

## Complications of Laparoscopic Ventral Hernia Repair

Ahmed Saleh Mostafa Baghdady, Hussein Ali Mostafa, Abd El Aal Ali Salem,  
Hassan Ahmed Abdullah, Mohamed Rabie Saad

Department of General surgery, Faculty of Medicine, Aswan University, Egypt

\*Corresponding author: Ahmed Saleh Mostafa Baghdady, Mobile: (+20) 01113726222, E-Mail: asb1010@gmail.com

### Abstract

**Background:** Laparoscopic techniques are being used increasingly in the repair of ventral hernias and offer the potential benefits of a shorter hospital stay, decreased wound complications, and possibly a lower recurrence rate. Despite good results from high-volume centers, significant complications may occur with this approach and the morbidity of incisional hernia repair may be underestimated.

**Objective:** To evaluate the outcome of laparoscopic ventral hernia repair as regard complications, post-operative pain, hospital stay, patient satisfaction and recurrence rate.

**Patients and methods:** This was a prospective non-randomized study. Forty consecutive patients admitted at the Department of General Surgery, Aswan University, Egypt, with diagnosis of ventral and or incisional hernia in the period from July 2016 to December 2019 were enrolled.

**Results:** Complication rate among the studied patients was found to be 30% (2 port site infection, 1 wound edge necrosis, 5 seroma, 3 ileus and 1 pneumonia). Mortality rate among our cases was found to be 0%. Recurrence rate showed that two cases developed recurrent hernia; one case after 6 months and the other case after 8 months. Success rate among this group was found to be 70 % of cases that passed without complications. Postoperative pain and patient satisfaction correlate significantly with clinical outcome. We found that patient satisfaction rate among our cases was 70%.

**Conclusion:** Laparoscopic ventral hernia repair main advantages being, with less postoperative pain, shorter hospital stays, lower recurrence rate and lower postoperative complications.

**Keywords:** Laparoscopic ventral hernia, Complications, Post-operative pain.

### INTRODUCTION

Many procedures have been described for ventral hernia repair. Primary repair with suture approximation requires laparotomy, with the recurrence rate of 41% to 52% during long-term follow-up. In open repair, wide area of dissection is required, which contributes to an increased incidence of wound-related complications (12% or higher) (1).

Therefore, surgical treatment of ventral hernias has changed dramatically over the past decades by the introduction of laparoscopy and prosthetic biomaterials for reinforcement of the abdominal wall (2).

Laparoscopic ventral hernia repair (LVHR) was first done by Karl LeBlanc in 1992. He performed Intraperitoneal onlay mesh repair (IPOM) that reported short hospital stay, 0 – 9% recurrence and less complications. The basic technique for repair is access to the abdominal cavity, adhesiolysis and repair of defect. There are still many controversies regarding the type of mesh and fixation of mesh (3).

An ideal mesh should be strong, pliable, non-allergenic, non-biodegradable, non-carcinogenic and should stimulate adequate fibroblastic activity. Prosthetic material can be polypropylene, polyester and ePTFE. The first two meshes are ideal for use where they do not come in contact with the abdominal viscera, like laparoscopic repairs of inguinal hernias - TAPP or TEP.

Though some surgeons use it as intra-abdominal placement for repair of ventral and incisional hernias, this is not advisable since literature reports about complications of bowel adhesions, bowel obstruction, fistulization and erosion into abdominal viscera even after many years. Although complications are less common with laparoscopic repair, but wound and mesh related complications, persistent postoperative pain, bowel obstruction, postoperative ileus and rarely cardiac tamponade can occur (4).

Ventral hernias are associated with reduced daily activities and high socioeconomic costs for its operations. The use of mesh has reduced surgical failure. Before the introduction of prosthesis, recurrence rate exceeded 50% of cases. The introduction of laparoscopic repair is an increasingly used alternative technique to open repair (5). Laparoscopic ventral hernia repair has a lower rate of wound infections compared to open repair. Recurrence rates and post-operative pain are similar between the two techniques during mid-term follow up. The advantages offered by LVHR over open hernia repair in terms of decreased wound complication rates should be taken into consideration by surgeons and disclosed to patients when they counsel them about surgical options (6).

The aim of the present study was to evaluate outcome of laparoscopic ventral hernia repair as



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regards complications, post-operative pain, hospital stay, patient satisfaction and recurrence rate.

### PATIENTS AND METHODS

This was a prospective non randomized study. Forty consecutive patients admitted at the Department of General Surgery, Aswan University, Egypt, with diagnosis of ventral and or incisional hernia were enrolled in this study. The study was conducted through the period from July 2016 to December 2019.

**Inclusion criteria:** All patients with ventral abdominal hernia (epigastric, umbilical, paraumbilical), patients with incisional hernia (not complicated or recurrent) with defect size less than 10 cm, and patients fit for general anesthesia ASA I, II, III.

