Hybrid: Evolving techniques in laparoscopic ventral hernia mesh repair

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Abstract

Introduction: Laparoscopic repair is now the treatment of choice for most cases of ventral/incisional hernia. Although the technique has undergone many refinements, there is no standard technique for difficult or complicated hernias.

Aim: The aim of this study was to show the different innovative methods used to treat difficult ventral hernia through hybrid techniques.

Materials and Methods: A total of 75 (n = 75) patients underwent Laparoscopic Ventral Hernia Hybrid Mesh Repair (LVHHMR) by our surgical unit between January 2014 and December 2016. Three different techniques of repairing the defects were used. Mesh fixation time, post-operative pain score (visual analogue score) and follow-up for pain and recurrence (at 6 months, 12 months and 24 months) were recorded and analysed.

Results: Out of 75 patients (20 men and 55 women), the median age was 45 years and body mass index of the patients was 25–35. Types of hernias operated were paraumbilical hernias, incisional and recurrent hernias. The techniques used were (1) laparoscopic adhesiolysis, open sac excision with closure of defect and laparoscopic mesh placement, (2) laparoscopic adhesiolysis, omphalectomy with closure of defect and laparoscopic mesh placement and (3) open adhesiolysis, sac excision with closure of defect and laparoscopic mesh placement. Five patients required analgesics for 48 h. No patients complained of pain at follow-ups (1 month, 6 months, 12 months and 24 months). Mean hospital stay postoperatively was 2–3 days.

Conclusion: LVHHMR is safe and feasible approach for complicated/difficult ventral hernias. However, further larger studies are required to establish these methods as gold standard.

Keywords: Composite mesh, hybrid techniques, laparoscopic ventral hernia mesh repair

INTRODUCTION

Laparoscopic repair is now the treatment of choice for most cases of ventral/incisional hernia. It is superior to open repair.[1] Although the technique has undergone many refinements, there is no standard technique for difficult or complicated hernias.

Although technique of laparoscopic repair of ventral hernias has almost been standardised, the ideal mesh, management of the defect and fixation techniques are still areas of debate.[2]

It has been reported extensively in literature that the primary closure of the hernial defect reduces the possibility...
of seroma formation by reducing the dead space and allows better reinforcement of the wall.\[6\]

In cases with difficult hernias, combined open/laparoscopic hybrid techniques to avoid dissection of large subcutaneous flaps benefit the patients.\[8\] Its been reported that hybrid methods are effective for treating cases of ventral hernias involving a large orifice.\[8\]

We report our experience (2014–2016) in the treatment of consecutive 75 cases of complicated/difficult ventral hernia by Laparoscopic Ventral Hernia Hybrid Mesh Repair (LVHHMR).

**Aim**
The aim of this study was to show the different innovative methods used to treat difficult ventral hernia through hybrid techniques.

**MATERIALS AND METHODS**
All the patients (n = 75) undergoing LVHHMR were studied during the period of 2 years from 1 January 2014, by single unit of general and minimal access surgery.

Patients meeting the inclusion criteria were consecutive patients presenting with complicated ventral hernia of defect diameter of up to 8 cm and fit for surgery. The complications included large defects, obstructed hernia with bowel contents, irreducible hernia with necrotic umbilical skin and multiple defects. Exclusion criteria were patients unfit for general anaesthesia, body mass index (BMI) >35 kg/m\(^2\), hernia defects more than 8 cm, pregnancy and contaminated abdominal cavity.

All the patients were clinically examined, underwent abdominal ultrasound, routine blood investigations and pre-anæsthesia evaluation.

Informed written consent was taken, and after pre-anæsthesia preparation, the patients were taken up for the surgery. General anaesthesia was used with endotracheal intubation in all patients. With the patient in supine position, pneumoperitoneum was created with a Veress needle at the Palmer’s point (2 cm below left subcostal margin in midclavicular line).\[6\] A 5-mm port was introduced at the level of umbilicus in the left flank. Under vision, two further ports were introduced, one 10 mm port in epigastric region (for 30\(^\circ\) laparoscope) and another 5 mm port in the right flank at the level of umbilicus.

