Laparoscopic ventral rectopexy for rectal prolapse and rectal intussusception using a biological mesh

S. Albayati, M. J. Morgan and C. E. Turner
Department of Surgery, Bankstown Hospital, Sydney, New South Wales, Australia

Received 7 June 2016; accepted 17 January 2017; Accepted Article online 29 March 2017

Abstract

Aim Laparoscopic ventral rectopexy (LVR) is a nerve-sparing technique for the treatment of rectal prolapse. Concerns about the use of synthetic meshes in the pelvis and the associated risk of erosion have led to the recent use of biological meshes in some colorectal units. This retrospective study aims to assess the outcomes of patients undergoing LVR using a noncross-linked nondermal biological mesh.

Method The medical notes of all patients who underwent LVR between 1 December 2011 and 31 May 2014 were reviewed. The rate of obstructed defaecation before surgery was retrospectively determined from medical records using the Rome III criteria. The rates of obstructed defaecation and faecal incontinence following surgery were determined using a self-reported questionnaire.

Results A total of 51 patients had LVR between 1 December 2011 and 31 May 2014. Their mean age was 57.3 ± 2.5 years and the mean follow-up was 23 ± 1 months. There were seven (13.7%) postoperative complications. In total, 45 (88%) patients completed the functional outcome questionnaires. Before surgery, 33 (73.3%) patients complained of symptoms of obstructed defaecation. At the end of follow-up, 22 (48.8%, P = 0.001) patients continued to have some symptoms of obstructed defaecation. Before surgery, 12 (26.7%) patients complained of faecal incontinence. At the end of follow-up, only three (6.7%, P = 0.004) patients reported faecal incontinence. At the end of follow-up, recurrence of symptoms had occurred in six (13.3%) patients.

Conclusion LVR using a biological mesh is safe and results in significant reduction in symptoms associated with external rectal prolapse and rectal intussusception.

Keywords Prolapse, rectal intussusception, rectocele, faecal incontinence, obstructed defaecation

What does this paper add to the literature?
Concerns about the use of a synthetic mesh in the pelvis have led to the use of biological meshes, which are thought to be safer but are associated with a higher rate of recurrence. This study reports the outcomes of patients undergoing LVR using a noncross-linked nondermal biological mesh.

Introduction

Laparoscopic ventral rectopexy (LVR) was described by D’Hoore and colleagues [1], in 2004, as a nerve-sparing technique for the treatment of rectal prolapse. Since then, the procedure has gained popularity throughout the world and especially in Europe.

Several studies, although heterogeneous and small in size, show an improvement in constipation and faecal incontinence following LVR, with recurrence, morbidity and mortality comparable with those of other forms of rectopexy [2–15]. A systematic review by Samaranayake et al. [16], which included 12 studies, showed an overall significant decrease in postoperative constipation, with new-onset constipation after surgery estimated to be 14.4%. Recurrence was estimated to be 3%.

Concerns about the use of a synthetic mesh in the pelvis and the associated risk of erosion, infection and pelvic pain have led to the recent use of biological meshes in some colorectal units. Two studies that investigated the use of a biological mesh with LVR both showed results comparable with those of previous studies that used synthetic meshes [17,18]. However, there is no information...
on long-term outcomes with the use of a biological mesh, and there is no clear evidence that the use of a biological mesh is superior to use of a synthetic mesh in terms of recurrence rate or mesh-related complications.

The colorectal unit at Bankstown hospital has been performing LVR using Biodesign mesh (Cook Medical, Bloomington, Indiana, USA), a noncross-linked graft derived from porcine small bowel submucosa, since 2011. This retrospective study aims to assess the outcomes of the first 51 patients undergoing LVR using a biological mesh. The primary objective is to assess the safety and perioperative outcomes following LVR. The secondary objective is to assess the medium-term functional outcomes following LVR performed for rectal prolapse and/or rectocele.

Method

The medical notes of all patients who underwent LVR between 1 December 2011 and 31 May 2014 were retrospectively reviewed. The operations were performed or supervised by three colorectal surgeons. Indications for LVR were external prolapse, rectal intussusception and/or rectocele associated with faecal incontinence or obstructed defaecation. Preoperatively, all patients underwent a complete history and physical examination, including examination under anaesthesia and a flexible sigmoidoscopy. Patients who had external rectal prolapse had LVR without further investigations. Patients who did not have external rectal prolapse had a defaecating proctogram to confirm the presence of rectal intussusception and/or rectocele. Rectal intussusception was classified into high grade and low grade using the Oxford rectal prolapse grading system [19]. Patients were referred for pelvic floor training by a specialized nurse. Patients with confirmed rectal intussusception and/or rectocele and persisting faecal incontinence or obstructed defaecation went on to have LVR.

