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Aesthetic Outcomes and Patient Satisfaction in Laparoscopic vs. Open Incisional Hernia Repair: Have We Asked the Patients?

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Abbreviations:
EuraHS-QoL: European Hernia Society Quality of Life;
CAWR: Complex Abdominal Wall Repair;
QoL: Quality of Life;
OS: open Surgery;
LS: Laparoscopic Surgery;
ACCi: Age-Adjusted Charlson Comorbidity Index;
PROM: Patient Reported Outcome Measures;
SD: Standard Deviation;
IPOM: Intraperitoneal Onlay Mesh;
eTEP: Enhanced-view Totally Extraperitoneal;
BMI: Body Mass Index;
COPD (BPOC): Chronic Obstructive Pulmonary Disease;
HTA: Hypertension (High Blood Pressure).

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Rezumat

Rezultatele estetice și satisfacția pacienților în chirurgia laparoscopică vs. deschisă a herniilor incizionale: i-am întrebat pe pacienți?

Context: Chirurgia herniile incizionale se poate realiza prin abord minim invaziv sau clasic. Alegerea tipului de abord influențează recuperarea şi rezultatele raportate de pacienți, subliniind necesitatea unor metode eficiente de evaluare, precum chestionarul EuraHS-QoL, pentru a cuantifica calitatea vieții postoperator.
Material şi Metode: Acest studiu prospectiv, unicentric, a evaluat 222 de pacienți, împărțiți în loturi în funcție de tipul de abord: clasic sau laparoscopic. Datele au fost colectate preoperator şi la 1 şi 3 luni postoperator folosind chestionarul EuraHS-QoL. Analiza statistică a fost efectuată utilizând software-urile Origin Pro 2018 şi SPSS versiunea 28.0.
Rezultate: Studiul a inclus 152 de femei şi 70 de bărbați, 78% dintre intervenții fiind realizate prin chirurgie deschisă şi 22% laparoscopic. Abordul laparoscopic a fost asociat cu rezultate mai bune raportate de pacienți în gestionarea durerii şi recuperare funcțională. Rezultatele estetice, în special forma abdomenului, au arătat inițial o îmbunătățire semnificativă, dar diferențele între tipurile de abord au devenit neglijabile în timp.
Concluzii: Chirurgia herniilor incizionale prin abord laparoscopic îmbunătățeşte semnificativ calitatea vieții pacienților comparativ cu chirurgia convențională, după cum demonstrează rezultatele noastre obținute prin completarea chestionarului EuraHS-QoL. Aceste constatări susțin preferința noastră pentru chirurgia laparoscopică în cazurile selecționate, având în vedere avantajele acesteia atât în reducerea durerii cât şi în recuperarea funcțională mai rapidă.

Cuvinte cheie: chirurgia herniilor incizionale, reconstrucția peretelui abdominal, calitatea vieții, EuraHS-QL, rezultate raportate de pacienți, rezultate estetice, recuperare postoperatorie

Abstract

Background: Incisional hernias are predominantly treated through open or laparoscopic surgery, with each method influencing recovery and patient-reported outcomes. This underscores the need for reliable assessment tools such as the EuraHS-QoL questionnaire to evaluate quality of life after surgery.

Methods: This prospective single-center study was aimed at evaluating aestethic outcomes and patient satisfaction following laparoscopic versus open hernia repair. It involved 222 patients categorized by type of approach. The EuraHS-QoL questionnaire was used preoperatively and at 1- and 3-months post-surgery, with data analysis performed using Origin Pro 2018 and SPSS software version 28.0.

Results: Among the participants, 152 were females and 70 males, with 78% undergoing open surgery and 22% laparoscopic. Findings revealed superior patient outcomes with laparoscopic repair in terms of pain management, daily activities, and aesthetic satisfaction. Patients reported significantly lower pain levels and fewer restrictions in daily activities post-laparoscopic surgery. While initial postoperative cosmetic results favored laparoscopic methods, the perceived differences in abdominal shape diminished over time.

Conclusions: Laparoscopic repair significantly improves quality of life compared to open surgery, as shown by EuraHS-QoL scores. These results support the use of laparoscopic techniques in appropriate cases due to their benefits in pain reduction and faster functional recovery.

Key words: incisional hernia repair, abdominal wall reconstruction, quality of life, EuraHS-QL, patient reported outcomes, aesthetic outcomes, postoperative recovery

Introduction

Primary hernias and incisional hernias are two broadly categories that are used to classify ventral hernias, as stated by the European Hernia Society. Each of these two categories has a number of subtypes. Primary hernias comprise a variety of different types of hernias, including epigastric, spigelan, umbilical, or lumbar. Incisional hernias, on the other hand, are hernias that form at the site of a prior surgical incision throughout the course of the patient's medical history (1,2).

In the era of complex abdominal wall repair (CAWR), incisional hernias are surgically treated by mending and reinforcing the abdominal wall using various techniques. These procedures can be done either by open surgery or minimally invasive approach, depending on the patient's particular condition and the surgeon's preference. The selection of procedure is contingent upon the hernia's dimensions and complexity, as well as the patient's general well-being and preferences, and, crucially, the surgeon's expertise (3).

Laparoscopic incisional hernia repair has gained popularity as a method of choice over open approach because of its reduced rate of complications, faster recovery, and shorter hospital stays well as increased quality of life and satisfaction for patients (4).

