Original article

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How to deal with complications after laparoscopic ventral mesh rectopexy: lessons learnt from a tertiary referral centre

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Abstract

Aim Laparoscopic ventral mesh rectopexy (LVMR) is increasingly recognized as having utility in rectal prolapse, obstructive defaecation syndrome (ODS), faecal incontinence (FI) and multicompartment pelvic floor dysfunction (PFD). This study aimed to highlight gaps in service provision and areas for improvement by examining a cohort of patients with complications referred to a tertiary centre.

Method Examination was carried out of a password-protected electronic database of all LVMRs operated on in one institution.

Results Fifty patients (45 women), median age 54 (range, 24–71) years, were referred with early symptomatic failure ($n = 27$) following an inadequate LVMR or major mesh complications (erosion into another organ, fistulation or stricturing) ($n = 23$). All were amenable to remedial laparoscopic surgery. Functional improvements were found in pre- and postoperative ODS, Wexner (FI) scores (two-tailed t-test; $P < 0.0001$) and quality of life (Birmingham Bowel and Urinary Symptoms Questionnaire-22) scores at 3 months (two-tailed t-test; $P < 0.001$) and normalization at 1 year ($P < 0.015$). This was mirrored by improved linear bowel symptom severity visual analogue scale scores (two-tailed t-test; $P < 0.0001$ at 3 months and $P = 0.015$ at 1 year) .

Conclusion LVMR can be associated with technical complications arising from inadequate technique or from operation-specific complications that are amenable to complex revisional laparoscopic surgery with significant improvement in quality of life and function.

Keywords Complications, morbidity, laparoscopic ventral mesh rectopexy, remedial surgery, consultant training

What is new in this paper?

This is the first reported case series examining complications arising post-LVMR, their surgical correction and potential avoidance.

Introduction

Since its origins in 1996 as a treatment for rectal prolapse [1,2], nerve-sparing laparoscopic ventral mesh rectopexy (LVMR) has gained increasing worldwide acceptance. Several reports have also confirmed its efficacy and reproducibility in correcting symptomatic intussusception, with significant improvement in obstructed defaecation and faecal incontinence (FI) [2–4]. The technique is based on correcting the descent of the posterior and middle pelvic compartments combined with reinforcement of the vaginal septum and elevation of the pelvic floor. LVMR also minimizes the incontinence and dyspareunia that can follow the more traditional transanal and transvaginal approaches [5–7]. LVMR is particularly advantageous for the 'super elderly' [8]. It is, however, technically demanding and requires a complete ventral dissection of the rectovaginal septum (recto-vesical in men) down to the pelvic floor and suturing skills within a confined space using instruments that are at their limit. Even in 'expert' hands the technique is not without complications [2].

The aim of this paper is to focus on the tertiary referral practice of a group of patients who have failed or developed late complications after LVMR. To the best of our knowledge, this is the first such report in the literature.

Method

All patients referred between January 2006 and January 2012 after an LVMR that had been followed by

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recurrent external prolapse, ODS symptoms or complications arising out of the procedure, were analysed. Data collected included patient demographics, preoperative details, ODS [9] and Wexner FI [10] scores, operative information and clinical course to last follow up. A validated Quality of Life (QoL) questionnaire [Birmingham Bowel and Urinary Symptoms Questionnaire-22 (BBUSQ-22)] [11] was completed preoperatively and at regular postoperative intervals (3, 12, 18, and 24 months). Primary outcomes included the effect on function [ODS and FI and bowel-disturbance visual analogue scale (VAS) score] and the impact on QoL.

On referral, all patients underwent a thorough examination, dynamic defaecography, anorectal physiology (when appropriate), with or without examination under anaesthesia, and laparoscopy. Patients with pelvic pain were evaluated in consultation with a chronic pain consultant. All received gabapentin (600 or 900 mg) premedication and a 24-h ketamine infusion.

Surgical technique

The surgical technique varied with the underlying indication, but for each case there were several underlying principles.

