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A prospective observational study to compare postoperative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods

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ABSTRACT

Background: Surgery of umbilical hernias may be challenging due to the heterogeneity of presentation, multiple options for repair, and potential for complications, including infection and recurrence. Laparoscopic repair of a ventral hernia has gained the popularity in recent times for its advantage over the open surgery. Hence the study aimed to compare postoperative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods.

Methods: The study was a prospective cohort study, conducted in the department of general surgery of a tertiary care teaching hospital. Patients undergoing umbilical hernia repair by the laparoscopic method and by open surgery were included in the study. The interoperative time, postoperative hospital stays, post-operative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods were assessed after the surgery.

Results: A total of 64 people were included in the final analysis, with 32 subjects each in each group. 13 (40.6%) were males and 19 (59.4%) females in both the groups. The mean duration of open umbilical hernia surgery was 59.37 ± 10.83 , and it was only 46.87 ± 12.74 for laparoscopic surgery. The difference was statistically significant (p<0.05). Post-operative period recovery time in days was significantly lesser for laparoscopic group. Pain score postoperative period was 6.52 ± 0.87 for open surgery and 4.84 ± 0.86 for laparoscopic surgery, and the difference was statically significant (p<0.05). The difference between individual Carolinas comfort scale scores and study group was statistically significant (p<0.001).

Conclusions: Laparoscopic umbilical hernia leads to lesser operative time, early postoperative recovery and comparatively superior quality of life, as compared to open umbilical hernia repair.

Keywords: Complications, Laparoscopy, Quality of life, Umbilical hernia

INTRODUCTION

An umbilical hernia(UH) is a rather common surgical problem. They are the most common type of linea alba abdominis defects in adults with a prevalence of about 10%. A true umbilical hernia is a defect in the anterior abdominal wall underlying the umbilicus, through which

the intestine can protrude.³ An umbilical hernia has gained little attention from surgeons in comparison with other types of abdominal wall hernias (inguinal, incisional).⁴ Although UH are often thought of as simple hernias, they can be complex and, if not handled properly, can be irritating to patients and surgeons. An umbilical hernia has a tendency to be associated with

high morbidity and mortality in comparison with an inguinal hernia because of the higher risk of incarceration and strangulation that require emergency repair.¹

Several things make umbilical hernias challenging, including the heterogeneity of presentation, multiple options for repair, and potential for complications, including infection and recurrence. The primary suture for an umbilical hernia resulted in recurrence rates of 19–54%.⁵⁻⁷ The use of a variety of mesh materials for the repair of these hernias has resulted in a decreased recurrence rate when compared with that in primary suture closure.⁸⁻¹⁰

Laparoscopic incisional hernia repair has gained popularity for its superiority and has been reported to have better outcomes in terms of hernia recurrence and postoperative complications.¹¹ however, its role in the repair of an umbilical hernia remains controversial.¹²⁻¹⁴

Hence, the current study was conducted to compare the inter-operative time, postoperative hospital stays, postoperative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods.

METHODS

The study was a prospective cohort study, conducted in the department of general surgery of a tertiary care teaching hospital. The study cohort consisted of people undergoing umbilical hernia repair by the laparoscopic method, and the comparison group consisted of people undergoing umbilical hernia repair by open method, as per the institutional protocol

The sample size was calculated to be 32 subjects in each of the study groups. A total of 64 people were included in the final study, with 32 subjects each in open and laparoscopy groups. The data collection for the study was done between March 2018 to June 2018, for a period of 1 year.

The ethical approval was obtained from the institutional human ethics committee. Informed written consent was obtained from each of the study participants.