Patient characteristics, perioperative data, length of hospital stay and complications were obtained from medical records. The rate of obstructed defaecation before surgery was retrospectively determined from medical records using the Rome III criteria [20]. The rate of faecal incontinence before surgery was also retrospectively determined from medical records and was defined as the uncontrolled passage of solid or liquid stool once or more per month. In the case of patients presenting with symptomatic rectal intussusception and/or rectocele, recurrence was defined as the return of symptoms to their preoperative levels following initial postoperative improvement, regardless of proctographic evidence.

A self-reported questionnaire form was sent out to all patients to determine their current symptoms and their satisfaction with the surgical outcome. This was followed by a telephone call. Questions were based on the Rome III criteria. The rates of obstructed defaecation and faecal incontinence following surgery were determined at the final follow-up using the self-reported questionnaire. Satisfaction with the operation was assessed using a 4-point Likert scale, ranging from worsening symptoms to complete improvement of symptoms.

The study was approved by the Human Research Ethics Executive Committee of the South Western Sydney Local Health District.

Surgical technique

The procedure was based on the technique described by D’Hoore et al. [1]. In brief, a peritoneal incision is made over the right sacral promontory and extended in the para-rectal groove down to the deep cul-de-sac and extended anterior to the rectum across the pouch of Douglas with a small extension onto the left side. The right ureter and the right hypogastric nerve are identified. Dissection is continued anterior to the rectum, dissecting in the rectovaginal septum down to the perineal body. No posterior dissection was performed.

A biological mesh (Biodesign; Cook Medical) is used, trimmed into a hockey stick shape that is 20 cm long and 5 cm wide at the distal end. The distal end of the mesh is sutured to the anterior seromuscular rectal wall with four interrupted 3/0 PDS sutures. The posterior vaginal wall is sutured to the anterior aspect of the mesh with a 3/0 PDS suture. Prolapse is reduced and the mesh is laid along the right side of the rectum with the proximal end fixed to the sacral promontory with nonabsorbable tacks (Covidien, Mansfield, Massachusetts, USA). The peritoneum is then closed over the mesh with a 3/0 V-Lock suture (Covidien Pty Ltd). A drain is left in the pelvis overnight.

Statistical analysis

Statistical analysis was performed using IBM SPSS (IBM, Armonk, New York, USA). Numerical data are presented as mean ± SD, median (range) and number (percentage). McNemar’s test was used to evaluate differences in proportions. A value of \( P < 0.05 \) was considered significant.

Results

A total of 51 patients had LVR between December 2011 and May 2014.

Patient characteristics and operative data are presented in Table 1. All patients were women. Mean age
was 57.3 ± 2.5 (median = 57; range: 22–83) years and mean follow-up duration was 23 ± 1 (median = 21.5; range: 12–35) months. All patients were included in the study and were contacted by telephone or received a questionnaire by post. In total, 45 (88%) patients completed the questionnaire, two (4%) patients declined to participate and four (8%) patients were lost to follow-up (one patient was overseas, and three patients had changed their addresses and/or telephone numbers). Those six patients were excluded when reporting functional outcomes.

Postoperative complications, and hospital length of stay

Nine (18%) patients had surgery for external rectal prolapse, and 42 (82%) patients had surgery for rectal intussusception, with or without rectocele. Of the 42 patients with rectal intussusception, 35 were high grade, seven were low grade, 33 were associated with a rectocele and seven were associated with an enterocele and a rectocele.

All operations were completed laparoscopically and no conversion to open was recorded. No intra-operative complications were recorded. No mortality occurred. Mean length of hospital stay was 2.5 ± 0.2 (median = 2; range: 1–7) days.

Seven (13.7%) patients had postoperative complications, of which five had an unexpected return to theatre. Two patients re-presented, within 10 days of their operation, with a pelvic haematoma, which was evacuated laparoscopically. One patient, who had a combined hysterectomy and LVR, developed sepsis while an inpatient. On laparoscopy, the pelvic abscess was drained and the sloughing mesh was removed. One patient represented 7 days postoperatively with small bowel obstruction, with a CT scan suggesting small bowel volvulus. No volvulus was found at laparoscopy and the pelvis was intact. One patient had small bowel obstruction because of incarcerated small bowel in a port site defect. This was recognized during the same admission and the patient returned to theatre for incisional hernia repair. Two patients had urinary tract infections that were treated with oral antibiotics and that did not prolong admission (Table 2).

External rectal prolapse

Before surgery, nine patients had external rectal prolapse. At the end of the follow-up period, one (11%) patient had recurrence 4 months postoperatively and had a further procedure, laparoscopic posterior mesh rectopexy.