**Exclusion criteria:** Patients unfit for general anesthesia ASA IV and V, patients with severe coagulopathy, complicated hernia (obstructed or strangulated), huge hernia more than 10 cm defect size with loss of abdominal domain and refusal of the patient to do laparoscopic repair.

#### All patients underwent the following:

**A. Perioperative assessment:** All patients were subjected to through history and clinical and physical examination with emphasis on age, sex, comorbidities (DM, hypertension, obesity, COPD), type of hernia, size of the defect, history of previous operation, history of complications and recurrence.

#### B. Laboratory and imaging investigations:

- Complete blood picture, blood sugar, urea, coagulation profile and liver function tests were done for all patients.
- ECG and chest X-ray for those patients above the age of forty years.
- Ultrasound for all patients but CT scan for selected patients with suspected complicated hernia with multiple defects and suspected other intra-abdominal pathology.
- Optimization of the general condition of the patients as much as possible done for the patients before surgery as this is elective operation ex; weight reduction and

control of DM, hypertension and coagulation profile abnormalities.

- Single dose of 1<sup>st</sup> generation cephalosporin (cevaoliene 1gm) was given to all patients at the time of induction of anesthesia or within 60 minutes before the procedure.
- VTE assessment and prophylaxis against DVT was performed specially in risky patients. Regarding the American society of hematology 2018 guidelines for prophylaxis of DVT, we used mechanical methods as elastic stocking or intermittent pneumatic pressure device in minor risk patients and pharmacological agent as low molecular weight heparin or both in moderate risk patients.

#### Ethical consent:

**An approval of the study was obtained from Aswan University Academic and Ethical Committee.** Every patient signed an informed written consent for acceptance of the operation.

#### Statistical analysis:

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test ( $\chi^2$ ) to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean  $\pm$  SD (Standard deviation). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P value  $\leq$  0.05 was considered significant.

### RESULTS

The age of patients ranged from 29 to 55 years and the mean age was  $42.25 \pm 7.06$  and the maximum percentage age groups encountered in our study was from 40 to 50 years (18). This study included 22 male and 18 female patients. 11 male patients had incisional hernia and 11 patients with ventral hernia.

**Table (1):** Age and sex distribution

	No of patient	%
<b>Age groups years:</b>		
10-20	0	0
20-30	2	5%
30-40	12	30%
40-50	18	45%
50-60	8	20%
<b>Sex:</b>		
Male	22	55%
Female	18	45%

**Intraoperative complications:** One case developed port site bleeding managed laparoscopically and one case developed inadvertent bowel injury that necessitated conversion to open approach for repair of the injury.

**Hospital stay:** Mean hospital stay among the studied patients was  $1.76 \pm 0.67$  days. Only one case required ICU admission due to chest complications.

**Postoperative complications:** Complication rate among the studied patients were found to be 30% (2 port site infection, 1 wound edge necrosis, 5 seroma, 3 ileus and 1 pneumonia). Mortality rate among our cases was found to be 0%.

**Table (2):** Postoperative complications.

Complications	NO.	%
Port site infection	2	5
Wound edge necrosis	1	2.5
Seroma	5	12.5
Ileus	3	7.5
Pneumonia	1	2.5

**Port site infection:** Only 2 cases developed port site infection who had been treated conservatively.

**Wound edge necrosis:** Only one case developed wound edge necrosis. Debridement was done after 1 week.

**Seroma** is commonly reported after hernia repair either by open or laparoscopic techniques. In our study, 5 patients (12.5%) have developed seroma and all of them were treated by conservative measures and complete resolution have been achieved. we did not use a drain in our cases as we thought that it isn't necessary in such cases.

**Ileus:** Three cases among our cases developed postoperative ileus in the next day postoperative that were treated by conservative measures just for 3 days.

**Pneumonia:** Only one case developed chest complications (pneumonia) in the 3<sup>rd</sup> day postoperatively. Conservative treatment was successful to achieve full recovery of this patient.

**Recurrence rate:** Two cases developed recurrent hernia; one case after 6 months and the other case after 8 months.

**Clinical outcome:** Success rate among this group was found to be 70 % of cases which have passed without complications. Postoperative pain and patient satisfaction correlated significantly with clinical outcome.

**Analysis of postoperative pain:**

We used VAS score for assessment of postoperative pain. We found that at 1<sup>st</sup> week postoperatively, the mean of VAS score was  $27.9 \pm 25.6$ , at the end 1<sup>st</sup> month mean, VAS score was  $14.5 \pm 20.4$  and after 2 months, mean VAS score was  $8.8 \pm 17.3$  (P value < 0.05). There was a statistical difference in VAS score at 1<sup>st</sup> week, 1<sup>st</sup> month and after 2<sup>nd</sup> month' duration .10% of cases needed Naluphin as analgesic

at 1<sup>st</sup> week postoperative while 30% of cases needed NSAIDS, only 5% of cases needed analgesics at 1<sup>st</sup> month and only 2% of cases needed analgesics at 2<sup>nd</sup> month as oral type (Table 3).

