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**Original Research Article**

# Management of concomitant umbilical hernia with laparoscopic cholecystectomy

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## ABSTRACT

**Background:** During laparoscopic cholecystectomy (LC) procedures, umbilical abnormalities may present technical challenges for general surgeons and increase the risk of incisional hernia. Objective was to identify the best repair technique to go along with LC for known or incidentally discovered umbilical hernias.
**Methods:** In this study, retrospective review of the medical records of patients who had concurrent LC and umbilical hernia repair was done. Between January 2020 and January 2023, our institution performed LC on 600 patients, 65 (10.5%) of whom also underwent simultaneous UHR and LC. The analysis included 65 (10.5%) patients who met the inclusion requirements. Patients with umbilical hernias were identified during the preoperative phase by a clinical examination.
**Results:** Mean age of 65 qualifying patients who underwent LC+UHR was 54.7±14.9 years (range 23-81 years) Men and women comprised 41 (65.6%) and 24 (34.4%) of these 65 patients, respectively. Median VAS pain scores measured on the first, second and seventh days were higher in group 3 compared with those of the other two groups. There were statistically significant differences between different days in groups 1, 2 and 3 (p=0.01).
**Conclusions:** The outcomes of the UHR with mesh after laparoscopic surgeries appear to be better for either obese or non-obese patients than primary suture techniques in recurrence rates.

**Keywords:** Laparoscopic cholecystectomy, Umbilical hernia, Mesh hernioplasty, Suture, Recurrence, Obesity

## INTRODUCTION

For the treatment of cholelithiasis, laparoscopic cholecystectomy (LC) is considered the "gold standard." The advantages of LC include a brief hospital stay, quick return to physical activity, low rates of postoperative pain, morbidity, and death, and positive cosmetic results.[1,2] 6% of adult abdominal hernias are caused by umbilical hernias.[3] Umbilical hernias have been treated surgically using a variety of techniques. Yet there isn't yet agreement on the most effective technique for treating umbilical hernias (UHR).[4] Technical issues with $CO_2$ insufflations and trocar insertion during LC may arise when an umbilical hernia and cholelithiasis occur together. Unsatisfactory data are still lacking in the literature about the best repair technique to use for umbilical hernias.[5] The rationale behind the study was to identify the best repair technique to go along with LC for known or incidentally discovered umbilical hernias.

## METHODS

It was a retrospective record based study were review of the medical records of patients who had concurrent LC and umbilical hernia repair was done. Conducted at department of general surgery in Prime Hospital Dubai between

January 2020 and January 2023, our institution performed LC on 600 patients, 65 (10.5%) of whom also underwent simultaneous UHR and LC.

### *Exclusion criteria*

Individuals having periumbilical fistula, omphalitis, strangulated umbilical hernia, or recurring umbilical hernia were disqualified from the study. Also, patients undergoing dual mesh hernia repair, those with an American society of anesthesiology (ASA) risk score IV, ascites, chronic renal failure, diabetes, chronic pulmonary disease, and those undergoing LC conversion to open surgery were all disqualified.

### *Inclusion criteria*

The analysis included 65 (10.5%) patients who met the inclusion requirements.

Patients with umbilical hernias were identified during the preoperative phase by a clinical examination. All patients with an umbilical hernia discovered after a physical examination or those who had a hernia possibility had ultrasound to determine the extent of the hernia and the size of the defect. Surgery reports were used to determine the diameters of umbilical hernias that were unintentionally found during various surgical procedures. Three groups of patients were formed: LC+ flat mesh hernioplasty (group 3, n=15), LC+ Mayo repair (group 2, n=20), and LC+ primary suture (group 1, n=30, 55%). General anesthesia was used for all elective procedures on the patients.

### *Methodology and surgical technique*

When Verres technique with carbon dioxide was used to produce pneumoperitoneum in a patient, LC was conducted using the normal four-port approach ($CO_2$). At the same surgical session, 65 patients with cholelithiasis and an umbilical hernia had both LC and hernia repair performed. We made an incision at the hernia's level while under general anesthesia and isolated the peritoneal sack. We avoided a visceral harm by controlling the presence of adhesion with a direct cutdown onto the peritoneum, and we installed a laparoscopic port similarly to an open laparoscopy (Hasson technique).[5] To stop severe $CO_2$ leak, a purse string suture is wrapped across the fascia and peritoneum.

The Mayo repair involves extending the fascial defect laterally on both sides until the two fascial flaps are double breasted. Using a row of interrupted 0 sutures, the upper fascia is imbricated over the lower fascia (Prolene 0; Ethicon). Whereas the pants are fastened horizontally at the belt line, these start and stop high on the vest. After these sutures are in place, a second layer of interrupted 0 sutures (Prolene 0; Ethicon) is utilized to secure the free superior edge (vest), which overhangs the inferior fascia (trousers). For suture herniorrhaphy, interrupted polypropylene sutures were generally used to seal the fascial defect (Prolene 0; Ethicon). Then the edges were fixed with four corner sutures using polypropylene 0 sutures (Prolene 0; Ethicon) to ensure proper stretching of the mesh. This was followed by placement of three evenly spaced longitudinal rows of continuous sutures fixing the mesh to the anterior abdominal wall from the edge of the defect to the edge of the mesh using polypropylene 2/0 sutures (Prolene 2/0; Ethicon). The upper and lower edges of the mesh were then fixed by a continuous row of polypropylene 2/0.

