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ORIGINAL ARTICLE

LAPAROSCOPIC INTRAPERITONEAL ONLAY MESH REPAIR OF VENTRAL HERNIAS: EARLY EXPERIENCE AT SOHAG UNIVERSITY HOSPITAL, EGYPT

Magdy Khalil, Hussien A. Mostafa, Asem Elsani M. Hassan
Department of Surgery, Faculty of Medicine, Sohag University, Egypt

Correspondence to: Magdy Khalil A., Email: mgkh11@gmail.com

Abstract

Introduction: Laparoscopic ventral and incisional hernia repair (LVIHR) is a challenging procedure, but it has the potential to improve outcomes for the management of ventral and incisional hernias. The aim of this prospective study was to evaluate its short and intermediate-term outcome.

Patients and Methods: 28 patients presented to our hospital with non-complicated ventral and incisional hernias were given the option of laparoscopic hernia repair. Postoperative complications were recorded and patients were followed up for 9-18 months.

Results: 27 patients had completed the procedure and included in the study. 18 females and 9 males, with a mean age of 40.04 (±11.49) years and BMI of 33.07 (± 10.15). 18 cases were incisional , 8 paraumbilical; and 1 epigastric hernias. The size of the defect ranged from 4-10 cm. Mean operative time was 113.7(± 39.65) min. Conversion to open repair was needed in one patient which was excluded from the study. Postoperative complications included wound infection in one (3.7%) patient, seromas in 5 (18.5%) patients, one recurrence (5%) and without mortalities.

Conclusion: LVIHR allows rapid recovery and low recurrence in short and intermediate-term follow-up periods. Further studies with longer follow up periods are recommended.

Keywords: Laparoscopy, ventral, hernia.

INTRODUCTION

Ventral and incisional hernias are heterogeneous common problem encountered in general surgery and causing morbidity to many patients. They necessitate different methods of repair for specific defects or locations, but till now controversy still exists as to the best method for surgical repair.[1]

The outcome of conventional surgery has been very disappointing; with a recurrence rate near 50% after primary repair and 23% after mesh repair.[2]

Laparoscopic ventral and incisional hernia repair (LVIHR) was first described by LeBlanc and Booth in 1993.[3] It is a challenging procedure, but has the potential to improve outcomes for the management of ventral and incisional hernia.[4]

With the development of newer prosthetics such as composite mesh which could be suited to intraperitoneal placement and induce minimal adhesions, LVIHR is now gaining more popularity.[5]

In our institution we are practicing laparoscopy for repair of inguinal hernias but not the ventral hernias. The purpose of this prospective study was to introduce advancing laparoscopic techniques for intraperitoneal repair of ventral hernias and to evaluate its complications, and recurrence rate.

PATIENTS AND METHODS

Between January 2010 and June 2011, 28 adult patients with non-complicated incisional or ventral hernias were admitted at General Surgery Department, Sohag University Hospital, Sohag, Egypt and given the option of laparoscopic hernia repair after full explanation of the technique with its possible complications including the recurrence. After approval of the Ethical Committee of our institution, a written consent was taken from all patients. The assessed variables were patient demographics (age, sex, body mass index [BMI] [calculated as the weight in kilograms divided by the height in meters squared], comorbidities, type of hernia, previous recurrence or operation, and associated pathology), operative details including conversion to open and its reasons, and outcome data (morbidity or mortality, recurrence rates, and length of hospital stay). Comorbidities specifically addressed included diabetes mellitus, hypertension, ischemic heart disease, obesity and pulmonary disease.

The exclusion criteria included patients with complicated hernias, small defect < 4cm, big defect >10 cm, patients with loss of abdominal domain and super-obese patients with BMI > 50. Patients were subjected to complete history, proper examination and routine preoperative investigations. Abdominal ultrasonography (US) was done for every patient to assess the size of the defect (s), its contents and if there is any associated intra-abdominal pathology.

Laparoscopic repair with the use of Proceed surgical mesh® (Ethicon, Inc., USA) was done in all patients. Proceed surgical mesh® is a sterile, thin, flexible laminate mesh designed for the repair of hernias and other fascial deficiencies. The mesh product is comprised of oxidized regenerated cellulose (ORC) fabric, and Prolene® soft mesh, a non-absorbable polypropylene mesh, which is encapsulated by a polydioxanone polymer (Ethicon, Inc.).[6] (Figs 3-5).