Study procedure

After obtaining the informed consent form and conducting thorough clinical assessment each participant was provided with the option of either choosing open or laparoscopic methods as per the institutional protocol. The advantages, disadvantages, cost and other relevant aspects of both the methods were explained to each participant, and they were allowed to take an informed decision about the procedure to undergo. Basing on the choice the participants were treated with the corresponding procedure and were recruited into the study in the corresponding group. Laparoscopy was

performed. The interoperative time, postoperative hospital stays, post-operative complications and quality of life between patients undergoing umbilical hernia repair by open and laparoscopic methods were assessed after the surgery. Carolinas comfort scale was used to assess the quality of life post-surgical complication. 15 The CCS is a 23-item questionnaire that quantifies the severity of pain, mesh sensation, and movement limitation from a hernia or surgical site during the following 8 activities: lying down, bending over, sitting up, activities of daily living, coughing or deep breathing walking, climbing stairs, and exercise. 15 The answers were recorded on a 6-point Likert scale, which ranges from an absence of symptoms to disabling symptoms. It is a hernia- specific questionnaire aiming at patients treated with a mesh.

Statistical methods

The relevant demographic, clinical parameters, operative findings, post-operative complications and the quality of life were entered into Microsoft excel sheet and analysed using IBM SPSS statistical software. Numerical variables were compared between two groups using independent sample t-test or Mann-Whitney U test. Qualitative variables were compared between the two groups using the chi square test or Fisher's exact test. A p<0.05 was considered as the statistically significant.

RESULTS

A total of 64 people were included in the final analysis, with 32 subjects each in open and laparoscopic groups. The demographic details and the baseline characteristic of the patients were collected for both the groups, and there was no statistically significant difference between study group and different parameters like age, gender, size of the defect in cm and number of defects (Table 1).

The mean duration of open umbilical hernia surgery was 59.37 ± 10.83 , and it was only 46.87 ± 12.74 for laparoscopic surgery. The difference was statistically significant (p<0.05). Post-operative period recovery time in days was significantly lesser for laparoscopic group. Pain score postoperative period was 6.52 ± 0.87 for open surgery and 4.84 ± 0.86 for laparoscopic surgery, and the difference was statically significant (p<0.05). Seroma formation and scar formation was significantly lesser for the laparoscopic surgery (p<0.05) (Table 2).

The scores of individual Carolinas Comfort Scale were more in open umbilical hernia repair compared to laparoscopic umbilical hernia repair. The difference between individual Carolinas Comfort Scale scores and study group was statistically significant (p<0.001). The mean the sensation of mesh total score in open umbilical hernia repair was 11.09 ± 2.6 , it was 1 ± 1.44 for laparoscopic umbilical hernia repair. The mean of pain total score in open umbilical hernia repair was 16.61 ± 3.63 ; it was 3.29 ± 2.58 for laparoscopic umbilical

hernia repair. The mean of the movement limitations total score in open umbilical hernia repair was 10.46±3.18; it was 1.36±1.31 for laparoscopic umbilical hernia repair. The mean of movement total score in open umbilical

hernia repair was 38.15±7.54; it was 5.65±4.19 for Laparoscopic umbilical hernia repair. The difference between study groups was statistically significant for all the parameters (p<0.001) (Table 3).

Table 1: Comparison of mean of demographical parameters across study groups (n=64).

Parameter	Open umbilical hernia repair (N=32)	Laparoscopic umbilical hernia repair (N=32)	P value		
Age in years (Mean±SD)	48.7±14.69	50.42±11.36	0.603		
Gender					
Male	13 (40.6%)	13 (40.6%)	1.000		
Female	19 (59.4%)	19 (59.4%)			
Size of the defect in cm	4.62±1.39	Five±1.37	0.276		
Number of defects					
1	31 (96.9%)	25 (78.1%)	***		
2 or more merge	1 (3.1%)	1 (3.1%)			
3	0 (0%)	6 (18.8%)			
Primary, recurrent hernia (make it comparable between groups)					
Primary hernia	28 (87.5%)	21 (65.6%)	0.039		
Recurrent hernia	4 (12.5%)	10 (34.4%)			
Spinal	26 (81.3%)	1 (3.13%)			

Table 2: Comparison of mean of pain score postoperative period, post-operative period and postoperative complications across study groups (n=64).