Assessing the quality of life in patients having incisional hernia repair is crucial as it allows for the comprehensive evaluation of

the surgery's overall influence on many areas of the patient's well-being, therefore surgeons can obtain valuable information about a patient's satisfaction, functional status, and capacity to carry out everyday tasks (5). Nowadays, several tools are available and have been successfully implemented in QoL assessment, as for example the Carolina Comfort Score (CCS) which focuses on pain and discomfort related to mesh implantation and movement (6), the Hernia-Related Quality of Life Scale (HerQLes) (5), that evaluates the impact of hernia and its treatment on daily activities and overall well-being, the Activities Assessment Scale (AAS)(7) that measures the impact of hernia surgery on physical activities, the Abdominal Hernia-Q (AHQ)(8), that assesses the specific QoL issues related to abdominal hernias, and the Hernia-specific Quality-of-Life Assessment Instrument (HERQLES) which is designed to measure the QoL specifically in hernia patients. Moreover, another method of assessment is The EuraHS-QoL (European Registry of Abdominal Wall Hernias-Quality of Life) questionnaire, developed by the European Hernia Society, which is a specialized tool for assessing the quality of life in patients with ventral hernias. It includes nine questions divided into three domains: pain, activity limitation, and aesthetic issues (3,5). Each question is rated on an 11-point scale from 0 to 10, allowing for a detailed evaluation of the patient's condition before and after surgery. This score helps in understanding the impact of hernias and the effectiveness of surgeries on patients' lives.

Although all have been successfully implemented in QoL assessment, none of them has been universally accepted and none become dominant.We chose the EuraHS-Qol because it is a validated assessment tool and it is free to use.

In this study, we aim at assessing the aesthetic outcomes and patient satisfaction following laparoscopic versus open incisional hernia repair in our center, focusing on the patient perspective through the use of the EuraHS-QoL questionnaire.

Material and Methods

The study was a prospective follow-up data collection in a single center conducted from January 2018 to August 2023. Patients were involved in the data collection after meeting the inclusion criteria and providing informed consent, in accordance with Law 95/2006, Law 46/2003 on patient rights, WHO No. 141:0/2016, and Ministry of Health's Order No. 482/2007, which was attached to the admission files. The patients were assessed preoperatively and at 1 and 3 months postoperatively with the questionnaire of EuraHS-QoL.

A number of 222 patients were included in this follow-up data collection and divided into two large groups based on the type of approach: open and laparoscopic. Patients regardless of the sex, who were a minimum of age of 18 years, who presented with incisional hernia, were included. Were excluded patients with a complex incisional hernia, primary ventral hernia, parastomal hernias, patients with complicated incisional hernias, and patients unfit for surgery.

The pandemic period of 2020-2021 was excluded from the study, as it could potentially introduce additional variables affecting the condition of patients, satisfaction levels, and the type of surgical approach employed, as well as due to the significantly higher number of complex cases. The selection of patients in both groups was conducted based on the order of admission to the clinic and the fulfillment of inclusion and exclusion criteria.

The data was gathered, inputted, and evaluated using Microsoft Excel software afterwards, the statistical analysis was carried out using Origin Pro 2018 software and SPSS software (Statistical Package for Social Sciences), version 28.0 (IBM, Armonk, NY, USA). The data were classified as nominal, ordinal, or quantitative; specific tests were applied to each type of variable. Additionally, uni-/multivariate logistic regression models were used, and for the comparison of two cohorts, the following tests were utilized: χ^2 (categorical variables), Fisher's exact test (categorical variables, but when the number of cells was "0"), and Mann

Whitney U (continuous variables). Descriptive analyses included frequency tables of the characteristics of cases with parietal defects according to the type of surgical approach, satisfaction level, and quality of life; results were presented as mean ± standard deviation or medians with range. For all analyses, the relative risk rate and confidence interval were obtained at a 95% significance level, with a probability value (p) considered significant at $p < 0.05$.

Results

Between January 2017 and December 2023, out of 222 patients diagnosed with incisional hernia who met the inclusion criteria for our study, 53 (23.9%) underwent minimally invasive, more specific laparoscopic surgery. The patients were divided into two cohorts: cohort I included 169 (76.1%) patients treated with open surgery at the Coltea General Surgery Department (Cohort I=OS), and Cohort II (LS) comprised those who underwent laparoscopic procedures.The clinical and demographic characteristics of all participants are detailed in *Table 1*. Patients with incisional hernias who underwent minimally invasive, laparoscopic treatment were treated using either the IPOM (Intraperitoneal Onlay Mesh) or ETEP (Enhanced-view Totally Extraperitoneal) techniques. The preffered methods of approach in the open surgery group where Rives-Stoppa procedure or Onlay technique (9-13). The average age of the patients was in the sixth decade of life, with a majority being female (68.5%). The range of comorbidities among patients diagnosed with incisional hernia, as measured by the ACCI, varied from 0 to 5, with an average score of 2.13±1.41.