Surgical technique: Preoperative mechanical bowel preparation and prophylaxis against deep venous thrombosis and wound infection were designed to each patient. The Patients were anaesthetized generally in a supine position and received nasogastric tube and urinary catheter. Insufflations using Veress needle introduced away from the hernia, usually at the left subcostal midclavicular line at the lateral edge of rectus abdominis muscle. Usually we used 3 ports; 10-mm for the 30º or 0 º degree telescope, 12-mm for the main working channel; to adopt a 12-mm endoscopic mesh stapler, and a 5-mm for the second working channel. Additional ports were placed whenever required. Port sites were designed to allow good distance away from the edge of the defect, usually between the anterior axillary and mid-clavicular lines for midline hernias.

Exploration of the peritoneal cavity was initially performed to detect any treatable intra-abdominal pathology that can be done concomitantly with hernia repair. After that, gentle reduction of the contents and adhesiolysis were done using harmonic scalpel® (Ethicon, Inc.) and/or cold dissection with scissor. The falciform ligament was mobilized from the anterior abdominal wall if needed. The periphery of the hernia defect was evaluated by direct vision and palpation. Carbon dioxide was released prior to measurement, revealing the true size of the hernia defect. The cranio-caudal and lateral measurements were taken to define the size of the prosthetic mesh. The defect size was estimated and a suitable mesh size was fashioned. The tailored mesh was then rolled tightly and introduced intraperitoneally through the 12-mm port site. The mesh was unrolled inside the abdomen and spreaded under the defect (Fig. 3).

Before fixation of the mesh, correct surface orientation was essential. The polypropylene side (side with the blue strips) of the mesh was placed facing the abdominal wall, and the other surface, oxidized regenerated cellulose (ORC) side, was placed facing the visceral surface (Fig. 4).

To place the mesh properly, we anchored the center of the mesh by a long suture thread withdrawn to the center of the defect with the help of a Berci fascial closure instrument (Karl Storz GmbH & Co. KG, Tuttlingen, Germany) inserted into the peritoneal cavity through a 2-mm skin stab (fig 2,3). The suture ends were tied down extracorporeally and buried subcutaneously. Mesh was then fixed using the 12-mm multifire endoscopic mesh stapler after lowering of the insufflation pressure to 8 mm Hg. The points of fixation were applied to the periphery of the mesh allowing at least 3 cm overlap over the defect margin and 1-2 cm apart at a distance approximately 6-7 mm from the edge of the mesh (Fig. 5). Fascial closure using Vicryl 2/0 suture was done for 10- and 12-mm ports and skin was closed using subcuticular stitches. Drains may or may not be used.

Patients were followed up postoperatively by clinical examination and US for complications or recurrence. postoperative seroma was diagnosed by clinical examination and/or ultrasonography. A significant seroma; which required aspiration, was considered when there was pain, discomfort, erythema, or infection.

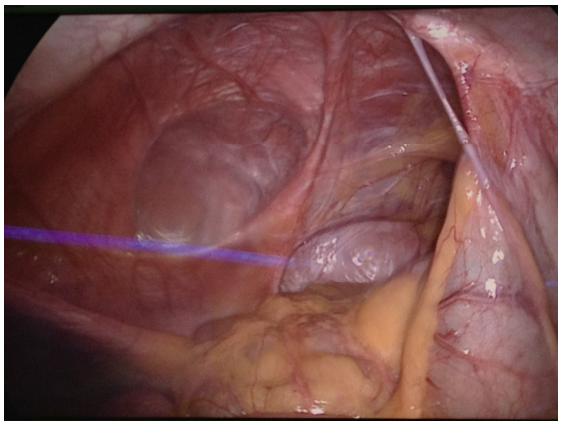

Fig 1. Post appendectomy bilocular sac.

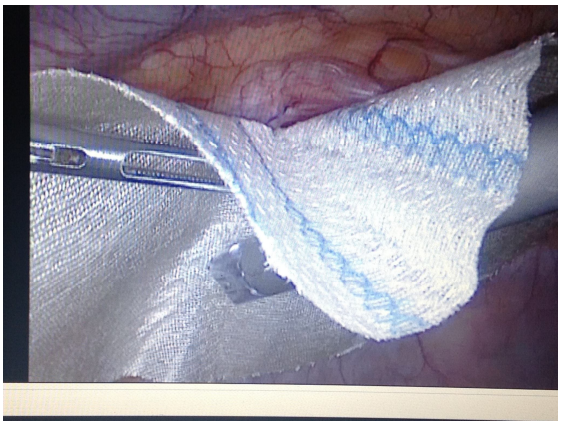

Fig 4. mesh orientation.

