Laparoscopic ventral hernia repair: local experience

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ABSTRACT

Introduction: Laparoscopic ventral hernia repair (LVHR) is a recent development that has been shown to be an effective way of treating ventral hernias. We present the first local series of LVHR with a review of the literature on laparoscopic ventral herniorrhaphy.

Methods: We retrospectively reviewed all our patients who underwent laparoscopic surgery for ventral hernias from December 1998 to May 2002. Results of LVHR such as operative time, length of hospital stay, complications and recurrence rates were evaluated.

Results: Twenty patients underwent LVHR. There were 16 female and four male patients. The average age was 54 years. The mean fascial defect was 46 square cm. An ePTFE Mesh was used in all the patients except for one patient who had a prolene mesh. The mean operative time was 117 minutes and the hospital stay was two days. There were two minor complications and no major complications. With a mean follow-up period of 14.9 months, the recurrence rate was 5.0 percent with a single recurrence at four months.

Conclusion: Our initial experience with this modality shows that LVHR a feasible option with great potential in both treatment success and reduction of surgical morbidity.

Keywords: herniorrhaphy, laparoscopic surgery, laparoscopic ventral hernia repair, ventral hernia

INTRODUCTION

The goals of a new technique for ventral hernia repair should be to decrease the high recurrence rates and the associated problems of conventional open hernia repair. The recurrence rates after open ventral herniorrhaphy range from 25% to 52% (1,2). The use of prosthetic material in open ventral herniorrhaphy has decreased this recurrence rate but with it comes complication of the mesh such as infection (3,4). There have been several well-received series that have reported comparatively lower infection and recurrence rates in the laparoscopic approach to ventral hernia repair (4,5). In this study, we share our initial experience with laparoscopic ventral hernia repair.
such that it would overlap the defect by 3cm to 4cm on all sides. Non-absorbable Gore-Tex sutures were placed at the upper and lower ends of the ePTFE mesh to achieve secure attachment to the anterior abdominal wall. The mesh was then introduced into the abdominal cavity via the 10mm port. A larger port was used for the very large mesh. After the mesh was positioned intra-peritoneally, the sutures were passed through the anterior abdominal wall using a laparoscopic suture passer (Gore Suture Passer Instrument, WL Gore, Flagstaff, Arizona, USA). The sutures were tied down and secured at two points. The circumference of the mesh was then tacked to the posterior fascia at intervals of 1cm. Drains were not inserted. The wound was infiltrated with a long-acting local anaesthetic agent post-operatively in all patients.

RESULTS

The 20 patients in our data analysis were 16 women and four men, with a mean age of 54 (range 35-78) years. There were nine Indian, four Malay, three Chinese and four Caucasian patients. In our series, hypertension, diabetes, asthma and hypothyroidism were the most common co-existing medical conditions. They bore no co-relation to the presence of hernia in these group of patients.

Of the hernia types, there were 12 incisional and 12 paraumbilical hernias in our 20 patients (Table I). About 65% (n=13) of the patients had a single abdominal wall defect, and the rest had multiple defects. There were three incarcerated hernias, all of which were successfully reduced after establishment of pneumoperitoneum.

All the patients in the series were operated on as elective cases, with successful completion of the procedure laparoscopically in all cases. No additional

<table>
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<th>Table I. Hernia characteristics in patients who underwent LVHR.</th>
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<tr>
<td>Incisinal hernia</td>
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<tr>
<td>Paraumbilical hernia</td>
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<tr>
<td>Recurrent hernia</td>
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<tr>
<td>Previous open repair</td>
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<tr>
<td>Single abdominal wall defect</td>
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<td>Multiple abdominal wall defects</td>
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<td>2 defects</td>
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<td>3 defects</td>
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<td>Mean hernia size (cm²)</td>
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</tbody>
</table>

*Contents of hernia sac

- Nil | 6
- Omentum | 13
- Bowel | 2

Number of patients with incarcerated hernias | 3

*One patient had omentum and bowel within the hernia sac.

<table>
<thead>
<tr>
<th>Table II. Reported small and large series on LVHR (in chronological order).</th>
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<tr>
<td>Year of study</td>
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<tr>
<td>----------------</td>
</tr>
<tr>
<td>Saiz et al[30]</td>
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<tr>
<td>Toy et al[18]</td>
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<td>Franklin et al[33]</td>
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<td>Ramshaw et al[10]</td>
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<td>Sanders et al[32]</td>
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<td>Heniford and Ramshaw[4]</td>
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<td>Nguyen et al[35]</td>
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<td>Chowbey et al[36]</td>
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<td>Moreno-Egea et al[37]</td>
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<td>Current series</td>
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procedures were carried out during the herniorrhhaphy. Intraoperative blood loss was negligible. The mean operative time was 117 minutes (range 55-260 minutes). The mean size of the ePTFE mesh was 206 cm² (range 9-432 cm²). The mean post-operative length of stay was 4.0 days (range 1-10 days). In our series, the overall complication rate was 10.0%. There were no major complications. Four patients had seromas that lasted less than six weeks, one patient had prolonged suture site pain lasting more than eight weeks, and one patient had a flank haematoma. The seromas were not aspirated and allowed to resolve spontaneously.

During a mean follow-up period of 14.9 months (range 3 to 45 months), there was a single recurrence at four months, giving a recurrence rate of 5.0%. This patient initially had a laparoscopic repair, following which she experienced prolonged suture site pain especially on standing. Computed tomography showed that the mesh had been partially pulled out of the peritoneal space into the hernia defect by the large abdominal apron of fat due to traction whenever she stood. She subsequently had the mesh refixed during an open surgery.

