 years	10 (11)	5 (19.2)	
Gender			0.446
Male	28 (30.8)	6 (23.1)	
Female	63 (69.2)	20 (76.9)	
Body Mass Index (kg/m ²)*	26.42 ± 3.17	27.54 ± 3.79	0.508
Underweight	2 (2.2)	1 (3.8)	
Normal weight	28 (30.8)	6 (23.1)	
Overweight	41 (45.1)	8 (30.8)	
Obesity	20 (22)	11 (42.3)	
Smokers	29 (31.9)	5 (19.2)	0.211
Alcohol abuse	26 (28.6)	12 (46.2)	0.091
Weight loss, < 6 Months	32 (35.2)	8 (30.8)	0.039
Physical activity	25 (27.5)	1 (3.8)	0.011
Diabetes Mellitus	29 (31.9)	12 (46.2)	0.017
ACCI (Mean $\pm$ SD*)	2.03 ± 1.29	2.58 ± 1.22	0.079
0-1	33 (36.3)	5 (19.2)	
2-3	47 (51.7)	13 (50)	
4-5	11 (12)	8 (30.8)	
≥ 6	0	0	
C-reactive protein	10.18 ± 4.63	12.36 ± 8.42	0.453

Variables are expressed as number with percentages in parentheses unless indicated otherwise.

*Values are mean (standard deviation). OS, Open Surgery; LS, Laparoscopic Surgery; y, years; BMI, Body Mass Index; ACCI, Age-adjusted Charlson Comorbidity Index; SD, Standard Deviation. Values in italics indicate statistical significance ($p < 0.050$).

reported in the OS group (n=32, 35.2% vs. n=8, 30.8%, $p=0.039$). The Age-Adjusted Charlson Comorbidity Index (ACCI) was slightly higher in the LS group, but the difference was not statistically significant (2.58 ± 1.22 vs. 2.03 ± 1.29 , $p=0.079$). C-reactive protein levels did not differ significantly between groups.

Table 2 presents the characteristics of the hernia defects, classified according to the European Hernia Society (EHS) system. The anatomical location (midline or lateral) and zonal distribution (M1–M5, L1–L3) did not differ significantly between surgical approaches. However, defect size was significantly different ($p<0.001$): large defects (W3, >10 cm) were more prevalent in the OS group (31.9%), whereas the majority of LS cases involved smaller defects (W1, <4 cm) (57.7%).

As shown in Table 3, patients undergoing LS were significantly more likely to have had previous laparoscopic surgeries (n=14, 53.8% vs. n=4, 4.4%, $p=0.017$). Regarding mesh types, all LS cases received dual mesh, whereas OS patients received a mix of lightweight and heavyweight polypropylene meshes ($p=NS$). All LS procedures used the intraperitoneal onlay mesh (IPOM) technique, whereas OS cases involved a variety of mesh placements (onlay, inlay, underlay). Estimated blood loss was higher in the LS group (148.08 ± 45.78 ml vs. 128.35 ± 30.08 ml, $p=0.026$), and operative time was significantly longer (153.46 ± 41.92 min vs. 105.49 ± 34.92 min, $p=0.002$). Despite this, overall complication rates were lower in the

LS group (n=6, 23.1% vs. n=35, 38.5%, $p=0.024$). No significant differences were found in Clavien-Dindo complication grades. Postoperative complications such as hematoma, seroma, surgical site infection (SSI), and reoperation rates were comparable between groups ($p>0.05$). The length of hospital stay was shorter in the LS group (4.68 ± 2.05 days) versus OS (5.27 ± 1.84 days), though this difference did not reach statistical significance ($p=0.118$). Patients in the laparoscopic group tended to have shorter hospital stays and faster recovery compared to the open surgery group; however, these differences did not reach statistical significance. Nevertheless, these trends may still hold clinical relevance in the context of post-operative recovery.

In the present study, quality of life assessment was performed using the EuraHS-QoL questionnaire, which evaluates pain, functional restrictions, and aesthetic discomfort on a scale from 0 (no pain or discomfort) to 10 (worst imaginable pain). Fig. 2 illustrates the comparative evolution of global mean scores between patients undergoing open versus laparoscopic repair, at three different time points: preoperative, 30 days postoperative, and 90 days postoperative. Preoperatively, patients in both groups reported moderate impairment of quality of life, with mean values exceeding 3 points, reflecting the symptomatic burden of abdominal wall hernia. At 30 days after surgery, a substantial improvement was observed in both groups, with a reduction of mean scores by nearly

Table 2. Characteristics of the parietal defect according to the EHS classification depending on the type of surgical intervention

Variables	OS (n=91)	LS (n=26)	p-value
Site			0.366
M	72 (79.1)	22 (84.6)	
L	19 (20.9)	4 (15.4)	
Midline Zone (M)			0.836
M1	3 (3.3)	1 (3.8)	
M2	35 (38.5)	12 (46.2)	
M3	26 (28.6)	6 (23.1)	
M4	5 (5.5)	2 (7.7)	
M5	3 (3.3)	1 (3.8)	
Lateral Zone (L):			0.545
L1	6 (6.6)	2 (7.7)	
L2	8 (8.8)	0	
L3	5 (5.5)	2 (7.7)	
Size			< 0.001
W1	10 (11)	15 (57.7)	
W2	52 (57.1)	10 (38.5)	
W3	29 (31.9)	1 (3.8)	

Variables are expressed as number with percentages in parentheses unless indicated otherwise.

