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

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Background
Ventral hernia can be defined as noninguinal and nonhiatal hernia in the fascia of the abdominal wall. Laparoscopic repair become a popular method with decreased overall complications nowadays. We aimed to provide an efficient management for ventral hernia through comparison of quality of life (QoL) postlaparoscopic and open techniques according to European registry for abdominal wall hernias quality of life (EuraHS-QOL) score.
Patients and methods
The data of 54 patients with primary ventral hernia were collected prospectively. Of these patients, 27 underwent open repair, and 27 underwent laparoscopic repair after excluding patients with a complicated and recurrent ventral hernia and incisional hernia. Perioperative QoL was assessed according to the EuraHS score.
Results
Two groups were designed, each including 27 patients. The most common complication was seroma (25.9%) in open repair, followed by infection (18.5%), while only one case in laparoscopic repair had port site infection; the difference was statistically significant ($P<0.05$). The mean operative time in open repair was 51.2 ±5.1 and 89.7±9.5 in laparoscopic repair; the difference was highly significant ($P<0.001$). The mean length of stay in the hospital was 23.1±7.3, and it was 19.1±6 in laparoscopic repair; the difference was significant ($P<0.05$). All cases in open repair had subcutaneous drain; but not in laparoscopic repair; the difference was highly significant ($P<0.001$). The EuraHS score in all its items was significant in favor of laparoscopic repair.
Conclusion
Laparoscopic repair was associated with high QoL, less complications, and recovery time as compared with open repair of ventral hernia.

Keywords:
European registry for abdominal wall hernias quality of life score, laparoscopic ventral hernia repair, open ventral hernia repair, quality of life

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Introduction

Ventral hernias of the abdomen are defined as any defect in the fascia of the abdominal wall other than the inguinal region, in which its repair has commonly performed surgery. It can affect an individual's quality of life (QoL) and can lead to hospitalizations and even death in some cases [1].

According to the European Hernia Society, it is classified into two major categories (primary or incisional) including different types of hernias. Umbilical, epigastric, spigelian, and lumbar hernias are examples of primary hernias. A hernia following a previous incision is considered incisional hernia [2].

Many surgical techniques have been developed to repair hernias, the most important being tension-free closure. The open repair with mesh has several options, including what type of mesh and where to place the mesh [3].

Laparoscopic ventral hernia repair has become a popular method, when compared with open techniques, it has fewer complications, less hospital stays and early recovery [4].

The European registry for abdominal wall hernias quality of life (EuraHS-QoL) score was developed during the 4th International Hernia Congress in berlin in 2009. It is a method to measure the QoL for patients before (preoperative) and after

(postoperative) an operation of an abdominal wall hernia. It is based on a numerical rating scale for three dimensions, including pain at the site of the hernia, restriction of activities, and cosmetic discomfort [5].

Patients and methods

The study was a prospective and randomized study that was carried out from November 2021 to August 2023. Patients were admitted with the inclusion criteria after obtaining informed consent from each patient. The surgical department committee and Institutional Review Board (IRB) were approved for this study (IRB#9062-27-10-2021).

Sample size

A total of 54 patients were included in this study and divided randomly into two groups (group A for open repair and group B for laparoscopic repair), each including 27 patients. This discrimination was randomized as patients with odd numbers were allotted to group A and patients with even numbers to group B.

Inclusion criteria

Patients of both sexes above 18 years presented with a primary ventral hernia.

Exclusion criteria

Patients with a complicated ventral hernia, incisional hernia, recurrent ventral hernia, and patients unfit for surgery.

All patients were subjected to history taking, general and local examination, investigations (including abdominal ultrasound, computed tomography if needed, and routine laboratory investigations for fitness for surgery) and preoperative questionnaire according to EuraHS-QoL score. All patients were submitted to careful follow-up of vital signs postoperatively and encouraged for early mobilization with good analgesia. The day of discharge was noted, and all patients were advised to visit our outpatient clinic every week during the first month postoperative and then monthly during the next 6 months. All patients were asked a questionnaire according to EuraHS-QoL score (1, 3, and 6 months postoperative) (Fig. 1).