The hybrid techniques used were (1) Laparoscopic adhesiolysis, open sac excision with closure of defect and a laparoscopic mesh placement. This was done in 50 patients, with large hernial sac. Harmonic shears or bipolar was used for laparoscopic adhesiolysis. Contents of hernia sac were reduced. A small circumumbilical incision was taken, and complete hernia sac was excised. The hernia defect was closed with interrupted prolene sutures and skin closed with monocrly.

(2) Laparoscopic adhesiolysis, omopectomy with closure of defect and laparoscopic mesh placement. This was done in 15 patients, with large sac, multiple defects and necrotic umbilical skin. Laparoscopic adhesiolysis was done, and hernia contents were reduced. The abdomen was desufflated and omphalectomy was done. Hernia sac was excised, and the defect was closed with interrupted prolene sutures and skin closed with monocrly.

(3) Open adhesiolysis, sac excision with closure of defect and laparoscopic mesh placement. This was done in 10 patients with large hernia sac with small defect and obstructed bowel. Diagnostic laparoscopy was performed. The abdomen was desufflated and infraumbilical incision was taken; open adhesiolysis was done. Hernia sac was excised, and the defect was closed with interrupted prolene sutures and skin closed with monocrly.

In all patients, intraperitoneal laparoscopic lightweight composite meshes were placed and fixed in a standardised method. The mesh sizes based on the defect used were 15 cm × 15 cm circular (20), 15 × 20 rectangular (25) and 20 cm × 20 cm circular (30). The size of the mesh had to overlap the defect from all sides by 4–5 cm. The skin was marked around the defect using the mesh template (for taking transfascial sutures). The skin was marked after desufflating abdomen and then Pneumoperitoneum recreated and mesh was deployed through the 10-mm port site. Two prolene sutures (at caudal/cephalic ends) were used to lift the mesh up on the anterior abdominal wall. Absorbable tackers were then used to anchor the mesh in each case. Double-crown technique was applied, that is, two circular rows of tack, one row at the extreme periphery of the mesh all around and second row of tack around the margins of the hernia defect.\[7\] The distance between each tack was about 2–3 cm.

In patients with BMI <30, prolene sutures were not tied, pulled and cut at the level of skin after anchoring the mesh with tackers. In patients with BMI between 30 and 35, the prolene sutures were tied. The median operating time was 60 min (range 60–80 min). The abdomen was desufflated, and the skin was closed with either absorbable subcuticular
sutures or non-absorbable synthetic sutures. Pressure dressing was applied for 48–72 h.

The patients were mobilised the same day. Visual analogue score was evaluated at 6 h and 24 h. After 24 h, the patients were given analgesia only on demand. IV antibiotics were given as protocol, one dose before surgery and two doses after. The oral feeding was resumed the same day for clear liquids; first post-operative day (POD) patients were put on liquid diet and second POD patients were given solids and sent home by evening.

The patients were sent home on 2nd or 3rd POD with abdominal binder. After discharge, the patients were followed up in the outpatient clinic at 1 week (for suture removal), 1 month, 6 months, 12 months and 24 months. Postoperative complications such as pain, seroma, wound infection or recurrence were recorded and analysed.

RESULTS

Out of 75 patients (20 men and 55 women) that underwent LVHHMR, the median age was 45 years (range 25–60 years). The median BMI was 26 (range 20–35). Types of hernias operated were 20 paraumbilical hernias, 30 incisional and 25 recurrent hernias. The median defect diameter was 6 cm (range 5–8 cm), and the mesh sizes used were 15 cm × 15 cm circular (35) and 15 × 20 rectangular (40).

The median defect size was 6 cm (range 5–8 cm), and the mesh sizes used were 15 cm × 15 cm circular (20) and 15 × 20 rectangular (30). The median operative time was 60 min (range 60–80 min). In 58 patients with BMI <30, only absorbable tackers were used to fix the mesh. In 17 patients with BMI between 30 and 35, the prolene sutures were tied, after fixing the mesh with tackers [Table 2].