Obstructed defaecation

Before surgery, 33 (73.3%) patients complained of symptoms of obstructed defaecation. At the end of the follow-up period, 22 (48.8%, P = 0.001) patients continued to have some symptoms of obstructed defaecation. Eleven (33.3%) patients reported complete resolution of symptoms, whereas 14 (42.4%) reported partial improvement. There was no change in preoperative symptoms of obstructed defaecation in seven (21.2%) patients and one (3%) reported worsening of symptoms. No new onset of constipation was reported.

When the rate of obstructed defaecation was analysed per indication, the reduction in obstructed defaecation was significant.

### Table 1 Patient characteristics and operative data.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>57.3 ± 2.5</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>27.5 ± 0.97</td>
</tr>
<tr>
<td>Obstetric history</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>7 (13.7%)</td>
</tr>
<tr>
<td>Uncomplicated vaginal deliveries</td>
<td>32 (62.8%)</td>
</tr>
<tr>
<td>Complicated vaginal deliveries*</td>
<td>12 (23.5%)</td>
</tr>
<tr>
<td>Surgical history</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>24 (47)</td>
</tr>
<tr>
<td>Pelvic surgery (including hysterectomy)</td>
<td>23 (45)</td>
</tr>
<tr>
<td>Previous surgery for rectal prolapse</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Indication for surgery</td>
<td></td>
</tr>
<tr>
<td>External rectal prolapse</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Rectal intussusception and/or rectocele</td>
<td>42 (82)</td>
</tr>
<tr>
<td>Surgical time (min)</td>
<td>176 ± 5</td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td>37.5 ± 5.8</td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
<td>2.5 ± 0.2</td>
</tr>
<tr>
<td>Postoperative complications</td>
<td>7 (13.7%)</td>
</tr>
<tr>
<td>Follow-up (months)</td>
<td>23 ± 1</td>
</tr>
</tbody>
</table>

Values are given as mean ± SD or n (%).

*Vaginal deliveries complicated by the use of forceps or significant perineal tears requiring episiotomy.

BMI, body mass index.

### Table 2 Postoperative complications.

<table>
<thead>
<tr>
<th>Postoperative complications</th>
<th>Number of events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavien-Dindo 2</td>
<td></td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>2</td>
</tr>
<tr>
<td>Clavien-Dindo 3B</td>
<td></td>
</tr>
<tr>
<td>Reoperation (pelvic haematoma)</td>
<td>2</td>
</tr>
<tr>
<td>Reoperation (pelvic abscess)</td>
<td>1</td>
</tr>
<tr>
<td>Reoperation (incarcerated port-site hernia)</td>
<td>1</td>
</tr>
<tr>
<td>Reoperation (small bowel obstruction)</td>
<td>1</td>
</tr>
</tbody>
</table>
in patients with rectal intussusception was significant ($P = 0.004$). The reduction in patients with external rectal prolapse, however, did not reach statistical significance (Table 3).

**Faecal incontinence**

Before surgery, 12 (26.7%) patients complained of faecal incontinence. At the end of the follow-up period, only three (6.7%, $P = 0.004$) patients reported faecal incontinence (Table 3).

When faecal incontinence was analysed per indication, only the reduction in faecal incontinence in patients with rectal intussusception reached statistical significance ($P = 0.03$). The sample size of patients with external rectal prolapse who experienced faecal incontinence was not large enough to perform a statistical analysis.

**Satisfaction and Recurrence**

In total, 35 (77.8%) patients reported their symptoms to have either completely resolved or improved following surgery.

At the end of the follow-up period, a total of six (13.3%) patients had a recurrence. One patient with external rectal prolapse had a recurrence, and five patients with rectal intussusception reported that symptoms returned to presurgery levels. Of these five patients, two had a proctogram which confirmed the recurrence.

**Discussion**

This study reports the outcomes of the first 51 patients undergoing LVR for external rectal prolapse and rectal intussusception using a noncross-linked nondermal porcine mesh (Biodesign®; Cook Medical). The complication rate was 13.7%, and five (9.8%) patients had an unexpected return to theatre for postoperative complications. Although this is high compared with the 8.9% morbidity reported in the systematic review by Gouvas et al. [21], other studies report similar morbidity rates to ours [4,22]. A closer look at the indications for return to theatre show rates of port site hernia (2%), pelvic haematoma (4%) and pelvic sepsis (2%) that are not significantly different from the 4%, 3.1% and 1.2% reported elsewhere for these complications [21]. This study reports initial experience with LVR, and this may explain the relatively high morbidity rate. The operation is technically demanding with a considerable learning curve that is thought to be equivalent to 50 procedures [23]. Another possible explanation is that biological mesh is associated with higher morbidity. The complication rate reported in studies using a biological mesh with LVR is between 12% and 17% [18,22,24,25]. However, systematic reviews examining the use of mesh in the pelvis suggest no difference in infection and severe complication rates between synthetic mesh and biological mesh [26,27].

