

Short Outcome Evaluation of Laparoscopic Ventral Hernia Repair

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ABSTRACT

Background: Ventral hernia is defined as primary anterior abdominal wall and incision hernia not including the groin. There are number of risk factors that lead to hernia to occur; like wound infection, morbid obesity, immunosuppression, previous operations, prostatism, and surgery for aneurysmal disease. Hernia defect can form within first 5 years of surgery but can occur late as well.

Objective: To evaluate the short-term outcome of laparoscopic ventral hernia repair as regard feasibility and safety, operative time and types of hernias.

Patients and methods: This study is a prospective nonrandomized study. It included forty out of sixty consecutive patients admitted at the Department of General Surgery, Aswan University, Aswan Egypt, with diagnosis of ventral and or incisional hernia in the period from July 2016 to December 2019.

Results: This study included 22 male and 18 female patients. 11 male patients had incisional hernia and 11 patients with ventral hernia. Types of hernias: Twenty-one cases had virgin abdomen with no previous surgeries while 19 cases had previous surgery done before; described as follows: midline laparotomy scar (11), caesarian section scar (5), port site scar (2) and appendectomy scar (1). Operative time: In first 20 operated cases the mean operative time was 120 min while in the last 20 cases with increasing learning curve the operative time starts to reduce markedly, and the mean time became 70 min.

Conclusion: Laparoscopic ventral hernia repair is an appropriate, safe and feasible approach for ventral hernia repair with short operative time.

Keywords: Laparoscopic, Ventral hernia.

INTRODUCTION

Ventral and incisional hernia repair is one of the most common operations performed in everyday clinical practice. Incisional hernia is a common long-term complication of abdominal surgery and is estimated to occur in 11–20% of laparotomy incisions. Almost 50% of incisional hernias develop within the first 2 years after the primary surgery, and 74% develop after 3 years⁽¹⁾.

The recurrence rate of incisional hernia after primary suture repair is more than 50% and has been reduced to 10–23% after the introduction of prosthetic materials (meshes) in hernia repair. However, open hernia repair can be major operation with considerable morbidity caused by infectious complications. An increasing interest in laparoscopic surgery and the availability of new materials have encouraged the adoption of laparoscopic techniques in ventral hernia repair^(2,3).

Leblanc and Booth⁽⁴⁾ described the first laparoscopic ventral hernia repair (LVHR) in 1991. It is based on the same physical and surgical principles as the open underlay procedure described by **Stoppa**⁽⁵⁾, **Rives et al.**⁽⁶⁾ and **Wantz**⁽⁷⁾. LVHR is now being used with increasing frequency, even for the management of complex incisional hernias. Most reports on this topic have supported minimal postoperative morbidity, a shorter convalescence period, and an acceptable recurrence rate⁽⁸⁾.

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⁽⁹⁾.

The aim behind this study was to evaluate the short-term outcome of laparoscopic ventral hernia repair as regard feasibility and safety, operative time and types of hernias.

PATIENTS AND METHODS

This study a prospective nonrandomized study. It included forty out of sixty consecutive patients admitted at the Department of General Surgery, Aswan University, Aswan Egypt, with diagnosis of ventral and or incisional hernia in the period from July 2016 to December 2019 who fulfilled the inclusion criteria were enrolled in the study sample.

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, and III.

Exclusion criteria: Patients unfit for general anesthesia ASA IV and V, patients with severe



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coagulopathy, complicated hernia (obstructed or strangulated), huge hernia more than 10 cm defect size with loss of abdominal domain, and unwilling or refusal of the patient to do laparoscopic repair.

Ethical consent:

All patients admitted with a diagnosis of ventral hernia and or incisional hernia who fulfilled the criteria were given the option of open or laparoscopic repair after explanation of both techniques to them as regards advantages, disadvantages. Only those who accept the laparoscopic approach were included in this study.

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.

Methods:

A. Perioperative assessment:

All patients were subjected to through history taking and clinical and physical examination; with emphasis on age, sex, comorbidities (diabetes mellitus (DM), hypertension, obesity, chronic obstructive lung disease (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, liver function tests 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, e.g. weight reduction and control of DM, hypertension, coagulation profile abnormalities.
- Venous thromboembolism (VTE) assessment and prophylaxis against deep venous thrombosis (DVT) was performed specially in risky patients. Regarding of 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.