The techniques used were (1) laparoscopic adhesiolysis, open sac excision with closure of defect and laparoscopic mesh placement (50), (2) laparoscopic adhesiolysis, omphalectomy with closure of defect and laparoscopic mesh placement (15) and (3) open adhesiolysis, sac excision with closure of defect and laparoscopic mesh placement (10) [Graph 1].

All patients were mobilised on the day of surgery. Visual analogue score for pain (VAS) was of median 2 (range 0–4). Five patients required analgesics for 48 h. The oral feeding was resumed the same day for clear liquids; first POD patients were put on liquid diet and second POD patients were given solids and sent home by evening.

One patient developed paralytic ileus and was treated for the same and sent on third POD. One patient developed urinary retention and had to be catheterised on the day of surgery and removed on second POD and sent home on third POD. The mean hospital stay postoperatively was 2–3 days. All patients were sent home with abdominal binders and were first followed up on the 7th POD for dressing and stitches removal. Two patients developed seroma and one patient had wound infection. All these were managed conservatively and patients did well [Graph 2].

No patients complained of pain or recurrence at follow-ups (1 month, 6 months, 12 months and 24 months).

DISCUSSION

Laparoscopic ventral hernia mesh repair is the procedure of choice in most of the uncomplicated ventral hernias with smaller defects. For complicated, large and multiple defects, laparoscopic approach presents a big challenge, and hence, an open approach is used. A combination of laparoscopic and open techniques with minimal access avoids dissection of large subcutaneous flaps, early post-operative recovery and comparable results.

It has been reported in literature that the hernia defect has to be closed to avoid complications such as seroma.

Table 1: Demographic data (%n=75)

| Parameter | Sex | 20-30 | 31-40 | 41-50 | 51-60 | 20-25 | 26-30 | 31-35 |
|-----------|-----|-------|-------|-------|-------|-------|-------|-------|
| Number (%n=75) | Male | 20 | 10 | 25 | 30 | 10 | 29 | 36 | 10 |
| Median | Female | 55 | | | | | | | |

BMI: Body mass index

Graph 1: Hybrid techniques used
and recurrence. In difficult and complicated hernias, the laparoscopic closure may not be achieved, usually in multiple defects, large and obstructed hernias. Hence, many times, open approach is applied to achieve better results. Open hernia mesh repair leads to increased morbidity in terms of increased postoperative pain, placement of drains, prolonged recovery and more chances of infection, which may lead to increased recurrence rates.

Patients who have undergone LVHR with mesh had fewer complications, shorter length of stay, lower hospital charges, more frequent routine discharge and decreased mortality compared with those who received open repair.

In hybrid technique, the mesh is placed laparoscopically. The closure of defects, removal of sac and necrotic skin may be done by open approach. Combining steps of open and laparoscopic techniques is employed to achieve good hernia mesh repair with minimal access and less morbidity. Studies suggest that the hybrid technique is safe in cases of recurrent difficult incisional hernias. Some reports also suggest using hybrid technique for obese patients with difficult incisional hernias, multiple defects, irreducible hernias with necrotic skin, lateral incisional hernias and parastomal hernias.

Our series demonstrates initial experience with various hybrid techniques and their post-operative outcome. This is a very small study group of patients with limited follow-up of 2 years; however, the results are comparable to that of literature. Managing difficult scenarios by combining both open and laparoscopic approaches helps in safe reduction of hernia contents with adhesiolysis, decreasing defect size, avoiding dissection of large flaps and placing a laparoscopic mesh. Larger multicentric studies with longer follow-ups maybe required to standardise the techniques for different complication and sizes of ventral hernias.

**CONCLUSION**

LVHHMR is safe and feasible approach for complicated/difficult ventral hernias. However, further larger studies are required to establish these methods as gold standard.

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**Conflicts of interest**
There are no conflicts of interest.

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