The procedure was associated with a significant reduction in symptoms of obstructed defaecation and faecal incontinence in patients with rectal intussusception. Obstructed defaecation and faecal incontinence were improved by 75%, which is in concordance with the current literature [21,22]. However, symptoms of obstructed defaecation were resolved in only 30% of patients with rectal intussusception. This suggests an occult concomitant functional component to the disorder that is not corrected by the operation. The strict use of the Rome III criteria to determine cure rate rather than a percentage improvement of severity scores may also explain the low cure rate.

The 2-year recurrence rate in this study is 13.3%. This is consistent with the 2-year recurrence rate of 14% reported by Franceshilli et al. [22] using biological mesh. Studies examining long-term outcomes using synthetic mesh, however, report recurrence rates of 2–

---

**Table 3** Patients experiencing functional symptoms before and after surgery.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructed defaecation</td>
<td>33 (73.3)</td>
<td>22 (48.8)</td>
<td>0.001</td>
</tr>
<tr>
<td>External rectal prolapse ($n = 9$)</td>
<td>3 (33.0)</td>
<td>1 (11.0)</td>
<td>0.5</td>
</tr>
<tr>
<td>Rectal intussusception ($n = 36$)</td>
<td>30 (83.3)</td>
<td>21 (58.0)</td>
<td>0.004</td>
</tr>
<tr>
<td>Faecal incontinence</td>
<td>12 (26.7)</td>
<td>3 (6.7)</td>
<td>0.004</td>
</tr>
<tr>
<td>External rectal prolapse ($n = 9$)</td>
<td>3 (33.0)</td>
<td>0</td>
<td>*</td>
</tr>
<tr>
<td>Rectal intussusception ($n = 36$)</td>
<td>9 (25.0)</td>
<td>3 (8.3)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Values are given as $n$ (%).

*Statistical analysis could not be performed because of the small sample size.
8% [13,28,29]. This suggests that the use of synthetic mesh may offer a more durable repair and fewer recurrences than the use of biological mesh. This is consistent with two systematic reviews on the gynaecological experience using mesh in the pelvis, which show that synthetic mesh is associated with fewer recurrences compared with biological mesh but at the expense of higher erosion rates [26,27]. Despite the risk of erosion associated with synthetic mesh, the reported mesh-related complications for LVR are surprisingly low. A recent multicentre collaboration on the safety of LVR reported a mesh-erosion rate of 2.4% associated with synthetic mesh compared with a mesh-erosion rate of 0.7% associated with biological mesh [30]. Therefore, with the available evidence, it seems that using biological mesh is safer than using synthetic mesh but possibly leads to inferior functional outcomes and a higher recurrence rate.

This study has several limitations, mainly from its retrospective design and the small sample size. The small number of patients with external rectal prolapse limited the ability to perform statistical analysis in the group. Constipation and faecal incontinence severity scores were not used pre- and postoperatively, which would have enabled us to assess the improvement in symptom severity following surgery and make our results more comparable with those reported in the literature. Recurrence was not confirmed by proctographic imaging, and this could have contributed to the high recurrence rate. Although a defecating proctogram can determine if symptoms are related to recurrent abnormal anatomy, it is not uncommon for some patients to report persisting or recurrent symptoms despite anatomical correction following surgery. Therefore, recurrence should still be determined based on patient symptoms, which can be assessed more accurately using symptom severity scores.

Despite these limitations, this study, reporting on the outcomes of LVR using a noncross-linked nodernal biological mesh, has the longest follow-up reported in the literature. It offers a more accurate assessment of recurrence rate associated with the use of biological mesh and it is possible that the recurrence rate may increase with time. The operation is safe using a biological mesh and resulted in significant reduction in symptoms of both obstructed defaecation and faecal incontinence. However, our results suggest that biological mesh may be associated with a higher recurrence rate compared with synthetic mesh. Although cost was not assessed in this study, biological mesh is more expensive than synthetic mesh and this should be considered as biological mesh is associated with inferior functional outcomes. Additional cost associated with the management of mesh-related complications from using synthetic mesh should also be taken into consideration. Further prospective research of this operation using a biological mesh with a longer duration of follow-up is needed to assess long-term safety, functional outcomes and the recurrence rate associated with biological mesh.

References