Data were collected, entered, and analyzed using Microsoft Excel software, then imported into Statistical Package for the Social Science (SPSS, version 28) (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version 28.0.; IBM Corp., Armonk, New York, USA) software for analysis. According to the kind of data, qualitative was represented by number and percentage, and quantitative continues group represented by mean ±SD. The following tests were used to test differences for significance; difference and association of qualitative variables by χ^2 test or Fisher's exact test; differences between quantitative data by independent sample t test or Mann–Whitney U test. P value was set at less than 0.05 for significant results and less than 0.001 for highly significant results. Then data were presented in tables and charts.

Results

The demographic data and the baseline characteristic of the patients were collected for each group, and there was no statistically significant difference ($P>0.05$) between both groups and different parameters like age, sex, comorbidities, and size of the defect (cm) (Table 1).

The mean operative time (min) for open repair was 51.2±5.1, while it was 89.7±9.5 for laparoscopic repair, and this difference was highly significant ($P<0.001$). Regarding postoperative complications, seroma was the most common one (25.92%), followed by infection (18.51%) in open surgical repair; while in laparoscopic repair, only one (3.7%) case was complicated with port site infection, and this difference was significant ($P<0.05$). The mean length of stay in the hospital (h) was 23.1±7.3 in open repair while it was 19.1±6 in laparoscopic repair; this difference was significant ($P<0.05$). In the open hernia repair, a subcutaneous drain was inserted in all cases (100%), while in laparoscopic repair not used at all; and this difference was highly significant ($P<0.001$) (Table 2).

Regarding the EuraHS-QoL score, the difference between the studied groups was not significant ($P>0.05$) in the preoperative questionnaire as regards the three main items of the score (pain at the site of the hernia, restriction of activities, and cosmetic discomfort).

The postoperative questionnaire of EuraHS-QoL score was applied to all patients after 1, 3, and 6 months postoperatively. The overall score of pain was less in laparoscopic repair as compared to open repair. The difference after 1 month was not significant ($P>0.05$) during rest, activities nor last week. After 3

Figure 1

EuraHS

EuraHS QoL

version: English

EuraHS Quality Of Life scale

1. Pain at the site of the hernia												
	0 = no pain										10 = worst pain imaginable	
Pain in rest (lying down)	0	1	2	3	4	5	6	7	8	9	10	
Pain during activities (walking, biking, sports)	0	1	2	3	4	5	6	7	8	9	10	
Pain felt during the last week	0	1	2	3	4	5	6	7	8	9	10	

2. Restrictions of activities because of pain or discomfort at the site of the hernia												
	0 = no restriction										10 = completely restricted	
Restriction from daily activities (inside the house)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction outside the house (walking, biking, driving)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during sports	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during heavy labour	0	1	2	3	4	5	6	7	8	9	10	X
	X = if you do not perform this activity											

3. Cosmetic discomfort												
	0 = very beautiful										10 = extremely ugly	
Shape of your abdomen	0	1	2	3	4	5	6	7	8	9	10	
Site of the hernia	0	1	2	3	4	5	6	7	8	9	10	

EuraHS-QoL score model [5]. Comment: preoperative and postoperative EuraHS-QoL score model. EuraHS-QoL, European registry for abdominal wall hernias quality of life.

months, the difference was significant ($P<0.05$) at rest and activities but not significant during last week ($P<0.05$). After 6 months, the difference was significant at rest, activities and during last week. Table 3 shows the EuraHS-QoL score, and Fig. 2 shows the score of pain at rest, during activities, and during the last week.

The overall score of restriction of activities was less in laparoscopic repair as compared to open repair. The difference of restriction of activities among both groups after 1 month was not significant ($P>0.05$) during daily activities, outside the house, during sports, and during labor. After 3 months, the difference was not significant ($P>0.05$) during daily activities, sports, and labor, while it was significant ($P<0.05$) outside the house. After 6 months, the difference was significant ($P<0.05$) during daily activities and outside the house, while it was not significant ($P>0.05$) during sports and labor. Table 3 and Fig. 3 show the score of restriction of activities.