1 All dissection was conducted using hook diathermy down to the pelvic floor with removal of the original mesh and replacement with lightweight Teflon-coated polypropylene (PFM Medical UK, Stockport, UK) using polydioxanone sutures.
2 Mesh deattachments were reattached using new mesh anchored to the promontory with Protacks™ (Covidien, Gosport, UK) and sutured (1 Ethibond) to the original mesh.
3 Rectal injury was managed by laparoscopic anterior resection and a limited LVMR using a biological mesh above the anastomosis.
4 Defunctioning of rectovaginal fistula (when present) was performed with laparoscopic removal of mesh and repair of the rectum abdominally if high or transvaginally if low.
5 All other erosions were managed by laparoscopic mesh removal, repair of the defect and insertion of a biological mesh.

Statistical analysis

Changes in pre- and postoperative ODS, Wexner and QoL scores were analysed with the paired *t*-test (two-tailed) using Prism 5 for Mac OS X software (version 5.0, © 1994–2010; Graphpad Software, San Diego, California, USA). $P < 0.05$ was considered significant.

Results

Fifty patients (45 women), of median age 54 (range, 24–71) years, were referred with early symptomatic failure ($n = 27$) or major complications arising after LVMR ($n = 23$). Their median length of stay was 1 (range, 1–4) days. There were no conversions or postoperative complications.

Early symptomatic failure following a deficient LVMR

Three men (median body mass index = 33 kg/m^2) were referred following a previous unsuccessful attempt to perform the LVMR (Table 1). Three women had undergone two previous LVMR procedures, but in each case at laparoscopy there was no evidence of a ventral dissection, the mesh 'lying free' on the pelvic brim. Eleven women had undergone LVMR using Permacol™ (Covidien) within a median of 11 (range 4–26) months. Apart from staples and an attenuated fibrous band at the sacral promontory there was no evidence of structural support or sutures within the rectovaginal septum.

Eight patients developed a full-thickness prolapse within 1 year, in seven (two Permacol™ meshes) because of deattachment of staples from the promonontory ($n = 5$) or incorrectly positioned staples to the upper sacrum ($n = 2$). In these seven patients, only two staples had been used. In the remaining patient the mesh had been sutured to the right lateral rectal wall, allowing the formation of a large left-sided enterocele. Two men with continuing ODS had an inadequate strip of mesh sutured to the right side of the upper rectum with no dissection of the rectoprostatic septum.

Major mesh complications

Rectal stricture

Four patients were referred with recurrent ODS and new-onset pelvic pain secondary to a stricture in the mid-rectum ($n = 3$) or the recto-sigmoid ($n = 1$)

Table 1 Cause of early failure of laparoscopic ventral mesh rectopexy (LVMR) among 27 patient referrals.

Cause	No. of patients
Unable to perform LVMR	3
Recurrent external prolapse within 6/12 months	8
Repeated LVMR	3
Recurrent ODS/RI	13

ODS, obstructed defaecation syndrome; RI, rectal intussusception.

Table 2 Major complications after laparoscopic ventral mesh rectopexy (LVMR) among 23 patient referrals.

Complication	No. of patients
Rectal stricture	4
Rectovaginal fistula	3
Pain/dyspareunia	5
Mesh erosion	
Rectum	2
Vagina	8
Bladder	1

(Table 2). All strictures were associated with the tail of the mesh, which had been stapled to the mid-sacrum rather than to the promontory.

Erosion

There were two erosions into the rectum. Laparoscopic revision was effective in relieving the pelvic pain in both cases. Nine women were referred with mesh erosion into the vaginal vault ($n = 7$), mid-vagina (1) and bladder ($n = 1$); all had undergone a previous hysterectomy and were postmenopausal.

Pelvic pain

Three patients were referred with chronic pelvic pain and localized vaginal tenderness unresponsive to epidurals and poly-pharmacy. One was associated with pudendal nerve irritation, which had started in the recovery room following the original surgery. Each mesh was associated with excessive chronic inflammation. Replacement with Teflon-coated polypropylene led to symptom improvement sufficient for two patients to be able to stop analgesic medication. One patient also developed recurrent ODS, requiring treatment with the symptom-relieving posterior stapled transanal resection of the rectum (STARR) procedure. The same patient has since had a transgluteal pudendal nerve release with a 50% reduction in the severity of pain and the ability to sit for longer periods of time. In the remaining patient a lightweight multifilament Vypro™ mesh (Ethicon, Edinburgh, UK) was used. Although this improved dyspareunia, recurrent ODS developed over a 2-year period as the mesh 'stretched'. The patient is now requesting a further revision.