C. Single dose of 1st generation Cephalosporin (cefazolin 1 gm) given to all patients at the time of induction of anesthesia or within 60 minutes before the procedure.

Operative details:

All patients received general endotracheal anesthesia.

Abdominal axis and trocar placement:

Induction of pneumoperitoneum using Veress needle 2 cm below the left costal margin in the mid clavicular line (palmer's point), open hasson technique or optical trocar for primary port placement. Secondary port placement performed under direct vision and placed as lateral from the hernia defect as possible. Three to four ports usually needed. One of them 10 ml for mesh insertion.

We started with exploration of the abdomen, then focusing on the hernia site. Adhesiolysis done with sharp and blunt dissection avoiding the use electrocautery as much as possible or use of bipolar cautery or harmonic as it is safe. Reduction of the contents of the hernial sac with repeated inspection of bowel after adhesiolysis to look for enterotomies (inadvertent injury to the bowel loops). After reduction of the contents we measured the size of the defect both externally and internally with focusing on the internal measurement as this represent the actual size of the defect specially if there are multiple defects.

We measured the defect by inserting a long needle from outside the abdomen to edges of defect inside the abdomen and measure the length or the width from outside. Repair of the defect done by using the intraperitoneal Gortex Dual Mesh spread to cover the defect and five cm all around from the edge. Fixation of the mesh to the abdominal wall done by using tacks as it is rapid and less time consuming with transfacial 4 corners suture occasionally.

Primary closure of the facial defect by using suture only done if the defect size is less than 5 cm. After ensure good hemostasis and proper fixation of the mesh and no evidence of bowel injury, the CO₂ gas was released from the abdomen and the port site closed using proline 3/0 or skin stapling.

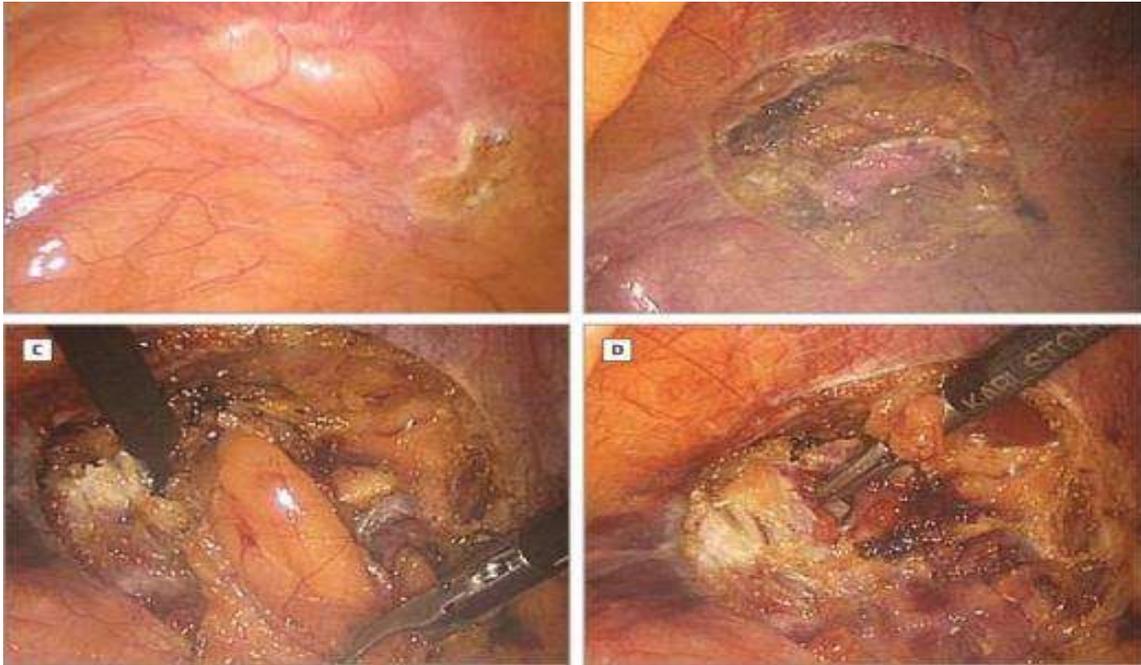


Fig. (1): Identification of primary ventral hernia (A), excision of hernia sac (B), excision of preperitoneal fat (C), and complete exposure of the hernia fascial edges (D).