*Values are mean (standard deviation). EHS, European Hernia Society; OS, Open Surgery; LS, Laparoscopic Surgery;

M1: Subxiphoidal; M2: Epigastric; M3: Umbilical; M4: Infraumbilical; M5: Suprapubic; L1, Subcostal; L2: Flank; L3: Iliac;

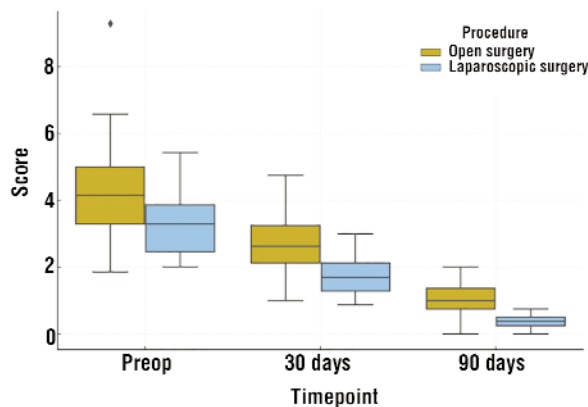
W1: < 4 cm; W2: 4-10 cm; W3: >10 cm. Values in italics indicate statistical significance ($p < 0.050$).

Table 3. Perioperative characteristics of patients according to the type of surgical intervention

Variables	OS (n=91)	LS (n=26)	p-value
Previous Surgery			0.017
Open	87 (95.6)	12 (46.2)	
Laparoscopic	4 (4.4)	14 (53.8)	
Type of mesh			ns
PP light	52 (57.1)	0	
PP heavy	34 (37.4)	0	
Dual mesh	5 (5.5)	23 (88.5)	
Biosynthetic	0	3 (11.5)	
Mesh placement techniques			ns
Onlay	23 (25.3)	0	
Inlay	8 (8.8)	0	
Underlay	57 (62.6)	0	
Intraperitoneally	3 (3.3)	26 (100)	
Estimate blood loss (ml)*	128.35±30.08	148.08±45.78	0.026
Operation time (min)*	105.49±34.92	153.46±41.92	0.002
Any postoperative complication	35 (38.5)	6 (23.1)	0.024
Clavien-Dindo classification			0.432
Grade I	19 (20.9)	4 (15.4)	
Grade II	5 (5.5)	1 (3.8)	
Grade IIIA	6 (6.6)	1 (3.8)	
Grade IIIB	2 (2.2)	0	
Grade IVA	3 (3.3)	0	
≥ Grade IVB	0	0	
Hematoma	16 (17.6)	4 (15.4)	0.172
Conservative treatment	13 (81.3)	4 (100)	
Surgical treatment	3 (18.7)	0	
Seroma	34 (37.4)	6 (23.1)	0.411
Conservative treatment	29 (85.3)	6 (100)	
Surgical treatment	5 (14.7)	0	
SSI 3 (3.3)	0	ns	
Reoperation	3 (3.3)	0	ns
Postoperative hospital stay*	5.27±1.84	4.68±2.05	0.118

Variables are expressed as number with percentages in parentheses unless indicated otherwise, *Values are mean (standard deviation). OS, Open Surgery; LS, Laparoscopic Surgery; PPL, Polypropylene; SSI, Surgical Site Infection. Values in *italics* indicate statistical significance ($p < 0.050$).

half, indicating early functional recovery and pain relief. Nevertheless, patients undergoing laparoscopic repair tended to present slightly lower average scores, suggesting a faster recovery profile

**Figure 2.** Preoperative, 30-day and 90-day postoperative quality of life assessment according to the EuraHS questionnaire, depending on the type of surgery

in terms of activity resumption and postoperative discomfort.

At 90 days, the differences became more pronounced, as both groups achieved near-minimal values, yet laparoscopic patients consistently reported better outcomes, with mean scores approaching zero. This finding highlights the sustained benefit of minimally invasive repair, especially in terms of reduced pain, fewer physical limitations, and higher cosmetic satisfaction. Clinically, this translates into an earlier reintegration of patients into daily activities and improved overall quality of life compared to conventional open repair. Taken together, these results confirm that while both surgical techniques significantly improve quality of life after hernia repair, laparoscopic surgery is associated with a more favorable trajectory, particularly in the short and medium term. The progressive reduction of scores across all domains supports the conclusion that surgical repair has a marked positive impact on patients' symptoms, with laparoscopic repair offering

additional advantages in terms of recovery dynamics.