Details on the clinical and demographic characteristics of the two cohorts are available in *Table 2*. In OS group, the mean age was 59.02 years with a standard deviation of 11.92,

Table 1. Distribution of patiens according to both demographic date and risk factors for laparoscopic approach

Variables	IPOM (N =41)	eTEP (N =8)	p-value
Age	56.54±13.70	59±13.99	0.645
Gender			
Male	14	2	0.62
Female	27	6	
BMI	26.98±3.4	24.63±4.03	0.089
Risk factors			
Neoplasia	7	1	1
COPD	5	0	0.575
High blood pressure	14	2	1
Diabetes II	14	3	0.966
Smoking	12	3	0.687
Operative time[min]	92.43±33.67	125±31.62	0.0227

Table 2. Clinical and demographic characteristics of patients by type of surgical approach

Variabiles	Lotul I OS (n=169)	Lotul II LS (n=53)	p-value
AGE(years)	59.02±11.92 (27-79)	57.21±13.53 (28-78)	0.059
Gender			0.809
Masculine	54 (32)	16 (30.2)	
Feminine	115 (68)	37 (69.8)	
Tabbaco use	48 (28.4)	17 (32.1)	0.610
BMI (kg/m^2)	25.91±3.36 (17.8-32)	26.51±3.66(19-31)	0.541
ACCI	2.17 ±1.37 (0-5)	2 ±1.53 (0-5)	0.368
DZ 50 (29.6)	19 (35.8)	0.394	

OD: pen Open Surgery OS; LS: Laparoscopic Surgery; BMI: body mass index; kg: kilograms; m: metre square; ACCI: Age-adjusted Charlson Comorbidity Index; DZ: Diabetes. Variables are expressed as mean ± standard deviation, with the range in parentheses unless otherwise indicated. *Number of cases, with percentages in parentheses. Italicized values denote statistical significance ($p < 0.050$).

and an age range of 27-79 years. This was similar to LS group, where patients underwent minimally invasive surgery within an age range of 28-78 years, averaging 57.21± 13.53 years. Regarding gender distribution, women were more prevalent than men in both cohorts (OS= 68%, LS= 69.8%).

The average duration of surgical procedures was longer for patients in Cohort I (106.98±40.9 minutes) compared to those in Cohort II (99.34±36.61 minutes).

The associated comorbidities were roughly equal across the two study cohorts, with the Age-Adjusted Charlson Comorbidity Index (ACCI) being more frequently observed in patients who underwent laparoscopic surgery, specifically ACCI scores of OD = 2.17±1.37 (range 0-5); OL = 2±1.53 (range 0-5). Additionally, a higher Body Mass Index (BMI) and the presence of diabetes were more common in the laparoscopic group, though these differences were not statistically significant (p=0.541 for both BMI and diabetes), as illustrated in *Fig. 1*.

In our patient lot, approximately 41.4 % of patients had a history of neoplasia, 8,6% of patients had chronic obstructive pulmonary disease, about 31.1% of patients had hypertension, 29.7% of patients had type II diabetes, while 31.5% of patients had dyslipidemia.

An overview of the prevalence and distribution of various comorbidities among the patients in the lot (total no. 222) is shown in *Table 3*.

The mean durations of hospitalization were shorter for the laparoscopic group, averaging 3.25 and 3.37 days respectively, compared to the open lot, which had longer hospital stays of 4.33 and 4.75 days respectively.

In terms of postoperative complications, the incidence of seroma was highest in the RIVES-STOPPA technique at 39.34%,

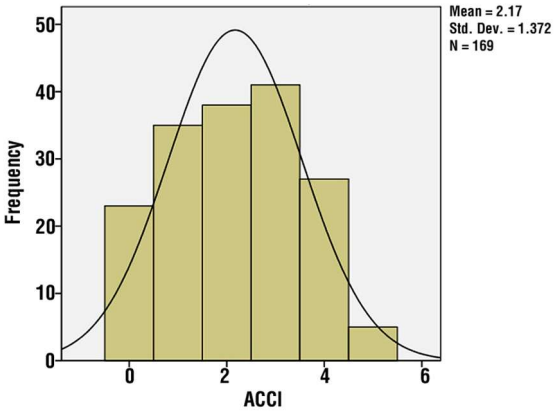

Figure 1. Distribution of the Age-Adjusted Charlson Comorbidity Index by Type of Surgical Approach

followed by the ONLAY technique at 36.6%. In contrast, the laparoscopic repairs showed lower seroma rates, with 29.26% in cases treated using the IPOM approach and only 12.5% in the ETEP approach.Similarly, the incidence of hematoma was higher for the classical approach, i.e., 27.86% for RIVES-STOPPA and 11.6% for ONLAY, as compared to the laparoscopic approach (4.87 % for IPOM and 2% for ETEP).

In regards to the characteristics of hernia defects, the size of the defect was statistically significant ($p < 0.001$); however, there were no statistically significant differences between the two study groups concerning the location of the defect ($p = 0.764$) or its reducibility ($p = 0.292$). The characteristics of the hernia defects in patients, according to the surgical approach, are presented in *Table 4*. Defects larger than 10 centimeters (W1) were preferably treated using open surgery. Supraumbilical and umbilical locations of the parietal defects were addressed equally by both open and minimally invasive methods (52.8% LS, M2; 48.5% OS, M2; and 35.8% LS, M3; 26% OS, M3).

Table 3. Distribution of various comorbidities among the patients in the lot

Comorbidities	COPD	Neoplasia	High blood pressure	Diabetes II	Dyslipidemia
Mean	0.08	0.41	0.31	0.29	0.31
Std. deviation	0.28	0.49	0.46	0.45	0.46

Table 4. Characteristics of hernia defects in patients, categorized according to the surgical approach employed. It includes details on the size, localization, and median of the defects, providing comparative data between different surgical methods.