	Study group				
Parameter	Open umbilical hernia repair (n=32)	Laparoscopic umbilical hernia repair (n=32)	P value		
Duration of surgery in mints	59.37±10.83	46.87±12.74	< 0.001		
Post-operative period recovery time in days	6.18±1.38	3.2±1.7	< 0.001		
Pain score postoperative period	6.52±0.87	4.84±0.86	< 0.001		
Urinary retention in the post-op period					
Yes	10 (31.3%)	4 (12.8%)	0.070		
No	22 (68.8%)	28 (87.5%)			
Seroma formation in the post op period					
Yes	28 (87.5%)	2(6.25%)	<0.001		
No	4 (12.5%)	30 (93.75%)			
Surgical site infection					
Yes	5 (15.6%)	1 (3.13%)	0.086		
No	27 (84.4%)	31 (96.87%)			
Scar formation					
Yes	26 (81.3%)	1 (3.1%)	<0.001		
No	6 (18.8%)	31 (96.87%)			
Recurrence					
Yes	2 (6.3%)	0 (0%)	***		
No	30 (93.8%)	32 (100%)			

DISCUSSION

Umbilical hernias generally develop from small facial defects. The umbilicus is one of the potential weak areas of the abdomen and a relatively common site of herniations. An umbilical hernia is common in adults and

is characterised by an acquired defect because of their size. Mesh repair became the gold standard in the elective management of most open umbilical hernias with significant improvement in terms of recurrence. However, the laparoscopic surgery is known to have a better outcome compared to the open surgery. With

advances in knowledge and improvement in clinical outcomes, attention is directed to functional outcomes, such as quality-of-life measures.

Table 3: Comparison of median in Carolinas comfort scale total scores in study group (n=64).

	Mean±SD			
Parameter	Open umbilical hernia repair (n=32)	Laparoscopic umbilical hernia repair (n=32)	P value	
Laying down	2.36±0.7	0.13±0.5	< 0.001	
Bending over	4.03±1.91	0.26±0.68	< 0.001	
Sitting up	3.76±1.12	0.07 ± 0.25	< 0.001	
Performing activities of daily living	4.36±1.73	0.19±0.6	<0.001	
Coughing	4.61±1.41	0.52 ± 0.85	< 0.001	
Walking or standing	5.36±1.41	0.71±1.1	< 0.001	
Walking up or down stairs	5.79±1.43	1.23±1.45	< 0.001	
Exercising total score	7.88±1.67	2.55±1.39	< 0.001	
Sensation of mesh (total score)	11.09±2.6	1±1.44	<0.001	
Pain (Total score)	16.61±3.63	3.29±2.58	< 0.001	
Movement limitations (total score	10.46±3.18	1.36±1.31	<0.001	
Overall total score	38.15±7.54	5.65±4.19	< 0.001	

In the current study, the mean of age of the subjects was comparable across both groups in which, OUHR group was 49.68 years while it was 51.56 years for LUHR group. Similar mean age among OUHR group (49 years), but slightly younger aged patients were present in LUHR group (48 years) was noted in the study by Gonzalez et al.⁸ In their retrospective cohort study Cassie et al, also reported similar age group about 49.7 years in both the groups. ¹⁶ Gender wise, females were higher in both the groups (56% in OUHR group and 64% in LUHR group). Contrastingly higher proportions of males were present in the studies by Gonzalez et al, (72% in OUHR and 56% in LUHR) and Cassie et al (69% in the former group and 65% in the latter). ^{8,16}

In the current study, Seroma formation and scar formation was significantly lesser for the laparoscopic surgery (p<0.05). This was in accordance with the study by Malik where the post-operative complication was more in open group.¹⁷ Gonzalez et al found that the number of postoperative complications were significantly