The overall score of cosmetic discomfort was also less in laparoscopic repair as compared with open repair. After

Table 1 Comparison of demographic data and defect size (cm) among both group (*N*=54)

Variables	Group A (open repair) (*N*=27)	Group B (laparoscopic repair) (*N*=27)	*P* value
Age (mean±SD)	41.67±10.5	44.89±9.4	0.24
Sex [*n* (%)]			
Male	9 (33.3)	8 (29.6)	0.77
Female	18 (66.7)	19 (70.4)	
Comorbidities [*n* (%)]			
None	18 (66.77)	14 (51.85)	0.59
Hypertension	6 (22.22)	7 (25.92)	
Diabetes mellitus	2 (7.4)	6 (22.22)	
Obesity	3 (11.11)	3 (11.11)	
Smoking	3 (11.11)	2 (7.4)	
Defect size (mean±SD)	2.3±0.5	2.1±0.6	0.4

Table 2 Comparison of mean operative time (min), complications, length of hospital stay (h), and subcutaneous drain among the studied groups

Variables	Group A (open repair) (*N*=27)	Group B (laparoscopic repair) (*N*=27)	*P* value
Operative time (mean±SD)	51.2±5.1	89.7±9.5	<0.001 (HS)
Complications [*n* (%)]			0.03 (S)
Seroma	7 (25.92)	0	
Infection	5 (18.51)	1 (3.7)	
Hematoma	1 (3.7)	0	
Recurrence	0	0	
Length of stay (mean±SD)	23.1±7.3	19.1±6	0.03 (S)
SC drain [*n* (%)]			<0.001 (HS)
Yes	27 (100)	0	
No	0	27 (100)	

HS, highly significant; SC, subcutaneous; S, significant.

1 month, the difference of cosmetic discomfort between both groups was highly significant ($P<0.001$) as regard the site of the hernia and was not significant ($P>0.05$) as regard the shape of the abdomen. After 3 and 6 months, the difference was highly significant ($P<0.001$) as regard the site of the hernia and was significant ($P<0.05$) as regard the shape of the abdomen. Table 3 and Fig. 4 show the score of cosmetic discomfort.

Discussion

QoL is an increasingly popular outcome measure in modern medicine. Although the concept of QoL has been known for several decades, an uprising of QoL instruments and their application in medicine can be seen only in the last 20 years. QoL is usually measured by means of standardized questionnaires, also often referred to as 'Patient Reported Outcome Measures.' These questionnaires result in one or more scores, depending on the specific instrument used [6].

In this study, we had the privilege to be among the first to assess the QoL of primary ventral hernia patients using EuraHS-QoL score either preoperative or postoperatively.

In the current study, the mean age of the patients was comparable across both groups where it was 41.67 ±10.5 in the open group, while it was 44.89±9.4 in the laparoscopic group, similar results but slightly older than ours was reported by Korukonda *et al.* [7], in their study where it was 45.7±12.8 in open group and 48.2 ±13.3 in laparoscopic group.

Regarding the sex, in our study female's percentage was higher in both groups (66.7% in the open group vs. 70.4% in the laparoscopic group) and this agree with the study by Subbiah and Chandrabose [8] (59.4% in both groups), and the study by Aggarwal *et al.* [9]. Contrastingly higher percentage of males was found in the study by Cassie *et al.* [10] (69.1% male in open group vs. 65.3% male in laparoscopic group).

Among 54 patients with primary ventral hernia included in this study, the majority has no comorbidities in both groups (66.67% in open group and 51.85% in laparoscopic group), while the most common comorbidity was hypertension in 13 patients (22.2% in open group and 25.9% in laparoscopic group) followed by diabetes mellitus in eight patients (7.4% in open group and 22.2% in laparoscopic group) with no statistically significant differences among both groups.