Variabiles	Lot I OS (n=169)	Lot II L S(n=53)	p-value
Size of defect			<0.001
W1	43 (25.4)	18 (34)	
W2	79 (46.7)	20 (37.7)	
W3	32 (18.9)	1 (1.9)	
SC	15 (8.9)	14 (26.4)	
Localisation defect			0.764
M	161 (95.3)	51 (96.2)	
L		8 (4.7)	2 (3.8)
Median defects			0.276
M1	17 (10.1)	2 (3.8)	
M2	82 (48.5)	28 (52.8)	
M3	44 (26)	19 (35.8)	
M4	16 (9.5)	2 (3.8)	
M5	1 (0.6)	0	
Lateral defects			0.523
L1	4 (2.4)	1 (1.9)	
L2	2 (1.2)	1 (1.9)	
L3	3 (1.8)	0	

OS: Open Surgery; LS: Laparoscopic Surgery; W: Width; M: Medial; L: Lateral; SC: Swiss Cheese

EURA-HS Results

In this study, all patients included were assessed using the EuraHS-QoL questionnaire at the time of diagnosis (preoperative) and postoperatively at 1 and 3 months. Each patient completed the questionnaire based on their self-perception. Correlations between patients' quality of life and their clinical-biological and perioperative characteristics were analyzed, with the findings presented in various tables and graphics.

The results of the EuraHS-QoL scores at the initial assessment, and at 1 and 3 months postoperatively, are shown in *Table 5*. Pain levels, both at rest (decreasing from 1.73±1.07 to 0.71±0.88 to 0.14±0.36) and during activities (decreasing from 3.33±3.01 to 1.97±1.13 to 0.34±0.6), significantly diminished from the initial assessment through the 1-month and 3-month evaluations, indicating favorable patient outcomes. Activity restrictions at home were more keenly felt in the first postoperative month (1.89±1.02) compared to the preoperative period (4.17±1.66), but were substantially reduced by the 3-month visit (0.35±0.58). A similar trend was observed for restrictions on outdoor activities (initial 2.38±1.24, increased to 2.66±1.01, and then decreased to 0.57±0.73).

The restriction on sports activities and intense physical labor showed a gradual decrease from the diagnostic visit to 30 and 90 days post-diagnosis. The aesthetic discomfort related to the shape of the abdomen, the hernia itself, and the postoperative scar also

Table 5. EuraHS-Qol score preoperative, postoperative at 1 month and at 3 months.

Variabiles	EuraHS-QoL scores		
	Preoperative	Postop – 30 days	Postop – 90 days
Pain while lying down	1.73±1.07 (0-5)	0.71±0.88 (0-4)	0.14±0.36 (0-2)
Pain during activities	3.33±3.01 (0-4)	1.97±1.13 (0-5)	0.34±0.6 (0-2)
The most intense pain from last week	4.17±1.66 (2-8)	3.06±1.71 (1-7)	1.29±1.01 (0-3)
Restriction of household activity	1.09±1.01 (0-4)	1.89±1.02 (0-4)	0.35±0.58 (0-2)
Restriction of daily activity	2.38±1.24 (0-5)	2.66±1.01 (0-5)	0.57±0.73 (0-2)
Restriction of sports activity	4.23±1.26 (2-8)	3.53±1.12 (1-7)	1.51±0.94 (0-3)
Restriction intense labour activity	5.91±1.65 (2-10)	4.23±1.20 (2-7)	2.25±0.88 (0-4)
Aestethic discomfort- shape of abdomen	4.32±1.92 (0-9)	1.98±1.43 (0-6)	0.94±1.01 (0-4)
Aestethic discomfort- site of hernia/scar	5.95±2.31 (1-9)	2.70±1.76 (0-7)	1.35±1.32 (0-6)

substantially decreased from one evaluation to the next (from 4.32±1.92 to 0.94±1.01, and from 5.95±2.31 to 1.35±1.32, respectively).

Regardless of comorbidities assessed by the ACCI score (ranging from 0 to 5), patients who underwent open surgery reported higher levels of pain, activity restriction, and aesthetic discomfort compared to those who underwent minimally invasive surgery. *Fig. 2* graphically represents the distribution of comorbidities according to the ACCI scores, categorized by the type of surgical intervention for patients with incisional hernia in the preoperative period, as related to their EuraHS-QoL scores.

The correlation between the size of the hernia defect and the EuraHS-QoL assessment is presented in *Table 6*. For hernia defects smaller than 4 cm, classified as W1, patients

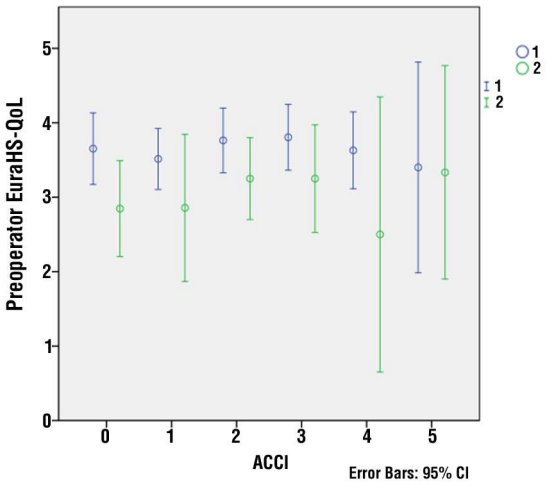

Figure 2. Preoperative assessment according to EuraHS-QoL, considering the type of surgical intervention and patient comorbidities as per the Age-Adjusted Charlson Comorbidity Index (ACCI).
1= open surgery, 2= laparoscopic surgery.