ODS and Wexner scores

Revisional surgery was associated with significant improvement in median postoperative ODS and Wexner FI scores at 1 year (two-tailed *t*-test; $P < 0.0001$) (Figs. 1 and 2). Significant improvements in QoL score and linear VAS for bowel symptom severity were seen at 3 and 12 months and these were maintained over the following year (Figs. 3 and 4).

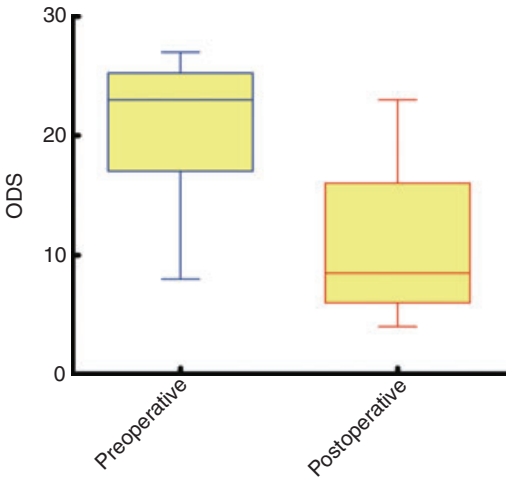

Figure 1 Pre- and postoperative obstructive defaecation syndrome (ODS) scores ($n = 50$) at 1 year (two-tailed *t*-test; $P < 0.0001$). The horizontal bars indicate the median value.

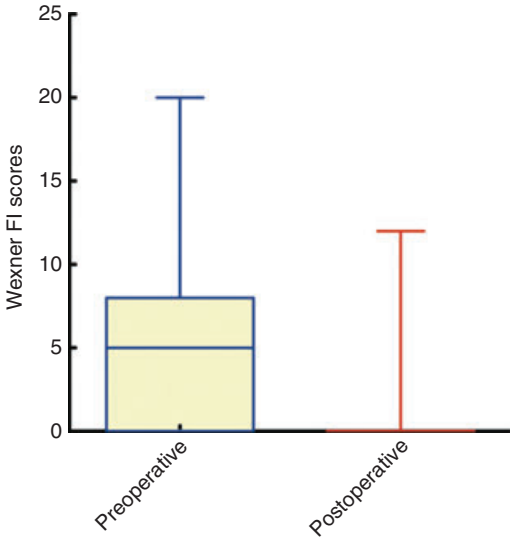

Figure 2 Pre- and postoperative Wexner faecal incontinence (FI) scores at 1 year ($n = 50$) (two-tailed *t*-test; $P < 0.0001$). The horizontal bars indicate the median value (if not visible this indicates that the median is 0).

Discussion

Surgery for rectal prolapse and ODS should be safe, effective and long lasting, with minimal morbidity and maximal patient satisfaction. LVMR has a relatively low risk of laparoscopy-related complications such as port-site hernia, port-site haematoma, inadvertent enterotomy and procedure-specific mesh-related complications,