Table 3 Preoperative and postoperative European registry for abdominal wall hernias quality of life score

		Score	Mean difference	95% confidence interval	*P* value
Score of pain	At rest	Preoperative	−0.6	−1.29, 0.09	0.09 (NS)
		1-month postoperative	0.33	−0.85, 0.19	0.19 (NS)
		3-month postoperative	0.02	−0.72, 0.32	0.44 (NS)
		6month postoperative	−0.6	−1.12, −0.08	0.02 (S)
	During activities	Preoperative	−0.11	−1.25, 1.02	0.85 (NS)
		1-month postoperative	−0.15	−1.29, 0.99	0.79 (NS)
		3-month postoperative	−0.07	−1.14, 0.99	0.88 (NS)
		6-month postoperative	−0.22	−1.16, −0.12	0.02 (S)
	Last week	Preoperative	−1.07	−2.13 to 0.009	0.056 (NS)
		1-month postoperative	0.93	−1.99 to 0.14	0.91 (NS)
		3-month postoperative	−1.11	−2.18 to −0.05	0.03 (S)
		6-month postoperative	−1.07	−2.14 to −0.009	0.04 (S)
Score of restriction	Daily activities	Preoperative	−0.11	−1.25, 1.02	0.85 (NS)
		1-month postoperative	−0.15	−1.29, 0.99	0.79 (NS)
		3-month postoperative	−0.07	−1.14, 0.99	0.88 (NS)
		6-month postoperative	−0.22	−1.16, −0.12	0.02 (S)
	Outside house	Preoperative	−1.07	−2.13 to 0.009	0.056 (NS)
		1-month postoperative	0.93	−1.99 to 0.14	0.91 (NS)
		3-month postoperative	−1.11	−2.18 to −0.05	0.03 (S)
		6-month postoperative	−1.07	−2.14 to −0.009	0.04 (S)
	Sports	Preoperative	−0.15	−1.08 to 0.79	0.99 (NS)
		1-month postoperative	−0.11	−1.05 to 0.82	0.99 (NS)
		3-month postoperative	−0.22	−1.16 to 0.71	0.98 (NS)
		6-month postoperative	0.15	1.08 to 0.79	0.99 (NS)
	Heavy labor	Preoperative	−0.15	1.23 to 0.93	0.91 (NS)
		1-month postoperative	0.11	−1.90 to 0.96	0.07 (NS)
		3-month postoperative	0.22	1.30 to 0.86	0.79 (NS)
		6-month postoperative	−0.14	1.23 to 0.93	0.91 (NS)
Cosmetic discomfort	Shape of abdomen	Preoperative	−0.21	−1.18 to 0.75	0.88 (NS)
		1-month postoperative	−0.69	−1.43 to 0.04	0.07 (NS)
		3-month postoperative	−0.76	−1.502 to −0.02	0.03 (S)
		6-month postoperative	−0.83	−1.57 to −0.09	0.02 (S)
	Site of hernia	Preoperative	0.71	0.31 to 1.74	0.17 (NS)
		1-month postoperative	2.34	1.33 to 3.38	<0.0001 (HS)
		3-month postoperative	2.76	1.73 to 3.79	<0.0001 (HS)
		6-month postoperative	2.90	1.88 to 3.93	<0.0001 (HS)