**DISCUSSION**

An incisional hernia develops in 3% to 13% of patients following a laparotomy, and is the most common long-term complication following abdominal surgery(7). A lasting surgical correction of a ventral hernia thus remains a challenge. Open primary suture repair has led to extremely high recurrence rates. For a fascial defect equal to or more than 4cm in size, the recurrence rate exceeds 40%. For a fascial defect less than 4cm in size, the recurrence rate can be as high as 25%(8). The use of prosthetic mesh came into popularity after it was shown that the long-term failure rate could be reduced to 11% to 21%(8-10). However, the placement of mesh typically required extensive soft tissue dissection, raising of flaps and insertion of drains. This in itself increased the incidence of wound infections and local wound complications(4,11,12).

The laparoscopic repair of ventral hernia utilises the principles of the open technique popularised by Stoppa, Rives et al, and Wantz(9,13,14). These principles include using a large mesh prosthesis, adequate overlap of the hernia defect, and eliminating tension. In the laparoscopic technique, the mesh is placed intraperitoneally and extensive soft tissue dissection is eliminated. It has been shown, based on widely-quoted comparative studies, that with LVHR wound complication rate, patient discomfort, length of hospital stay, time to return to normal activities and recurrence rates are all reduced(10,15,16). LVHR has also been established as a cost-effective procedure, with total facility costs for the laparoscopic repair being significantly lower than that for the open repair(7).

Intra-abdominal placement of a large mesh with wide overlap of defects, use of smaller incisions, laparoscopic adhesiolysis to uncover small unpalpable defects that may go unnoticed with open repair, and use of large non-absorbable sutures for stronger patch fixation could account for the greater success of the laparoscopic operation(9). In our series, the patients as a group had a good outcome. Despite an early experience with this technique, there were no conversions to open surgery. The mean operative time was about 117 minutes, with a single case taking about 260 minutes due to dense intra-abdominal adhesions. This time is longer than most mean operative times reported in other series, which range from 82 to 97 minutes(5,7,10,18). This is attributable to the more careful and meticulous approach adopted by the surgeons in the execution of a new procedure.

There were also no operative mortalities or major complications in our series. Seroma formation was the most common post-operative complication, which was defined as any bulge at the operation site observed by the surgeon or the patient. It is considered significant if it lasts more than six weeks. We found that all of them resolved without treatment within six weeks. Heniford et al recommend aspirating seromas in patients who are symptomatic, and allowing the others to resolve spontaneously(9).

We also observed that seroma at the site of hernia repair and suture site pain were the most common minor complications reported in other series as well(7,15,19). The suture site pain experienced may have originated from tissue or nerve entrapment during placement of sutures or tacks through the full thickness of the anterior abdominal wall. It could also have resulted from traction of the transabdominal sutures fixing the mesh to the anterior abdominal wall. However, suture placement is vital to the long-term durability of the mesh repair and we do not advocate any change in the technique. Suture site pain can be managed conservatively but the possibility of traction on the mesh from a large, heavy abdominal apron of fat and subsequent detachment must be borne in mind, as was the case in one of our patients.

The major complications following LVHR are well documented. These include enterotomy, mesh infection, skin breakdown, intra-abdominal abscess and mortality. The overall complication rates range from 0% to 24% (Table II). The recurrence rate in our series was 5.0%, with a single recurrence at four
months. Given that 66% to 90% of recurrences occur within two years after operation, our mean follow-up of about 15 months is acceptable, and we do not expect the recurrence rate in this series to change markedly. Recurrence rates following laparoscopic repair in other series range from 0% to 11% (Table II).

95% of the hernias in our series were repaired with ePTFE mesh, with one repair utilising prolene mesh placed in a preperitoneal position for a small hernia early on in our series. Both polypropylene and polyester mesh have been observed to cause severe bowel adhesions, with subsequent intestinal erosion and fistulisation. ePTFE also appears to be less easily infected than other biomaterials. It is therefore recommended that mesh materials be separated from the intestine, whenever possible.

For this purpose, we found the Gore-Tex Dual Mesh to be well suited. The smooth side placed directly adjacent to the bowel has a pore size of 3µm, resulting in minimal tissue attachment; while the other side has an average size of 22µm, allowing tissue ingrowth and attachment to the anterior abdominal wall. There have been no reported cases in the literature of erosion or fistulation with the use of the Dual Mesh. However, ePTFE biomaterial costs more and is opaque, making laparoscopic work slightly harder.

LVHR can essentially be extended to any patient who is a candidate for open repair and with an acceptable risk for general anaesthesia. As experience increases, LVHR can be safely extended to patients with multiple prior abdominal procedures and atypically-located hernias. Incarceration is not a contraindication as onset of anaesthesia, muscle relaxation and introduction of pneumoperitoneum make reduction easy. The procedure should however be generally avoided in children.

The data derived from our first 20 patients represents the first local series on laparoscopic ventral hernia repair in Singapore. In our series, we have found this procedure to be technically feasible, safe and effective, with good clinical outcome for our patients. The possible limitations in our series are the relatively small study group and the short mean follow-up period. The concept of LVHR has developed considerably since it was first described by LeBlanc in 1993. This paper serves to share our experience and it is hoped that by doing so, there will be better awareness and acceptability of the procedure.

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