Table 6. Correlation between the size of the hernia defect and the EuraHS-QoL assessment.

Size of defect			Statistic	EuraHS-QoL scores			
						95% Confidence Interval	
				Bias	Std. Error	Lower	Upper
W1	Mean	Preoperative	2.49	.00	.10	2.31	2.69
		Postop 1	2.15	.00	.11	1.93	2.36
		Postop 3	.64	.00	.10	.44	.84
	Median	Preoperative	2.00	.26	.44	2.00	3.00
		Postop1	2.00	.00	.04	2.00	2.00
		Postop 3	.00	.11	.32	.00	1.00
	Std. Deviation	Preoperative	.766	-.011	.098	.567	.957
		Postop 1	.891	-.010	.073	.733	1.033
		Postop 3	.817	-.008	.051	.698	.897
W2	Mean	Preoperative	3.68	.00	.08	3.52	3.84
		Postop 1	2.62	.00	.08	2.45	2.79
		Postop 3	.75	.00	.07	.61	.90
	Median	Preoperative	4.00	-.03	.18	3.00	4.00
		Postop 1	3.00	-.35	.48	2.00	3.00
		Postop 3	1.00	-.13	.34	.00	1.00
	Std. Deviation	Preoperative	.831	-.006	.058	.704	.931
		Postop 1	.866	-.003	.056	.742	.961
		Postop 3	.761	-.003	.035	.684	.825
W3	Mean	Preoperative	5.27	.01	.19	4.88	5.64
		Postop 1	3.09	.00	.15	2.82	3.39
		Postop 3	1.21	.00	.14	.94	1.48
	Median	Preoperative	6.00	-.43	.50	5.00	6.00
		Postop 1	3.00	.01	.12	3.00	3.0
		Postop 3	1.00	.29	.45	1.00	2.00
	Std. Deviation	Preoperative	1.069	-.034	.154	.777	1.341
		Postop1	.843	-.021	.107	.612	1.039
		Postop 3	.820	-.017	.061	.667	.914
SD	Mean	Preoperative	3.14	.00	.21	2.69	3.55
		Postop 1	2.34	.00	.19	2.00	2.72
		Postop 3	.52	.00	.15	.24	.83
	Median	Preoperative	3.00	.08	.33	3.00	4.00
		Postop 1	2.00	.05	.21	2.00	3.00
		Postop 3	.00	.04	.19	.00	1.00
	Std. Deviation	Preoperative	1.187	-.035	.154	.861	1.457
		Postop 1	1.010	-.031	.146	.677	1.271
		Postop 3	.829	-.028	.138	.511	1.048

reported an improvement in quality of life, with scores decreasing from 2.49±0.76 to 0.64±0.81. Patients with medium-sized hernia defects (W2) had a preoperative EuraHS-QoL score of 3.68±0.83, which was lower compared to patients with large hernia defects (≥ 10 cm), who had a score of 5.27±1.06.At the 1-month and 3-month postoperative assessments, both categories of patients experienced an improvement in quality of life, with scores significantly reduced to 0.75±0.71 and 1.21±0.82, respectively. Patients categorized as having a significant hernia defect (SD) also showed a marked improvement in quality of life, with scores decreasing from 3.14±1.18 to 0.52±0.82.

The preoperative, 1-month postoperative (visit 1), and 3-month postoperative (visit 2) evaluations of pain scores from the last week, as per the EuraHS-QoL and considering the type of surgical intervention, are graphically represented in *Fig. 3*. At the preoperative assessment, patients scheduled for open surgery reported significantly higher pain scores from the previous week compared to those planned for laparoscopic surgery. At the 30-day postoperative visit, this trend continued, though the difference in quality of life between the two surgical approaches had narrowed. By the 3-month visit, the quality of life outcomes were similar for both surgical techniques.

According to the type of surgical intervention, the EuraHS-QoL questionnaire results are detailed in *Table 7*. Patients who underwent open surgical procedures reported a higher initial postoperative score (at 30 days) of 2.79±0.85 compared to those who had minimally invasive surgery, who reported a score of 1.66±0.62, indicating a higher quality of life. This trend continued at the second postoperative assessment at 90 days, with scores of 0.91±0.81 for open surgery and 0.26±0.53 for minimally invasive surgery. Both open and laparoscopic surgeries showed an improvement in patients' quality of life from the preoperative period to the first and second postoperative visits. There were statistically significant differences in the 3-month postoperative evaluations concerning sports activities (p=0.0029) and intense physical activities (p=0.0063). However, there were no statistically significant differences in daily or outdoor activities at any point during the assessments.

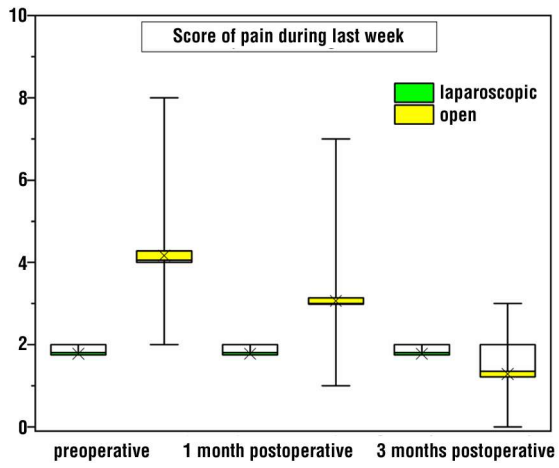

Figure 3. Preoperative and postoperative assessments at visit 1 (1 month) and visit 2 (3 months) according to the EuraHS-QoL regarding the pain score from the last week, considering the type of surgical intervention.