Oral acetaminophen (500 mg, four times day) or an oral codeine/acetaminophen combination (30–60 mg, four times daily) were used to relieve postoperative pain. During the first, second, and seventh postoperative days, a visual analogue scale (VAS) scoring system was used to assess the level of discomfort.[6] Also, patients were asked to mark where their pain was on a vertical chart, where 100 mm denoted the most severe pain and 0 mm represented no pain. The length of the hospital stay, the amount of analgesics consumed within the first week following the operation, and the operating time were all noted. Following surgery, patients were checked on weekly for the first week, then monthly for the next month, and then every six months after that. The study was approved by institutional ethics committee.

### *Statistical analysis*

The statistical analysis was performed using statistical package for the social sciences (SPSS) for windows version 22.0 software (Mac, and Linux). The findings were present in number and percentage analyzed by frequency, percent, and Chi-squared test. Chi-squared test was used to find the association among variables. The critical value of p indicating the probability of significant difference was taken as <0.05 for comparison.

## RESULTS

As per Table 1 mean age of 65 qualifying patients who underwent LC+UHR was 54.7±14.9 years (range 23-81 years). Men and women comprised 41 (65.6%) and 24 (34.4%) of these 65 patients, respectively. Mean hernia diameter in all patients was 1.8±0.8 cm. All patients who underwent LC had gallstones, but we did not detect acute cholecystitis and/or malignancy during histopathologic exam of the cholecystectomy specimens. Mean operative time was 59.3±10.3 min (range 40-85 min) it was slightly, but not significantly. Median VAS pain scores measured on the first, second and seventh days were higher in group 3 compared with those of the other two groups. There were statistically significant differences between different days in groups 1, 2 and 3 (p=0.01). Analgesic intake was slightly, but not significantly (p=0.06, 95% CI: 7.0-8.4) higher in group 2 than that in groups 1 and 3. It has been determined in our study that the surgery method does not affect surgical outcomes in patients with BMI <30 or BMI >30 (p=0.122).

**Table 1: Demographic and clinical features in groups.**

| Characteristics | Group 1(N= 30) | Group 2(N=20) | Group 3(N=15) | P |
|---|---|---|---|---|
| **Age (year)** | 56.5±4.4 {23-77) | 55.5±18.1 (23-81) | 54.6±11.6 (36-74) | 0.52 |
| **Male: female** | 20:10 | 13:7 | 8:7 | 0.62 |
| **Body mass index (kg/m2)** | 26.6±2.7 ( 23-32) | 29.2±2.0 ( 26- 32) | 39.9±1.8 (27-33) | 0.09 |
| **Hernia diameter (cm)** | 1.0±0.2 (1-2.1) | 2.0±0.4 (1-3.1) | 3.0±0.6 (2-3.8) | 0.00 |
| **Operative time (min)** | 60±10.9 (40-85) | 55±9.7 (45-78) | 56±9.3 (48-75) | 0.41 |
| **Visual analogue scale, 1st day** | 22.5±9.2 (11-42) | 13.0±9.8 (20-56) | 16.5±9.4 (28-60) | 0.00 |
| **Visual analogue scale, 2 nd day** | 22.0±7.4 (6-30) | 18.0±11.7 (2-40) | 18.0 ±8.6 (14-42) | 0.01* |
| **Visual analogue scale, 7th day** | 23.0±2.6 (1-12) | 6.0±4.3 (2-15) | 16.5±8.9 (6-32) | 0.00 |
| **Analgesic intake (tablet)** | 7±3.0 (2-12) | 9.5±2.8 (4-12) | 6.0±2.2 (3-10) | 0.06 |
| **Mean follow-up period (months)** | 22±8.7 (9-45) | 26±9.5 (9-42) | 26±9.5 (10-42) | |

As per Table 2 post-operative complications were seen mostly in group 1 in form of wound infection and seroma. Most common post-operative complication was wound infection but this was not significant (p>0.05), The recurrence was also higher in group 1 (13.3%) which suggest umbilical hernia recurrence was observed all of whom belonged to the suture-receiving groups. Recurrence rate in patients of suture-receiving groups was statistically significant when compared with patients of mesh-receiving group (p=0.01). Mean length of hospital stay was 4.0±3.9 days, 5.5±2.2 days and 4.0±3.0 days in groups 1, 2 and 3, respectively. No significant difference was detected in terms of mean length of hospital stay between the groups (p=0.84).