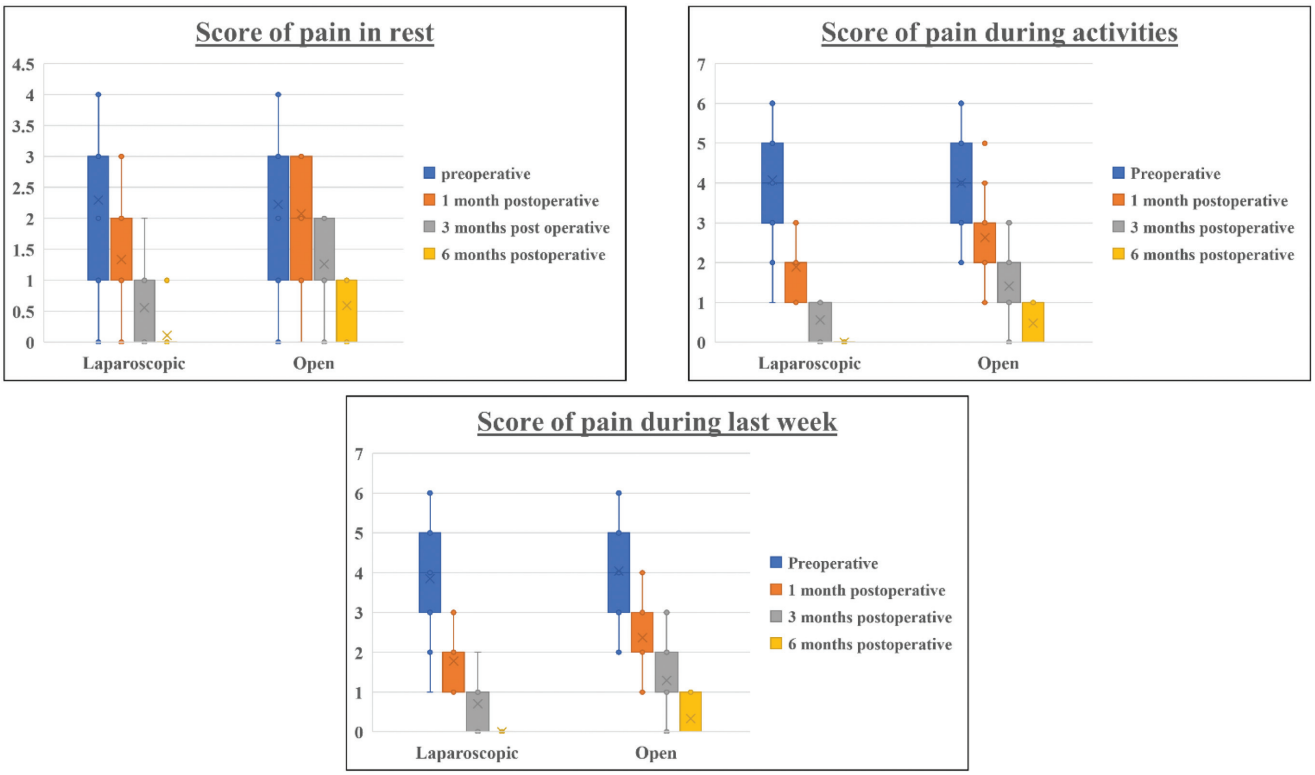
HS, highly significant; NS, not significant; S, significant.

Aggarwal *et al*. [9] found in their study that most of the cases had diabetes mellitus followed by hypertension.

The postoperative complications in our study show statistically significant differences in favor of laparoscopic group. Majority of cases in both groups had no complications (51.8% in open group and 96.2% in laparoscopic group), while postoperative seroma and surgical site infection were the commonest complications in the open group [seven (25.9%) cases of seroma and five (18.5%) cases of SSI in open group vs. zero seroma and one (3.7%) case of port site infection in laparoscopic group]. Subbiah and Chandrabose [8] in their study reported the same significant differences regarding seroma (87.5% in open group and 6.2% in laparoscopic group) and SSI (15.6% in open group and 3.1% in laparoscopic group) that was higher in the open group. But Forester *et al*. [11], reported that seroma was higher in laparoscopic group (20.7%) than open group (12.9%).

Regarding the operative time, our study shows that there is high statistically significant difference among both studied groups ($P<0.001$) with the laparoscopic group (mean±SD=89.7±9.5) is longer than open group (mean±SD=51.2±5.1) and this is attributed to starting the learning curve for laparoscopic repair of hernia in our center. Korukonda *et al*. [7], reported that operating time for laparoscopic group (mean ±SD=109±19) was longer than open group (mean ±SD=69±11) but the difference was not statistically significant. But the operative time in the study by Subbiah and Chandrabose [8] was shorter in laparoscopic group (mean±SD=46.8±12.7) than open

Figure 2



EuraHS-QoL score of pain at rest, activities, and during the last week. Comment: Boxplot comparing laparoscopic and open ventral hernia repair regarding score of pain in rest and during activities (showing significant difference at 3 and 6 months postoperative in favor of laparoscopic repair) and score of pain during the last week (showing significant difference at 6 months postoperative in favor of laparoscopic repair). EuraHS-QoL, European registry for abdominal wall hernias quality of life.

group (mean±SD=59.3±10.8) and the difference was statistically significant. Also, Forester *et al.* [11], reported that the operative time was shorter in laparoscopic group (mean±SD=83±52) than open group (mean±SD=117±67) and the difference was statistically significant.