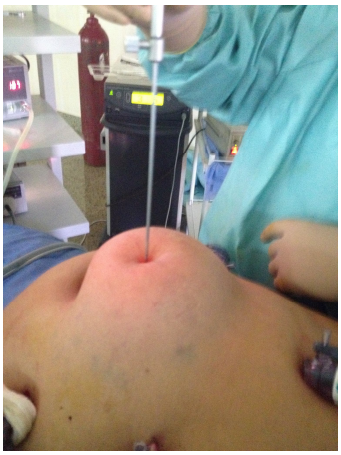

Fig 2. Ceneralization of mesh using fascial closure.

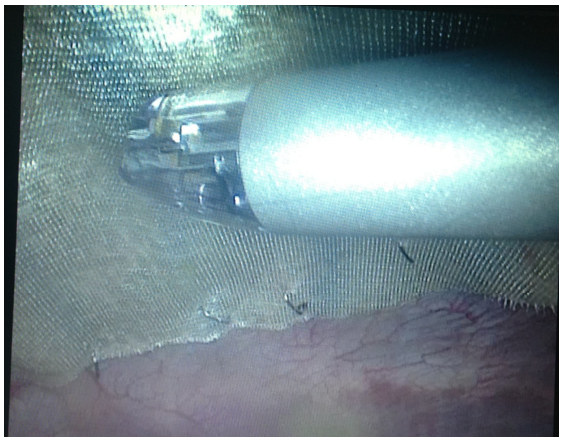

Fig 5. mesh fixation using endo-stapler.

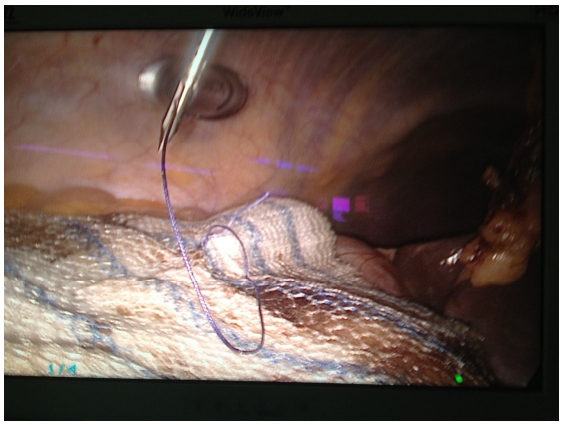

Fig 3. Ceneralization of mesh using fascial closure.

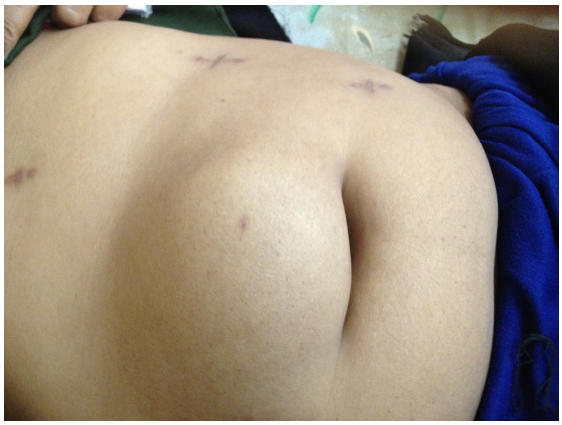

Fig 6. Postoperative seroma.

RESULTS

Patient characteristics: During the study period, 28 among 152 adult patients with non-complicated ventral and incisional hernia underwent attempted repair of their hernias by a laparoscopic approach using Proceed surgical mesh®. 27 patients had completed the procedure and only one had converted to open surgery.

Patients characteristics and demographic data are shown in Table 1.

Table 1. Demographics and characteristics of the patients.