Significant statistical differences were observed in the cosmetic discomfort related to the shape of the abdomen during the preoperative visit (95% CI, 0.1679 - 1.5945, p=0.017). However, there were no significant statistical differences concerning the cosmetic discomfort about the shape of the abdomen at the 30-day postoperative visit (p=0.244) or the 90-day postoperative visit (p=0.980), nor were there any differences regarding the shape of the hernia incision at any point of evaluation.

Discussion

Quality of life is a widely used metric to assess the effectiveness of medical treatments in contemporary medicine. While the idea of Quality of Life (QoL) has been recognized for many years, the emergence of specific instruments and their usage and cuantification in medicine has only occurred in the past few decades (14).

Our research revealed that the proportion of females in the sample population was higher in both laparoscopic and open lots, with

Table 7. Corelation between type of approach and EuraHs-Qol evaluation

Type of approach			Statistic	Std. Error	EuraHS-QoL scores			
					Bias	Std. Error	95% Confidence Interval	
							Lower	Upper
OS	Preoperative	N	169		0	0	169	169
		Mean	3.67	.098	.00	.10	3.48	3.88
		Std. Deviation	1.270		-.011	.065	1.133	1.387
	Postoperative 1 month	N	169		0	0	169	169
		Mean	2.79	.065	.00	.07	2.66	2.92
		Std. Deviation	.851		-.006	.042	.760	.930
	Postoperative 3 months	N	169		0	0	169	169
		Mean	.91	.064	.00	.07	.78	1.04
		Std. Deviation	.837		-.004	.026	.780	.882
	Valid N	N	169		0	0	169	169
LS	Preoperative	N	53		0	0	53	53
		Mean	3.02	.151	.00	.15	2.72	3.32
		Std. Deviation	1.101		-.013	.101	.896	1.290
	Postoperative 1 month	N	53		0	0	53	53
		Mean	1.66	.085	.00	.09	1.49	1.83
		Std. Deviation	.618		-.009	.054	.503	.717
	Postoperative 3 months	N	53		0	0	53	53
		Mean	.26	.067	.00	.07	.13	.40
		Std. Deviation	.486		-.012	.065	.342	.602
	Valid N	N	53		0	0	53	53

OS: open surgery; LS: laparoscopic surgery

a male-to-female ratio of 31.53% to 68.47%. This conclusion aligns with the study undertaken by Subbiah and Chandrabose, which revealed a 59.4% proportion of females in both groups (9). Furthermore, the research conducted by Aggarwal et al. further corroborates these findings (10). In contrast, the study done by Cassie et al. found that a higher percentage of men (65.3% in the laparoscopic group compared to 69.1% in the open surgery group) were included in the research population.

Among our patients, 41.4% have a history of neoplasia, 8.6% have chronic obstructive pulmonary disease, about 31.1% have hypertension, 29.7% have type II diabetes, and 31.5% have dyslipidemia. In contrast to our study, Aggarwal et al. found that a significant proportion of the patients had diabetes mellitus, with hypertension being the second most prevalent condition (15).

The mean time of the surgical operation (in minutes) for open repair was 107.29±41.20, whereas it was 97.75±35.19 for laparoscopic repair. These findings contrast with the results published by Bayomi et al, who reported a mean duration of 51.2±5.1 min for open repair and 89.7±9.5 min for laparoscopic repair (16). We consider the main reason for the time frame results in our study is the careful selection of patients who undergo laparoscopic ventral hernia repair within our clinic. Our study found that the laparoscopic method resulted in lower mean hospitalisation periods (3.25 and 3.37 days, respectively) compared to the open surgery group. These findings align with the results of the study conducted by Froylich et al, which reported an average of 3.8 days for the open group and 3.2 days for the laparoscopic group (17).

In our study, postoperative rates for seroma and hematoma showed statistically significant differences, favoring the laparoscopic group. Specifically, over 30% of patients in the open surgery group experienced seroma, compared to less than 20% in those undergoing laparoscopic repair. Itani et al. also noted a marked discrepancy in seroma incidence, reporting 24.7% in the open group versus 8.3% in the laparoscopic group (18). Conversely, both Colavita et al. and Rogmark et al. found higher rates of seroma in the laparoscopic group -

9.7% and 10.9% respectively - compared to 7.5% and 8.6% in the open group (4,19). These findings highlight the variability in complication rates between surgical techniques.

In terms of EuraHS-QL results, both surgical approaches initially demonstrated minimal restrictions in heavy labor activities preoperatively. However, the follow-up assessments painted a more differentiated picture. By the third month postoperatively, patients who underwent laparoscopic repair exhibited notably fewer restrictions, as evidenced by a significant mean difference of -1.03. This suggests a more favorable outcome in terms of returning to labor-intensive activities for patients undergoing laparoscopic procedures. Similarly, for sports-related activities, the laparoscopic approach showed a distinct advantage by the third postoperative month. While the initial postoperative month did not show significant differences, the continued recovery demonstrated by the third month, with the mean difference of -0.998, indicates a quicker recuperation, allowing patients to resume sports activities more readily than those who had open surgery. Our findings aligned with the study conducted by Subbiah and Chandrabose, which indicated that activities were more restricted in the open group compared to the laparoscopic group (20).In their study, Colavita et al. found that the laparoscopic group had a higher rate of activity limitation (37.3%) compared to the open group (20.5%) one month after the operation. However, there was no significant difference in long-term follow-up between the two groups. Unlike our study, both results were determined using the Carolinas Comfort Scale score (4,6).