The length of stay in hospital in our study was statistically significant difference among the both studied groups ($P<0.05$), with the laparoscopic group (mean±SD=19.1±6 h) stayed shorter than the open group (mean±SD=23.1±7.3 h) in hospital, and so the recovery time was less in laparoscopic group than open group, these results were consistent with Subbiah and Chandrabose [8], and Korukonda *et al.* [7]. While Cassie *et al.* [10] laparoscopic group (0.29±0.68 days) versus open group (0.17±1.47 days) ($P=0.001$), and Liang *et al.* [12], found that the length of stay was significantly longer for laparoscopic group than open group.

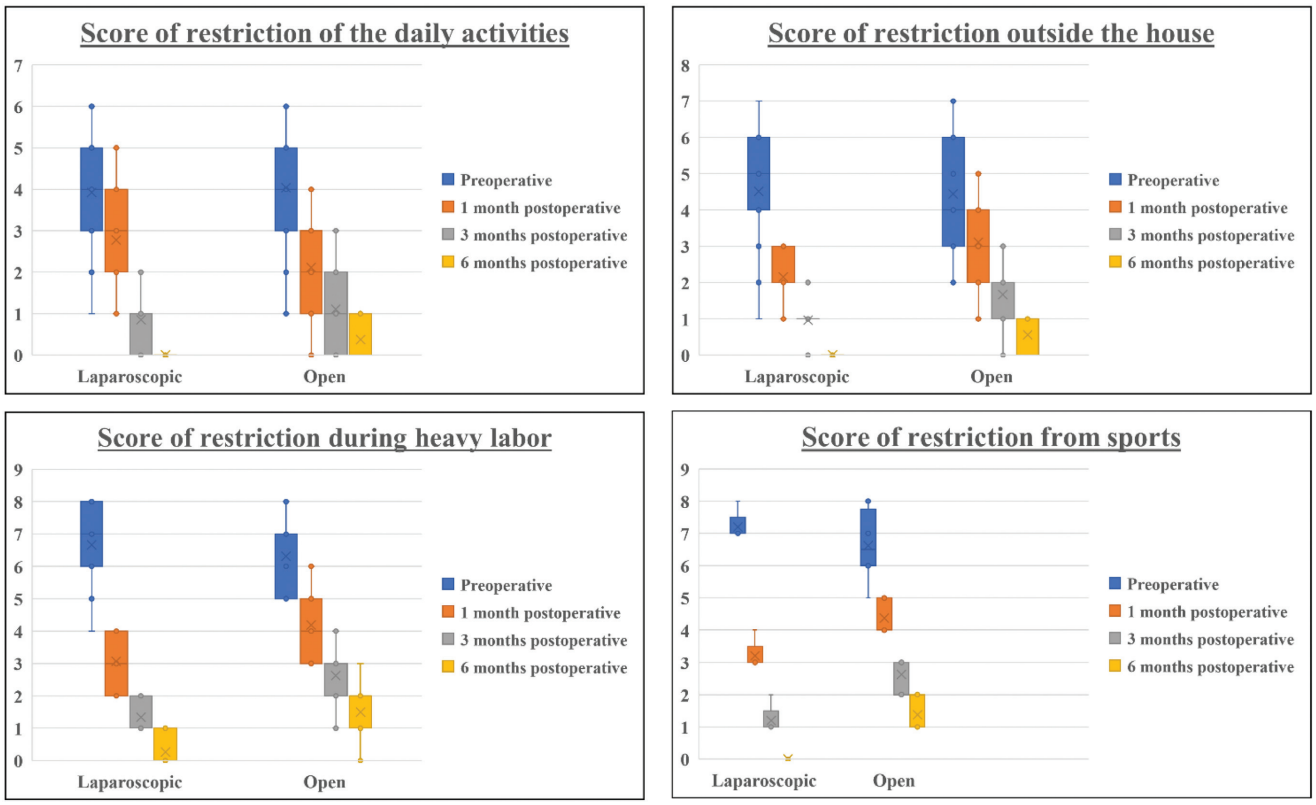
Our study shows no significant differences among both groups as regard the defect size of the hernia with the mean±SD was 2.3±0.5 cm in open group and was 2.1 ±0.6 cm in the laparoscopic group, this was consistent with Forester *et al.* [11], and Langbach *et al.* [13].