Patient characteristic	
Sex (male / female)	8 / 19
Age, mean (±SD) (yr)	40.04 (11.49)
Type of hernia	
Incisional: **18 (66.66%)**	
Midline	13
Right paramedian	2
Appendectomy	2
Right subcostal	1
PUH: **8 (29.63%)**	
Primary	5
Recurrent	3
Epigastric: **1 (3.7%)**	
BMI, mean (±SD) (Kg / m^2)	33.07 (10.15)
Comorbidity	9 (33.33%)
Associated pathology (gall stones)	2 (7.40%)
Defect size, mean (±SD) (cm)	6.11 (1.26)
Operating time, mean (±SD) (min)	113.7 (39.65)
Hospital stay, mean (±SD) (days)	4.73 (2.62)
Follow up, mean (±SD)(months)	13.13 (3.12)
Total No. of cases	**27 (100%)**

Outcomes: The hernia defect was single in 23 (85.19%) cases and multiple in 4 (14.81%) cases (Fig. 1). The maximum diameter of the defect ranged from 4-10 (mean 6.11±1.26) cm. We used 15×15 and 30×30 cm mesh sizes which were refashioned according to the defect size and shape.

The operative time ranged from 65-210 (mean 113.7 ±39.65) min. In two patients concomitant LC was done (before mesh fixation) for symptomatic gall stones diagnosed preoperatively. This increased the operative time 35 min for one patient and 40 min for the other.

There was no bowel injury or other intraoperative complications related to the technique. One patient with midline incisional hernia was converted to open approach because of severe adhesions that jeopardized safe adhesiolysis and dissection. The same mesh type was also used to repair the defect and this patient was excluded from the study.

Postoperatively, 5 (18.52%) patients developed seromas; 3 of them were treated conservatively and resolved within 2 weeks and the other 2 had big seromas necessitating additional US-guided aspiration under strict aseptic conditions and improved after 6 weeks (Fig. 6). Ileus occurred in 2 patients who recovered by simple measures after 3 days. Another 2 patients acquired chest infections which were resolved within 10 days after prescribing suitable antibiotics according to culture and sensitivity. One patient had mild superficial wound infection which responded to repeated dressings and antibiotic therapy. None of the patients had mesh removal for infection. The postoperative hospital stay ranged from 2-11 (mean 4.73±2.62) days. All patients tolerated the procedure well with no mortality.

Of the 27 patients laparoscopically repaired, 20 (74.7%) patients had completed the follow up period (9-18 months). The remaining 7 patients were lost the follow up after the first 2 visits (one and 3 weeks after discharge). We had only seen one recurrence (5%) after repair of midline incisional hernia in a morbidly obese patient with preexisting chronic obstructive airway disease that was done early in the study. This hernia recurred after 4 months and determined by clinical examination and the patient refused to be reoperated again at that time. (Table 2).

Table 2. Intra and postoperative complications.

Complications	Number (Percent)
Intraoperative complications	
Bowel injury	----
Bleeding	----
Difficult dissection	1 (3.7%)
Conversion to open	**1/28 (excluded from the study)**
Postoperative complications	
Haematoma	-----
Seroma	5 (18.52%)
Wound infection	1 (3.7%)
Chest infections	2 (7.40%)
Recurrence	1 / 20 (5%)
Total cases	**27 (100%)**

DISCUSSION

Ventral incisional hernia remains one of the most common postoperative complications of abdominal surgery with rates as high as 20% after a midline laparotomy.[7] Paraumbilical hernia in adults is not an uncommon problem and accounts for 10-14% of all hernias. It is more common in females.[8] Currently there is no consensus on the best management approach for incisional or ventral hernia repairs.[9]

The wide dissection of soft tissue required during open mesh repairs contributed to morbidity and increased

incidence of wound-related complications.[10,11]

Since the first report of LVHR by LeBlanc and Booth (1993),[3] the laparoscopic technique has gradually become increasingly popular worldwide because of its obvious advantages. It offers early recovery, decreased hospital stay, minimal morbidity, and low recurrence rates. Also it avoids long incisions and wide dissections, and facilitates the placement of a large mesh with adequate overlap of the defect.[12-16] In addition to the previous advantages of laparoscopy, it allows clear identification of multiple hernia defects which could be missed during open surgery and performing additional procedures at the time of hernia repair.[17]

In our series, multiple hernia defects were diagnosed in 4 (14.8%) cases and covered by a large piece of mesh. Two (7.4%) patients underwent concomitant laparoscopic cholecystectomy before mesh fixation.

LVHR is a challenging procedure. It may be indicated for most patients, regardless of age or hernia complexity, but the most challenging patients were those with long standing defects, incarcerated small bowels, morbid obesity, multiple previous repairs and placement of prosthetic mesh.[18]

As we are in the learning curve and early experience of the procedure we put exclusion criteria for our patients including morbid obesity ((BMI>50), very small (<4cm) and very big (>10cm) defects and patients with complicated hernias. All these exclusion criteria could be relative contraindications.