Fig. 3 depicts the comparative mean VAS scores between patients undergoing open versus laparoscopic repair. On postoperative day 1, pain intensity was significantly lower in the laparoscopic group, with average VAS values around 2, compared to nearly 3 in the open surgery group. This early difference highlights the reduced surgical trauma and diminished nociceptive input associated with minimally invasive techniques. At hospital discharge, both groups showed a further decrease in pain levels, reflecting the natural course of postoperative recovery. However, laparoscopic patients continued to report lower values, frequently approaching minimal discomfort. Clinically, these findings confirm that the laparoscopic approach is associated with a more favorable postoperative pain profile, ensuring better immediate comfort, less reliance on analgesics, and potentially shorter hospital stays. By contrast, patients undergoing open repair experienced higher pain levels, which may contribute to slower mobilization and delayed functional recovery.

Discussion

This prospective cohort study evaluated and compared the clinical and patient-reported outcomes of open versus laparoscopic incisional hernia repair in the setting of bowel obstruction, a clinical scenario typically associated with increased surgical complexity and perioperative risk. Our findings demonstrate that while laparoscopic repair was associated with longer operative time and slightly greater intraoperative blood loss, it offered significant benefits in terms of reduced complication rates, lower postoperative pain, and improved short-term quality of life, as assessed by VAS and EuraHS-QoL scores. Our results support findings from prior studies that advocate for the safety and efficacy of laparoscopic incisional hernia repair even in acute settings (15).

Consistent with our results, laparoscopic repair is associated with reduced rates of surgical site infections and shorter hospitalization, although it requires longer operative time (16). Similarly, Schjøth-Iversen et al. (17) demonstrated that laparoscopic ventral hernia repair is associated with less postoperative pain and earlier return to normal activities compared to open surgery. While the use of laparoscopic techniques in emergency hernia repair remains controversial, recent studies suggest it can be performed safely in selected cases (17-19). Abet et

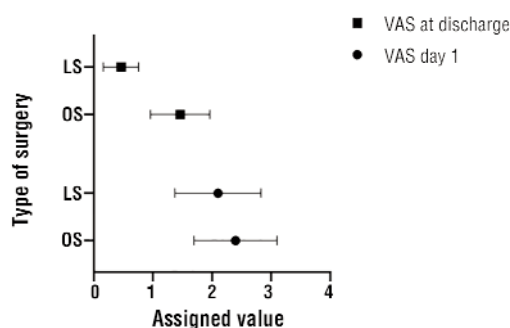


Figure 3. Postoperative pain assessment on day 1 and at discharge according to VAS, depending on the type of surgery

al. (20) emphasized the importance of surgical expertise and patient selection, particularly when bowel obstruction is involved. In our cohort, careful intraoperative assessment ensured that all cases had preserved intestinal viability, a key prerequisite for safely avoiding bowel resection or conversion.

The complication rate in the open group (38.5%) aligns with previously published rates for emergency hernia repairs, which can range from 30% to 50% depending on patient comorbidities and hernia size (1,3). Notably, our study identified a significantly lower overall complication rate in the laparoscopic group (23.1% vs. 38.5%, $p=0.024$). Here, the overall complication rate refers to the proportion of patients experiencing any postoperative complication, irrespective of type. Although individual complications such as hematoma, seroma, surgical site infection, and reoperation rates did not differ significantly between groups, the cumulative incidence of complications was lower in the laparoscopic group, suggesting that minimally invasive techniques may mitigate the overall physiological insult associated with emergency surgery. Although baseline differences in comorbidities, such as diabetes, and hernia defect size were present between the laparoscopic and open surgery groups, these factors did not show a statistically significant impact on postoperative pain or complication rates in our cohort. Nevertheless, they may represent potential confounders and should be considered when interpreting the findings.

The superior pain control observed in the laparoscopic group, as measured by VAS scores, is in line with existing evidence that highlights the advantage of the minimally invasive approach in reducing early postoperative discomfort (14,21,22). More importantly, the application of the EuraHS-QoL questionnaire provided a structured assess-

ment of patient recovery across pain, functionality, and aesthetics domains; our study adds to a growing body of literature that emphasizes the utility of Patient-Reported Outcome Measures in evaluating surgical success from the patient's perspective (23).

In Romania, where emergency presentations for abdominal wall hernias remain common due to delays in elective care and limited access to specialized hernia centers (5,6), our findings advocate for greater integration of laparoscopic techniques in emergency surgical protocols. Training programs and infrastructure investment will be necessary to expand access to minimally invasive surgery, especially in regional hospitals.

This study has several limitations. First, the sample size, particularly in the laparoscopic group, was relatively small, reflecting the selective application of this approach in the emergency setting. Second, the follow-up period was limited to 90 days, precluding long-term assessment of recurrence rates. Third, although validated tools were used to assess pain and QoL, the subjective nature of these measures may introduce bias. Future randomized studies with longer follow-up are needed to validate these findings and assess recurrence and mesh-related complications.

Conclusion

Laparoscopic repair of incisional hernias complicated by bowel obstruction is a feasible and beneficial alternative to open surgery in carefully selected patients. It offers comparable safety, superior early recovery, and better patient-reported outcomes.

Conflict of Interest

The authors declared no potential conflicts of interest.

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