(p<0.05) high in patients with open mesh repair (30%)than laparoscopic repair (6%).8 The incision for OUHR is generally longer and located in a heavily contaminated area, thereby rendering it more susceptible to wound infection. None of the subjects in the LUHR group had seroma while most of them (84%) had it in OUHR group. Contrary to this, Gonzalez et al found a higher proportion of patients with seromas in LUHR group (56%) than OUHR group (40%).8 Surgical site infections (SSI) are not benign complications. Multiple studies have demonstrated that SSI is related to higher rates of hernia recurrence, longer-hospital stays, higher incidence of hospital readmission, and increased likelihood for reoperation.¹⁸ Regarding the post-op urinary retention few of them were reported in LUHR group (8%) than the OUHR group (28%). Contrastingly Gonzalez et al, observed 5% of patients in the OUHR group, and none in the LUHR group had urinary retention.8 In our study, SSI was only seen in the OUHR group in 16% of them. Similarly, Gonzalez et al noted no wound complications LUHR group, but 15% of patients in the OUHR group had wound infections. Laparoscopy has helped to reduce the risk of SSI for most abdominal surgeries, in particular, obese patients. 11,19 It may decrease rates of SSI by simply decreasing incision length. In line with this finding Gonzalez et al observed recurrences of a hernia only in the OUHR group (20%).8

Regarding the mean duration of surgery, LUHR procedure took significantly (p<0.001) less time 45.6 minutes than the OUHR procedure (67.8 minutes). Gonzalez et al though, noted that the operating time of LUHR was relatively short (62 minutes) compared to that of OUHR (82 minutes), but the difference was not statistically significant. But the duration of surgery in the study by Korukonda, et al, was 1:49±0:19 for the laparoscopic group and it was 1:09±0:11 for the open surgical group. However, there was no statistical significance between the group.

Post-operative recovery time was significantly (p<0.001) less in the LUHR group (3.04 days) than the OUHR group (7.4 days). The LUHR group experienced significantly less pain as indicated by their pain scores (4.84) than the OUHR group (6.520). The laparoscopic technique for umbilical hernia repairs results in decreased postoperative pain and LOS, shorter RTNA, and lower recurrence rates.¹³

In the current study, the scores of individual Carolinas comfort scale were more in open umbilical hernia repair compared to laparoscopic umbilical hernia repair. The difference between individual Carolinas Comfort Scale scores and study group was statistically significant (p<0.001).

Colavita et al, made a prospective long-term comparison of QOL among 720 patients who had undergone either open surgery or laparoscopy.²¹ They found that at 1-month postoperatively, the frequency and severity of

symptoms was significantly higher in the LVHR (laparoscopic ventral hernia repair) group than in the OVHR (open ventral hernia repair) group. Discomfort was reported by 56% of LVHR versus 37% of OVHR patients, activity limitation in 47% versus 33%, and overall symptoms in 59% versus 43% (p<0.001 for each domain and overall). Beyond one month, there were no differences between LVHR and OVHR in regard to symptoms or pain. Evaluation of individual CCS scores for individual activities showed similar trends to previously mentioned situations, with increased symptoms being associated with LVHR. Exceptions were pain with walking at 1-month follow-up (p=0.115) and exercise movement limitation at 1 month (p=0.335). For all other activities 1 month postoperatively, LVHR patients experienced more discomfort and movement limitation than OVHR repair.

Our study findings overall reveal that all the parameters of CCS were significantly more noticed in patients with OUHR and hardly any patient in LUHR had any positive scores. This is contrary to that reported by Colavita et al.²¹

The median of laying down the score in Open umbilical hernia repair group was 2; it was nil for Laparoscopic umbilical hernia repair. The median of bending over the score in open umbilical hernia repair group was 3; it was nil for laparoscopic umbilical hernia repair. Conversely, Colavita et al found 40.4% of subjects in the LVHS group and 23.7% in OVHS group had a limitation in the bending over activity (p<0.001).²¹

The median of sitting up the score in open umbilical hernia repair group was 4; it was nil for laparoscopic umbilical hernia repair. Contrastingly Colavita et al noted 27% in LVHS and 15.1% in OVHS group having difficulty in sitting up (p<0.001).²¹