For restrictions related to activities outside the house, although there was a visible trend toward improvement in the laparoscopic group, statistical significance was not achieved. This points to a potential area for further investigation, possibly exploring specific factors that could influence recovery dynamics differently in outdoor settings.

Our comparative analysis between laparoscopic and open incisional hernia repair shows no significant statistical differences in postoperative pain scores across various conditions and time points. This should reassure both patients and surgeons that the choice of surgical technique can be made based on other factors without compromising pain management. The evidence thus supports the continued use of both techniques, with choices tailored to specific patient needs, surgical indications, and clinical contexts. Colavita et al found that after one month mark, there were no differences in score pain in conventional versus laparoscopic surgery, although the pain was greater at the 1-month visit (21). Our study comes in contradiction with the results from Subbiah and Chandrabouse that states greater pain in the open vs laparoscopic group (mean: 16.61 versus mean: 3.29) (20).

In the current context of complex abdominal wall reconstruction surgery, aesthetic outcomes are increasingly recognized as critical variables influencing patient satisfaction and quality of life. Despite their growing importance, as highlighted by Prof. Daes in his retrospective study examining abdominal contour post-enhanced view totally extraperitoneal (eTEP) Rives procedure, the focus on aesthetic results in surgical literature remains relatively limited (12). This observation underscores a significant gap in current research, suggesting that further exploration into aesthetic outcomes could provide valuable insights into surgical practices and patient-centric care in AWR.

In our study, the scores of aesthetic at the site of the hernia preoperatively show a higher median score for open repair compared to laparoscopic repair, most probably based on the size of the defect and bulge. One month postoperatively, the spread of scores for open repair is wide, indicating variability in patient experiences, while laparoscopic repair shows a more consistent lower score. This is consistent with Ramhorst et all study which states that patients with incisional hernia experience a lower health-related quality of life on physical components and worse body image (22).

Similarly, the shape of the abdomen scores indicates that preoperatively, the patients who further underwent open repair had a higher

median score, reflecting greater discomfort. One month postoperatively, the spread of scores for open repair is again broader, indicating more variable cosmetic outcomes. By three months, both groups show low and comparable levels of discomfort, highlighting the improvement over time.

These findings indicate that patients in the laparoscopic group reported higher levels of satisfaction with their cosmetic appearance compared to those in the open repair group preoperatively. However, this significant difference in cosmetic discomfort did not persist at 1 month and 3 months postoperatively for both the shape of the abdomen and the postoperative scar. The laparoscopic approach, known for its minimally invasive nature, initially seemed to offer better cosmetic outcomes, but over time, the differences between the two groups equalized (5,23,24).

Study Limitations

Firstly, the relatively small sample size could restrict the generalizability of the results to a broader population. Additionally, the utilization of a telephone survey for gathering postoperative data introduces the potential for recall bias, as patients may not accurately remember or may selectively report their symptoms and functional status. This method of data collection, while necessary and practical, especially under constraints, might compromise the precision of the reported outcomes. The fact that the conclusions are taken from a single centre is another drawback of the study, which is considered to be unicentric. Given that our single-center expertise in laparoscopic parietal surgery is restricted to only a few surgeons, it was not possible to get a homogeneous distribution of both groups. This is the primary reason why the distribution in the laparoscopic group is less than ¼ of the total population under study. Moreover, the impact of the COVID-19 pandemic on healthcare delivery and patient follow-up cannot be overlooked. The pandemic has likely influenced patient outcomes, healthcare access, and the overall management of surgical patients, adding an additional layer of complexity to the interpretation of the study results.

Taken together, these limitations suggest that while the study provides valuable insights into the postoperative outcomes of the surgical procedures assessed, the findings should be interpreted with caution.

Conclusions

In order to substantiate or refine our understanding of the true impact of the type of approach and surgical techniques used in incisional hernia repair on postoperative quality of life and functional recovery, these findings require further investigation. This investigation could take place over longer follow-up periods and with larger patient cohorts on a multicentric nuance. Therefore, this would be of great assistance to surgeons in better adapting their surgical approach to the specific requirements of their patients, so optimising both the clinical results and the quality of recovery.

Author's Contributions

Conceptualization: M.D.M.; methodology, M.D.M, A.P.; formal analysis, M.D.M, A.C.I.P., A.P. and D.E.G.; data curation, M.D.M., A.C., R.T. and F.A.G.; writing - original draft preparation, M.D.M; writing - review and editing, M.D.M., R.T., F.A.G, R.S.; supervision, T.B., C.D.A,F.G. All authors have read and agreed to the published version of the manuscript.

Conflict of Interests

Authors have none to declare.

Ethical Statement

This follow-up data collection adhered to the ethical guidelines set forth by the Declaration of Helsinki and received approval from the General Surgery Department of Coltea Clinical Hospital. Additionally, the research complied with national and international

regulations, including Law 95/2006 and Law 46/2003, which govern patient rights, as well as WHO No. 141:0/2016 and the Ministry of Health's Order No. 482/2007.