In our study, all patients in the open group had subcutaneous drain while no one in the laparoscopic group had a drain, and so there was high statistically significant difference among both studied group as regard the subcutaneous drain ($P<0.001$).

In this study, three aspects were assessed in the patients of both groups using EuraHS-QoL score, these aspects are pain, activities, and cosmetic discomfort. Theses aspects were assessed preoperatively and 1, 3, and 6 months postoperatively.

Regarding the first aspect, pain, we can find that there was no statistically significant difference in the preoperative period neither in pain during rest, during activities nor in pain felt last week before surgery. The same can be noticed in the two remaining aspects. On the other hand, we can observe the significant statistic difference postoperatively in the previously mentioned aspects between both groups, hence this study gains its value.

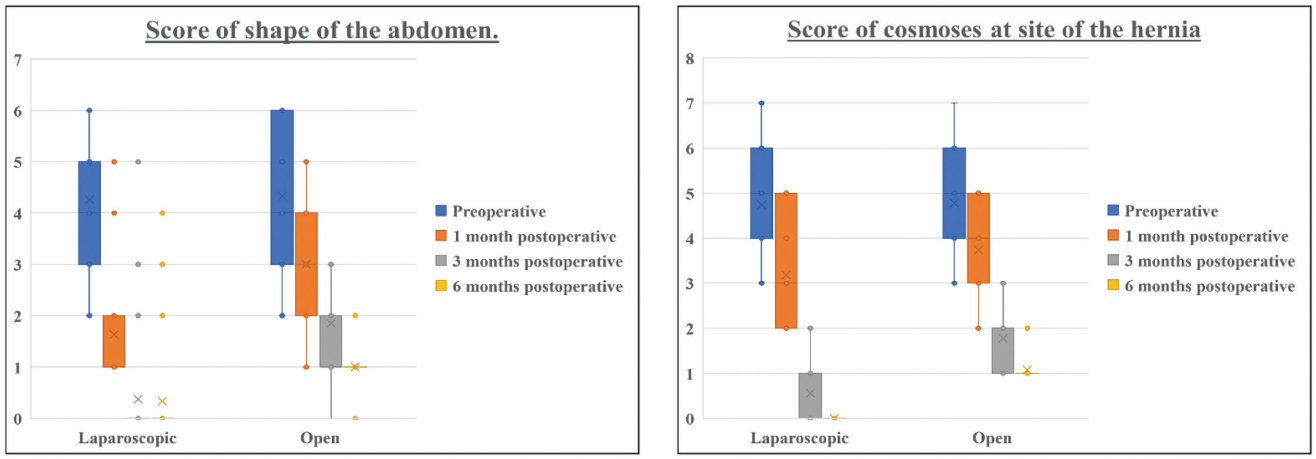
Figure 3



EuraHS-QoL score of restriction of activities during daily activities, outside house, during sports, and labor. Comment: Boxplot comparing laparoscopic and open ventral hernia repair regarding score of restriction of the daily activities (showing significant difference at 6 months postoperative in favor of laparoscopic repair), score of restriction outside the house (showing significant difference at 3 and 6 months postoperative in favor of laparoscopic repair) and score of restriction during heavy labor and sports with no significant differences. EuraHS-QoL, European registry for abdominal wall hernias quality of life.

Regarding the pain, laparoscopic repair was found to cause less pain than open repair. In this study, no significant difference between both compared groups was found at preoperative and 1 month postoperative where the mean difference was 0.0001 [95% confidence interval (CI): −1.500 to 1.500] and −0.14 (95% CI: −1.121 to 0.839), respectively. While at 3 and 6 months postoperative, the mean differences between

Figure 4



EuraHS-QoL score of cosmetic shape of abdomen and site of hernia. Comment: Boxplot comparing laparoscopic and open ventral hernia repair regarding the shape of the abdomen (showing significant difference at 3 and 6 months postoperative in favor of laparoscopic repair) and score of cosmoses at the site of the hernia (showing high significant differences at 1, 3, and 6 months postoperative in favor of laparoscopic repair). EuraHS-QoL, European registry for abdominal wall hernias quality of life.