In their large-scale study of 710 patients Colavita et al noted more patients in LVHS group compared to OVHS group having difficulty in performing daily activities (37.3% vs. 20.5%), coughing (32.6% vs 21.3%), walking or standing difficulty (22.2% vs 15.5), walking upstairs (25% vs 15.7%) and difficulty in exercising (25% vs 20.2%) and all the differences were statistically significant (p<0.001).²¹ Contrastingly in our study, the median of performing activities of daily living in OUHR group was 4, it was nil for LUHR group. The median of coughing in OUHR group was 4; it was nil for LUHR group. The median of walking or standing in OUHR group was 2; it was nil for LUHR group. The median of walking up or down stairs in OUHR group was 6; it was 1 for LUHR group. The median of exercising in OUHR group was 8; it was 3 for LUHR group. All the differences were statistically significant (p<0.001).

However, in their study of 56 patients, Hope et al observed the findings using CCS that are similar to the present study findings, which is as follows: lying down (LR-1.93; open-2.50), bending over (LR-3.15; open-

5.87), sitting up (LR-2.51; open-5.13), daily activities (LR-2.48; open: open-5.75), coughing (LR-2.95; open: open-5.75), walking (LR-2.36; open: open-4.62), upstairs (LR-2.77; open: open-4.31), exercising (LR-3.19; open: open-6.14) and overall comfort (LR-17.62; open: open-40.23). The median of the total score in open umbilical hernia repair group was 39; it was 5 for Laparoscopic umbilical hernia repair. There was a statistically significant difference between all scores in the study group (p<0.001).

In the current study, the median sensation of mesh (Total score) in open umbilical hernia repair group was 12; it was 1 for laparoscopic umbilical hernia repair. This is in line with that of Colavita et al, who noted that there was a trend within the OVHR group toward increasing mesh sensation over time as indicated by a significant rise (p=0.008) in the frequency of mesh sensation from 17.1% at one month to 26.0% at six months.²¹

The median of pain (Total score) in open umbilical hernia repair group was 18; it was 3 for Laparoscopic umbilical hernia repair. The median of movement limitations (Total score in open umbilical hernia repair group was 10, it was 10 for laparoscopic umbilical hernia repair. The difference in study group between the sensation of mesh, pain, movement limitations totals scores was statistically significant (p<0.001). The sensation of the presence of mesh was noted in 4% of the LUH group while 48% of them in the OUH group felt it. The overall pain score was 3 in LUH group, and it was 18 in the OUH group. The movement limitations were noted more often in OUH (10) group than the LUH group (1). Colavita et al, reported that the adjusted QOL outcomes for LVHR versus OVHR for the significant pain it was 1.9, for activity limitation (1.6), for mesh sensation (1.3) and overall symptoms it was 1.6 and all the differences except mesh sensation was statistically significant.²¹

A recent meta-analysis by Hajibandeh et al concluded that best available evidence (randomised and non-randomised studies) suggests that laparoscopic repair of umbilical or paraumbilical hernias may be associated with a lower risk of wound infection, wound dehiscence and recurrence rate, shorter length of stay but longer operative time.²³

Laparoscopic umbilical hernia leads to lesser operative time, early postoperative recovery and comparatively superior quality of life, as compared to open umbilical hernia repair. The key limitation of the current study was non-randomized nature of the study participants into the study. The differences in the demographic, which influenced the selection of a particular procedure by the patients would have an influence on the outcome. This would have introduced some bias in attributing the outcomes to the procedure alone, the direction and magnitude of which is difficult to estimate. Also, the lack of blinding would have resulted in ascertainment bias, even though we have made all efforts to assess the outcomes in an objective manner, using standardised

study tools. Scientifically designed randomised controlled trials may provide a better quality of evidence on the subject. Also, there is a need to study the influence of various patient-related factors on quality of life. Till such time, patients should be provided with detailed information regarding various aspects both the methods and shall be allowed to make an informed choice regarding the procedure.

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