Fig. (2): Female patient with paraumbilical hernia.



Fig. (3): Laparoscopic view of hernia defect.



Fig. (3): Closure of the hernia defect.



Fig. (4): Closure of hernia defect.



Fig. (5): Spreading of the mesh.



Fig. (6): Fixation of the mesh with tacks.

Statistical analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for the Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Qualitative data were represented as frequencies and relative percentages. Quantitative data were expressed as mean ± SD (Standard deviation).

RESULTS

The age of patients ranged from 29 to 55 years and the mean age was 42.25 ±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).

Table (1): Age and sex distribution

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

Body mass index (BMI): Mean BMI among patients was 25.43±3.66. Most of our patients were overweight (50%) and minority were obese (10%) (Table 2).

Table (2) Classification of obesity according to BMI and number of patients in each group

BMI (KG/M ²)	Classification of obesity	Number of patients in each group (n=40)
<18.5	Underweight	0
18.5-24.9	Normal weight	16
25-29.9	Overweight	20
>30	Obese	4
CLASS I: 30-34.9		2
CLASS II:35-39.9		1
CLASS III:>40		1
CLASS IV:>50		0

(BMI = weigh (Kg) / Height (m²))

Most of our patients operated upon for LVHR were overweight (50%) and minority were obese (10%).

Comorbidities associated with ventral and incisional hernia: 16 (40%) cases were found to have comorbidities (Table 3).

Table (3): Comorbidities associated with ventral and incisional hernia

Comorbidities	Number of cases (n=40)	%
None	24	60%
Diabetes mellitus	7	17%
Hypertension	5	13%
Chronic obstructive lung disease	2	5%
Grade I nephropathy	2	5%

Special habits: Among our cases, 16 cases were found to be smokers (40%) all of them were males (Figure 7).

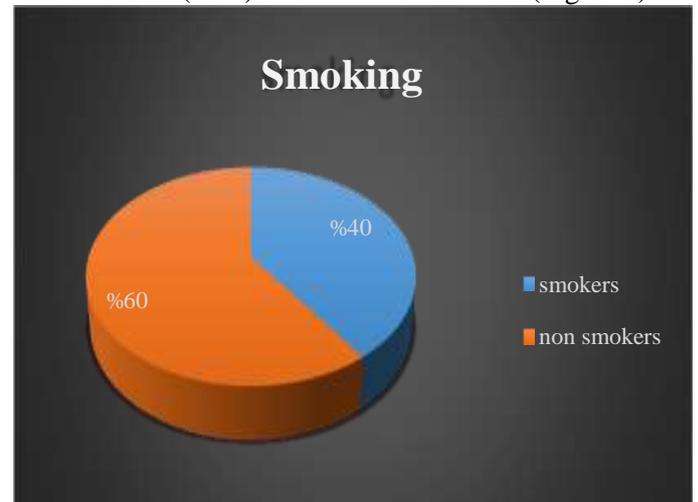


Figure (7): Special habits.

Types of previous operations: 11 of cases with previous operations were found to have midline incisions, 5 of cases with gynecological incisions and 1 with appendectomy incisions and 2 with port site incision (Table 4).

Table (4): Types of previous operations

Types of previous operations	NO.	%
Midline exploratory incision	11	58%
Gynecological	5	26%
Appendectomy	1	5.5%
Port site incision	2	10.5%

Types of hernias: Twenty-one cases had virgin abdomen with no previous surgeries while 19 cases had previous surgery done before and described as follow: midline laparotomy scar (11), caesarian section scar (5), port site scar (2) and appendectomy scar (1) (Table 5).