laparoscopic and open repair were −0.277 (95% CI: −1.033 to −0.479, *P*=0.02) and −0.244 (95% CI: −1.021 to −0.533, *P*=0.04), respectively. This shows statistically significant difference among both groups in the postoperative pain in rest which was less in laparoscopic group. This score also applied to pain during activities and during the last week before surgery and show the same statistically significant difference among both groups. We believe that pain is more in open group due to long incision, extensive dissection, and raising of adequate flaps around the defect for mesh fixation which was not occurred in laparoscopic group.

Our findings are consistent with other studies that used other scores to evaluate postoperative pain other than our current score. Korukonda *et al.* [7], found the same result as our study but using visual analog scale score for assessment of pain (mean±SD=2.76±0.98 in laparoscopic group and 4.73±1.46 in open group). Also, Subbiah and Chandrabose [8], reported that pain is more in open group (mean±SD=16.61±3.63) than laparoscopic group (mean±SD=3.29±2.58) by using the scores of individual Carolinas Comfort Scale score. This is contrary to that reported by Colavita *et al.* [14], that found that 1 month postoperative, the pain was higher in laparoscopic group (31%) than open group (17.9%) and beyond 1 month there were no differences between both groups.

As regard to the second aspect of this score which was restriction of activities inside the house due to pain or discomfort at site of the hernia, we found in our study that laparoscopic group was better than open group in term of activities restriction. In this study no significant difference between the compared groups was found at preoperative, 1, and 3 months postoperative, *P* value was more than 0.05. Six months postoperatively the mean difference was −0.22, and the 95% CI ranged from −1.16 to −0.12. The *P* value was 0.02, indicating a statistically significant difference at this time point. Also, the score was applied to restriction outside the house, during sports and during heavy labor, and show statistically significant difference along the postoperative period follow-up with the laparoscopic group less than open group in restriction of activities.

Our results were consistent with Subbiah and Chandrabose [8], who reported that activities were limited in open group much more than laparoscopic group but on Carolinas Comfort Scale score. However, Colavita *et al.* [14], reported in their study that limitation of activities was more in laparoscopic group (37.3%) than open group (20.5%) 1 month postoperatively, and no difference among both groups in long-term follow-up, and this also by using Carolinas Comfort Scale score.

Finally, regarding the last aspect of the score which was the cosmetic discomfort regarding the shape of the abdomen and the site of the hernia and the scar, we found that laparoscopic group was satisfied more than open group regarding the cosmetic appearance. In this study we found no significant difference in the cosmetic appearance of the shape of the abdomen between laparoscopic and open repair at the preoperative time point and 1 month postoperative, with a mean difference of −0.21 (95% CI: −1.18 to 0.75, *P*=0.88) and −0.69 (95% CI: −1.43 to 0.04, *P*=0.07), respectively. By 3 months, the difference became significant, with a mean difference of −0.76 (95% CI: −1.502 to −0.02, *P*=0.03). The trend continued at 6 months, with a significant mean difference of −0.83 (95% CI: −1.57 to −0.09, *P*=0.02). The score was applied for the cosmetic discomfort regarding the site of the hernia and the scare and there was high statistically significant difference among both groups at 1, 3, and 6 months postsurgery, where laparoscopic repair showed significantly higher cosmetic improvement of the scar compared with open repair. The mean differences were 2.34 (95% CI: 1.33–3.38), 2.76 (95% CI: 1.73–3.79), and 2.90 (95% CI: 1.88–3.93), respectively, with *P* values less than 0.0001.

Liang *et al.* [12], in their study reported that bulging at site of the hernia was common in laparoscopic group with less satisfaction from the patients regarding the cosmetic appearance. In our study we bypassed this problem by using a soft ball of gauze at site of the hernia over the skin for at least 2 weeks.

Conclusion

Laparoscopic repair of primary ventral hernia is associated with fewer complications (especially seroma and infection), less hospital stays, early recovery, and higher postoperative QoL according to EuraHS-QoL score as compared with open hernia repair.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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