Previous studies described obesity as a risk factor for the development of ventral incisional hernias as well as a risk factor for recurrence and complications. Patients with a BMI higher than 30 had a risk of recurrence 5 times higher compared with that in patients with a BMI lower than 25.[1] Yuri et al (2006) concluded the safety of the laparoscopic approach in obese patients with complex hernias.[14] In our study, BMI ranged from 21-44 while more obese patients (BMI>50) were excluded from the study.

There are many different types of meshes available for LVIHR; polypropyelene, expanded polytetrafluoroethylene, composite polypropyelene and polytetrafluoroethylene or composite polypropyelene and collagen. Polypropyelene mesh has been abandoned in the laparoscopic approach because it may induce adhesions with the intestinal loops although some surgeons used it if there was a big amount of omentum that can prevent bowel contact with the mesh. It has been replaced by Proceed® mesh with a bioresorbable layer against the bowels and a polypropylene layer against the abdominal wall.[1,19]

The ORC layer is absorbed from the site of implantation within 4 weeks. It is intended to physically separate the mesh from underlying tissue and organ surfaces during the critical wound healing period, thereby reducing the severity and extent of tissue attachment to the mesh.[6]

During the follow up period (9-18 months), we did not encounter any problems related to the mesh but this needs long term follow-up to conclude about the complications that might develop from the mesh.

The aponeurotic edges of the hernia should be overlapped by the mesh at least 3-cm. Some surgeons suggest a 4-5 cm overlap, especially if the patient is morbidly obese, or if the hernia is recurrent or of large size.[20]

To avoid dislodging, crinkling or curling of the edges, a sufficient number of fixation points should be placed along the borders of the Proceed® mesh. Fixation may be accomplished with devices such as tackers, anchors, staples or non-absorbable sutures.[19,21] According to Misiakos et al (2008), fixation technique does not really affect the final outcome in LVHR, and that the laparoscopic repair yields very low recurrence rates.[22]

In this study, we used staplers as the main fixation techniques because it was available and less time consuming. The proper orientation and spreading of the mesh over the defect with avoidance of lateral displacement was aided by the use of Berci fascial closure device that anchored the centre of the mesh to the defect.

The main causes of conversion to an open procedure were the presence of dense and extensive adhesions, inadvertent bowel or bladder injuries, and in some cases of hernia strangulation.[23,24]

In our work, one case (3.6%) was converted to open surgery because of dense adhesions between omentum and bowel loops to the hernia defect. The decision for conversion was made early in the procedure for the safety of the patient. We had no bleeding or bowel injuries among our cases.

A recent meta-analysis of laparoscopic versus open ventral hernia repair reported fewer wound-related and overall complications and a lower rate of hernia recurrence for LVHR.[18]

The main disadvantage of the laparoscopic approach is that the hernia sac is usually retained in place, which predisposes to postoperative seroma formation. Some seromas persist for more than 8 weeks or cause symptoms requiring intervention, which is usually a sterile aspiration. The incidence of symptomatic seromas according to various reports ranges from 1% to 24%. [22]

In our study, 5 (18.52%) patients developed seromas; 3 of them was treated conservatively and resolved within 2 weeks and the other 2 had big seromas necessitating additional US-guided aspiration under strict aseptic conditions and improved after 6 weeks. we observed that these cases were big hernias with multiple

defects that needed extensive dissection and adhesiolysis, also they needed large numbers of staples for fixations.

Pierce et al had presented a pooled data analysis of 45 published series in LVHR, representing 5340 patients (4582 laparoscopic, 758 open). They demonstrated a significantly lower recurrence rate with LVHR compared with OVHR series.[18] Although recurrence still remains an important problem after LVHR, it does not surpass 5% to 10% in most series.[25,26]

We had one recurrence (5%) occurring 4 months after repair, it was a postcholecystectomy midline incisional hernia. It happened during our early cases for LVHR in a morbidly obese patient with preexisting chronic obstructive airway disease.

LVIHR has a shorter mean post-operative hospital stay compared to open one (2.7 versus 9.9 days).[27] The laparoscopic patients group required significantly fewer inpatient admissions, a finding that may be explained by better pain control or faster recovery from operative trauma. [1] The mean post-operative hospital stay for our patients was 4.73 (±2.62) days.

In conclusion LVIHR allows rapid recovery and low recurrence in short and intermediate-term follow-up periods. Big hernias, cost benefit relationship and late recurrences are our emerging targets that require further studies with longer follow up periods.

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