Return to daily activity correlated significantly with general well-being. Among our cases, 26 cases returned to their daily activity after 1<sup>st</sup> week, 12 cases returned to daily activity at 1 month and only 2 cases returned to daily activity at 2 months (Table 3).

**Table (3):** Analysis of postoperative pain.

Analysis of postoperative pain	at 1 week	at 1 month	at 2 months	P-value
Mean VAS score	$27.9 \pm 25.6$	$14.5 \pm 20.4$	$8.8 \pm 17.3$	0.0004
Need to analgesics (naluphin / NSAIDS)	Naluphin (10%) / NSAIDS (30%)	NSAIDS (5%)	NSAIDS (2%)	
Return to daily activity	65%	30%	5%	

Interpretation of Visual analogue scale (VAS): no pain (0-4), mild pain (5-44), moderate pain (45-74) and severe pain (75-100).

**Patient satisfaction:** Regarding Carolina comfort scale, we found that satisfaction rate among our cases was 70%.

**DISCUSSION**

The complications of laparoscopic abdominal hernia repair can be divided into a major category, including hemorrhage, intestinal injury, mesh infection, and recurrence. minor category including seroma, ileus, and wound pain (7). The incidence of complications has decreased with the increased numbers of laparoscopic repairs, and patient's expectations regarding the results of laparoscopic repair also are increasing. The use of the laparoscopic approach to repair ventral hernias is not always successful. If the intestine is injured during laparoscopic repair and resection or suturing of the intestine is required, it may be necessary to switch to the open approach. LeBlanc, who first attempted laparoscopic hernia repair, reported incidences of laparotomy conversion and intestinal injury of 2.4% and 1.8%, respectively (8).

About Complication in our study there were 2 cases had intraoperative complication; one case developed inadvertent bowel injury (large intestinal injury), which needed to convert to open and another had port site bleeding needed intervention and managed by just cauterization. Bowel injury during adhesolysis is a commonest fear in laparoscopic incisional hernia repair procedure. We had single large bowel injury as intraoperative complication. This made us to convert to open approach (9).

Complication rate of our study was 30% (2 port site infection, 5 seroma, 3 ileus and 1 pneumonia). This agrees with **Kumar et al.** <sup>(5)</sup> who reported postoperative recovery was uneventful in all patients. Patients in our study were followed for the complications and we found cellulitis in 4 (7.5%) that was managed conservatively by antibiotics and anti-inflammatory. pain at trocar site were 2 (3.7%) managed by analgesic, 2 (3.7%) patients had seroma treated by aspiration and abdominal binder, conversion to open in 2 (3.7%) secondary injury to small bowel, while 2 (3.7%) patients developed wound infection and 1 (1.8%) patient had prolonged ileus, treated conservatively by nasogastric tube. There was no hematoma in our patients.

Seroma occurred after hernia repair in almost all patients. The use of an abdominal binder at the surgical site decreases the incidence of seroma. Mesh infection is a serious complication in hernia repair. The most common bacteria found in mesh infections are *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Escherichia coli*. Except for *E. coli*, the other bacterial causes of infection are skin microbes. Therefore, it is necessary to minimize contact between the mesh and the skin during the surgical procedure, and to minimize the transfer of bacteria to the mesh <sup>(10)</sup>. **Franklin et al.** <sup>(11)</sup> found no such complications in series of 384 patients with ventral hernia, when used polypropylene mesh in 75% of cases. We also didn't notice these complications in our study. Multiple studies suggested that laparoscopic repair of ventral hernias carries a lower recurrence rate and shorter hospital stay with quicker recovery <sup>(12, 13, 14, 15)</sup>.

**Heniford et al.** <sup>(16)</sup> in their study of 100 consecutive laparoscopic repairs had a recurrence rate of 3% at 23-mo follow-up. Isolated studies however argued that the recurrence rate with laparoscopic repair may not be that low over a long-term follow-up, and argued that over a longer term, the recurrence rate with laparoscopic repairs is the same as with open repairs and may actually even be worse. The surgical literature is however lacking data that compare the recurrence rates with the open and laparoscopic techniques over a long-term follow-up <sup>(16, 17)</sup>.

All these studies support our results as recurrence rate of our study was 5%. Two cases developed recurrent hernia, one case after 6 months and the other case after 8 months. Both these cases were in the early phase of our study (early 20 cases). With increasing skills and learning curve the recurrence rate decreased but we can't judge upon the true incidence of recurrence as the follow up period was short. The most probable cause of recurrence of these two cases is insufficient mesh size, improper fixation and less experience and skills. The important factors to be considered in laparoscopic ventral hernia repair are securing the space to apply the mesh, preventing injury to intraabdominal organs, and

preventing recurrence and postoperative complications.

## CONCLUSION

Complication of our study was significantly less than reported by open technique, Also recurrence rate of our study was 5% which was much lesser than open technique.

Laparoscopic ventral hernia repair main advantages being, with less postoperative pain, shorter hospital stay, lower recurrence rate and lower postoperative complications.

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