Table (5): Types of hernias

Type of hernia	NO.	%
Incisional hernia following laparotomies	17	42
Umbilical hernia and paraumbilical hernia	17	43
Epigastric hernia	4	10
Port site incision following laparoscopy	2	5

Operative data (Table 6):

- Operative time:** In first 20 operated cases the mean operative time was 120 min while in the last 20 cases with increasing learning, curve the operative time starts to reduce markedly and the mean time became 70 min.
- Defect size:** The size of the defect ranged from 1 cm to 7 cm and the mean defect size was $3.22 \pm 1.15 \text{ cm}^2$
- Defect number:** Twenty cases were found to have one defect, 13 cases were found to have two defects and 7 cases had multiple defects.
- Conversion to open:** Two cases were converted to open repair; one was due to too much extensive adhesions and the other one was due to inadvertent injury to small bowel with spillage of intestinal contents into the peritoneal cavity.
- Intraoperative complications:** One case developed port site bleeding managed laparoscopically and one case developed inadvertent bowel injury that necessitates conversion to open approach for repair of the injury.

Table (6): Descriptive of operative details

Operative details	Descriptive statistics
Mean operative time	63.83 ± 16.29 minutes
Mean defect size	$102.22 \pm 7.52 \text{ cm}^2$
Conversion to open	2 (5%)

DISCUSSION

An increasing interest in laparoscopic surgery and the availability of new materials have encouraged the adoption of laparoscopic techniques in ventral hernia repair. Laparoscopic repair is exceedingly used and widely accepted operative procedure. General advances of laparoscopic trends are valid for patients. The short term outcome of laparoscopic repair is outstanding open repair as regard to less perioperative complications, minimal blood loss, and shorter hospital admission (4,10).

In our study (55.0%) of the study population were males vs. (45.0%) were females. Male gender was slightly higher than female gender, which can be explained by strenuous physical work, multiple

operations in male than female and this goes with the study done by **Ferrari et al.** (11) who reported in his study 17 (47.3%) were female patients and 19 (52.7%) were male patients; **Wassenaar et al.** (12), reported 64 female patients and 108 male patients; and **Juo et al.** (13), reported 1139 (31.7%) female patients and 2455 (68.3%) male patients, in which the number of male patients exceeded that of female patients. However, it differs from the studies **Basheer et al.** (14) who reported the number of female patients in his study was slightly higher than male patients [22 (55%) patients vs. 18 (45%) patients], due to higher cosmetic concerns of females. This goes with the studies of **Andersen et al.** (15), with 30 (53.6%) female patients and 26 (46.4%) male patients, and **Ecker et al.** (16), with 8303 (61.2%) female patients and 5264 (38.8%) male patients.

In our study 17% was diabetic, 13% was hypertensive and 5% had COPD. Multiple associated conditions, such as obesity, smoking, and others, have been reported in various studies to contribute to higher recurrence rates (17).

One of the main advantages of LVHR is less postoperative pain as compared to open approach as the wounds are minute puncture like and no much trauma of the tissues, this is proved by less requirement to analgesics in the immediate postoperative period, subjectively measured by Visual Analogue score, which was in our study 27.9 ± 25.6 (mild pain). This agree with **Petro et al.** (18) who reported a statistical significance, regarding the postoperative pain score according to the VAS within 24 h postoperatively, between the two groups laparoscopic vs open ($P < 0.001$). In the laparoscopic group, it ranged from 2 to 7, with a mean value of 4.11 ± 1.91 , whereas in the open group, it ranged from 4 to 9, with a mean value of 6.45 ± 1.24 .

In our study most of our patients were discharged 2nd or 3rd day postoperatively and the mean hospital stay was 1.94 ± 0.67 days. This was in agreement with **Zhang et al.** (19) who reported that there was a significant difference between hospital stay of both groups open and laparoscopic. Only 2 patients required hospitalization for 7 days due to bowel injury and conversion to open technique. The early discharge to home decreases the incidence of hospital acquired infection from long hospital stay. Also this shorter hospital stay decreases overall cost to the hospital.

CONCLUSION

Laparoscopic ventral hernia repair is an appropriate, safe and feasible approach for ventral hernia repair with short operative time.

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