**Table 2: Post-operative complications and recurrence among groups.**

| Complications | Group 1 (30) | Group 2 (20) | Group 3 (15) | P value |
|---|---|---|---|---|
| **Wound infection** | 3 | 1 | 1 | 0.21 |
| **Seroma** | 1 | 0 | 0 | 0.33 |
| **Atelectasis** | 0 | 0 | 1 | 0.12 |
| **Recurrence** | 4 | 1 | 0 | 0.01* |
| **Hospital stay** | 4.0±3.9 | 5.5±2.2 | 4.0±3.0 | 0.84 |

**Table 3: Association between BMI and recurrence among groups.**

| Variables | Group 1 (30) | Group 2 (20) | Group 3 (15) | P value |
|---|---|---|---|---|
| **BMI<30** | 8 | 11 | 10 | 0.65 |
| **Recurrence** | 0 | 0 | 0 | |
| **No recurrence** | 8 | 11 | 0 | |
| **BMI>30** | 22 | 9 | 5 | 0.02* |
| **Recurrence** | 4 | 1 | 0 | |
| **No recurrence** | 18 | 8 | 5 | |

As per Table 3 recurrence was not observed with BMI <30 kg/m$^2$ groups among 29 patients. Recurrence rate in patients with BMI ≥30 kg/m$^2$ was statistically significant (p=0.02) when compared with patients having BMI <30 kg/m$^2$.

## DISCUSSION

Many studies have investigated LC and its complications (incisional hernia from umbilical port) or UHR and its complications (recurrence rates).[3,7-10] However, only a limited number of studies have reported short- and long-term outcomes of UHR performed simultaneously with LC in the same session. Prevalence of cholelithiasis accompanied by umbilical hernia varies between 4.7-18% (in our study, 10.5%).[10]

In addition to creating a technical challenge for LC, fascia abnormalities on the umbilicus enhance postoperative port-site problems such incisional hernia and intestinal obstruction.[4] The possibility of damaging the organs and structures in the umbilical hernia sac during the insertion of a trocar or a Verres needle is another risk in such circumstances. We carried out LC using the Hasson method and then UHR.[5]

The umbilicus is the site of incisional hernias following LC most frequently (0.8-2.8%) due to failure in the closure of fascial abnormalities.[11,12] Enlarging the umbilical port entrance also increases the risk of developing an incisional hernia, despite the fact that it seems like a practical and reliable approach.[21] Thus, we prefer enlargement of the epigastric port entrance for a convenient insertion of trocar in order to take out the gallbladder.

Although the primary suture, Mayo repair, mesh hernioplasty, LC, and Prolen hernia system are among the treatments that can be employed, the optimum technique for umbilical hernia repair is still up for debate.[5,6] Most general surgeons perform open surgery of umbilical hernias as a normal practice. On the other side, mesh hernioplasty has been shown to significantly reduce the recurrence rates of umbilical hernias.[2,5,10] Laparoscopic repair of incisional and ventral hernias appears to be safe, especially when mesh is used, and is demonstrating its efficacy by reducing discomfort, complications, hospital stay, and recurrences. Nevertheless, its function in the

repair of umbilical hernias is still debatable. Moreover, there are no established standards for the laparoscopic repair of umbilical hernias.

The most crucial element in choosing the best procedure for LC and concurrent UHR is the recurrence rate. Several studies have noted high recurrence rates following Mayo repair (ranging between 10 and 30 percent) and suture repair (11 percent).[3] As the gold standard for the treatment of midline aponeurotic abnormalities, including umbilical hernias, most surgeons now favor prosthetic mesh hernioplasty.[13] In our study, we discovered that patients who underwent primary repair and Mayo repair, respectively, had recurrence rates of 13.3% and 5.6%. In contrast, no recurrence was seen in individuals who had mesh-based tension-free herniorrhaphy.

Obesity is a significant risk factor for hernia recurrence. In our study, regardless of BMI, we found higher recurrence rates in cases undergoing primary repair compared with those who received mesh repair. We found, in our study, recurrence rates of 7.0% and 4.8% in patients with BMI ≥30 kg/m$^2$ and BMI <30 kg/m$^2$, respectively, similar results were seen in most of the studies.[14,15]

Our study has few limitations firstly retrospective nature of study will change the associations and impact. Secondly, our findings cannot be useful in development of clinical practice guidelines for lap cholecystectomy in umbilical hernia and further economic evaluations. Thirdly, no information was reported on the expertise of the surgeons performing the procedures. Fourthly, no information was provided on hernia size and the impact and limitations of using some fixation techniques for larger hernias.

## CONCLUSION

The umbilicus's fascia abnormalities during LC make the process harder. For umbilical defect correction following laparoscopic procedures, there isn't one yet. The length of the hospital stay, VAS score, and painkiller usage are all influenced by the complexity of the LC. For either obese or non-obese individuals, the results of umbilical defect repair with mesh following laparoscopic procedures appear to be superior to primary suture approaches in terms of recurrence rates.

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