References

1. Sanders DL, Pawlak MM, Simons MP, Aufenacker T, Balla A, Berger C, et al. Midline incisional hernia guidelines: the European Hernia Society. Br J Surg. 2023;110(12):1732-1768.
2. Wilson HH, Rose M, Ku D, Scarola GT, Augenstein VA, Colavita PD, et al. Prospective, international analysis of quality of life outcomes in recurrent versus primary ventral hernia repairs. Am J Surg. 2023;226(6):803-7.
3. Muysoms F, Campanelli G, Champault GG, DeBeaux AC, Dietz UA, Jeekel J, et al. EuraHS: the development of an international online platform for registration and outcome measurement of ventral abdominal wall hernia repair. Hernia. 2012;16(3):239-50.
4. Colavita PD, Tsirline VB, Belyansky I, Walters AL, Lincourt AE, Sing RF, et al. Prospective, long-term comparison of quality of life in laparoscopic versus open ventral hernia repair. Ann Surg. 2012;256(5):714-22; discussion 722-3.
5. LaGuardia JS, Milek D, Lebens RS, Chen DR, Moghadam S, Loria A, et al. A Scoping Review of Quality-of-Life Assessments Employed in Abdominal Wall Reconstruction. J Surg Res. 2024;295:240-252.
6. Heniford BT, Lincourt AE, Walters AL, Colavita PD, Belyansky I, Kercher KW, et al. Carolinas Comfort Scale as a Measure of Hernia Repair Quality of Life. Ann Surg. 2018;267(1):171-6.
7. Grove TN, Muirhead LJ, Parker SG, Brogden DRL, Mills SC, Kontovounisios C, et al. Measuring quality of life in patients with abdominal wall hernias: a systematic review of available tools. Hernia. 2021;25(2):491-500.
8. Muysoms F. Evaluating Outcomes and Evidence in Hernia Repair. In: Textbook of Hernia. Springer International Publishing; 2017. p. 15–21.
9. Köckerling F. Onlay Technique in Incisional Hernia Repair - A Systematic Review. Front Surg. 2018;5:71.
10. Pereira C, Gururaj S. Onlay Versus Sublay Mesh Repair for Incisional Hernias: A Systematic Review. Cureus. 2023;15(1):e34156.
11. Natarajan S, Meenaa S, Thimmaiah KA. A Randomised Prospective Study to Evaluate Preperitoneal Mesh Repair Versus Onlay Mesh Repair and Laparoscopic IPOM in Incisional Hernia Surgery. Indian J Surg. 2017; 79(2):96-100.
12. Daes J, Luque E, Hanssen A, Rocha J. eTEP Rives-Stoppa impact on abdominal contour: a retrospective observational and clinical quality improvement study using Ellipse 9 tool. Surg Endosc. 2024;38(4):2197-2204.
13. Cassie S, Okrainec A, Saleh F, Quereshy FS, Jackson TD. Laparoscopic versus open elective repair of primary umbilical hernias: Short-term outcomes from the American College of Surgeons National Surgery Quality Improvement Program. Surg Endosc. 2014;28(3):741-6.
14. Catarinella FS, Nieman FHM, Wittens CHA. The relation between clinical scores and quality-of-life in long-term follow-up. Phlebology. 2016; 31(1 Suppl):99-105.
15. Aggarwal S, Sachan PK, Mittal V. Evaluation of outcome in laparoscopic and open ventral hernia repair: a prospective study. International Surgery Journal. 2022;9(6):1236.
16. Bayomi MS, Fahmi KS, Sarhan AERM, Habib FM, Sallam AM. Comparison of quality of life in laparoscopic and open primary ventral hernia repair according to European registry for abdominal wall hernias quality of life score. The Egyptian Journal of Surgery. 2024;43(1):178–86.
17. Froylich D, Segal M, Weinstein A, Hatib K, Shiloni E, Hazzan D. Laparoscopic versus open ventral hernia repair in obese patients: a long-term follow-up. Surg Endosc. 2016;30(2):670–5.
18. Itani KMF, Hur K, Kim LT, Anthony T, Berger DH, Reda D, et al. Comparison of laparoscopic and open repair with mesh for the treatment of ventral incisional hernia: a randomized trial. Arch Surg. 2010;145(4):322-8; discussion 328.
19. Rogmark P, Petersson U, Bringman S, Eklund A, Ezra E, Sevonius D, et al. Short-term outcomes for open and laparoscopic midline incisional hernia repair: A randomized multicenter controlled trial: The prolove (prospective randomized trial on open versus laparoscopic operation of ventral eventrations) trial. Ann Surg. 2013;258(1):37-45.
20. Subbiah V, Chandrabose K. A prospective observational study to compare postoperative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods. International Surgery Journal. 2019;6(3):963.
21. Tsirline VB, Colavita PD, Belyansky I, Zemlyak AY, Lincourt AE, Heniford BT. Preoperative pain is the strongest predictor of postoperative pain and diminished quality of life after ventral hernia repair. Am Surg. 2013;79(8):829-36.
22. Van Ramshorst GH, Eker HH, Hop WCJ, Jeekel J, Lange JF. Impact of incisional hernia on health-related quality of life and body image: A prospective cohort study. Am J Surg. 2012;204(2):144-50.
23. Ross SW, Wormer BA, Kim M, Oommen B, Bradley JF, Lincourt AE, et al. Defining surgical outcomes and quality of life in massive ventral hernia repair: an international multicenter prospective study. Am J Surg. 2015; 210(5):801-13.
24. Ciomperlik H, Dhanani NH, Cassata N, Mohr C, Bernardi K, Holihan JL, et al. Patient quality of life before and after ventral hernia repair. Surgery. 2021;169(5):1158-1163.