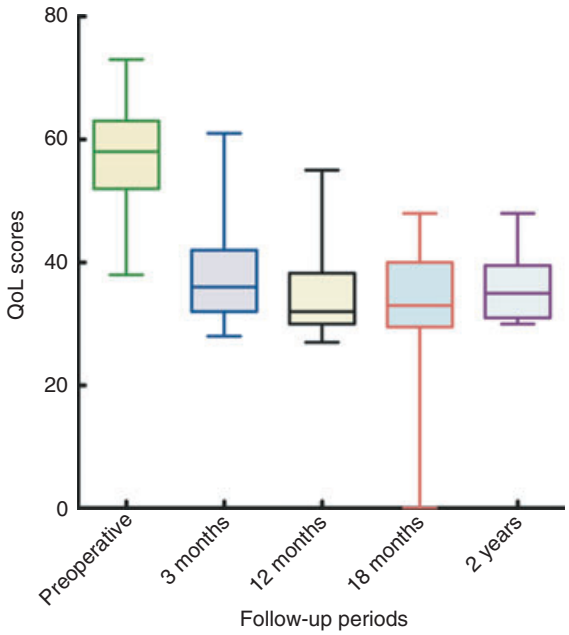

Figure 3 Quality of life (QoL) (Birmingham Bowel and Urinary Symptoms Questionnaire-22 (BBUSQ-22)) scores. The horizontal bars indicate the median values. Preoperative *vs* 3 months, $P < 0.0001$; 3 months *vs* 12 months, $P = 0.015$; and 12 months *vs* 2 years, NS.

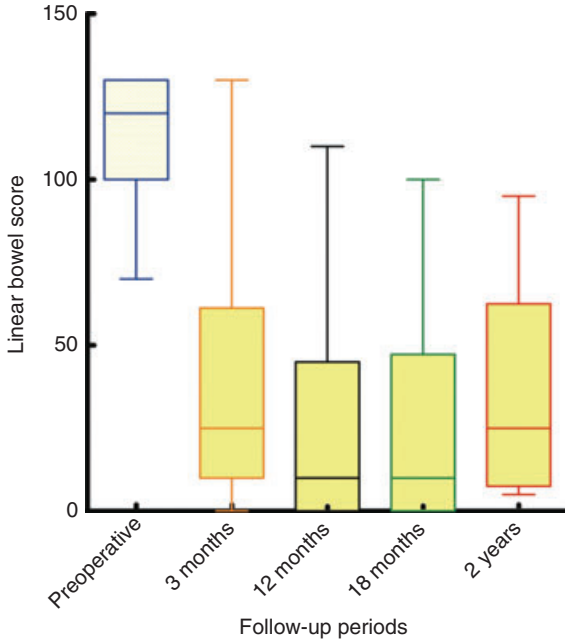

Figure 4 Linear analogue score for severity of bowel symptoms. Preoperative *vs* 3 months, $P < 0.0001$; 3 months *vs* 12 months, $P = 0.0151$; 12 months *vs* 2 years, NS. The horizontal bars indicate the median value.

which have been reported in around 2% of patients and may have serious consequences [1,2,12]. The surgeon must have substantial experience in laparoscopic colorectal surgery and be able to take the ventral rectal dissection down to the pelvic floor, but even then there is a continuing learning curve [1,2,12]. Although unreported, it is likely that the learning curve might influence the functional outcome and the complication rate, as demonstrated in the present report.

The most serious complications of LVMR are mesh-related, including infection, erosion and extrusion and failure. The 2008 National Institute of Clinical Excellence (NICE) review [13] of surgery for pelvic organ prolapse demonstrates that these relate to the type of mesh used and are a function of the duration of follow up. The report showed that erosion rates were zero for biologic mesh (xenografts), but rose to 7% for synthetic mesh and to 14% for combined synthetic mesh. The price paid was a higher failure rate for biological mesh compared with synthetic mesh (23% *vs* 9%).

As shown in the present study, most complications are amenable to corrective surgery. This can be complex but there appears to be an invariable improvement in overall function (ODS and FI scores) and quality of life and these benefits are maintained over a 2-year follow up. Unless the sepsis has made the mesh freely mobile in the rectovaginal septum, in our experience it is impossible to remove it via a perineal approach without the serious risk of causing a rectovaginal fistula. This is particularly true if the erosion is at the level of the vault or posterior fornix. Laparoscopic removal, whilst being a technical challenge, offers a more direct approach and can usually be performed without the complication.

Failure, defined as the recurrence of symptoms and/or of prolapse, of LVMR after insertion of Permacol™ mesh has been reported in 12% and 21% of patients at a median follow-up of 1 and 2 years, respectively [14,15]. Two studies [16,17] reporting the results of rectocele repair using the same xenograft describe a 41% incidence of anatomical recurrence at 3 years, with the majority of patients reporting persisting obstructive defaecation. These failures may simply reflect the underlying collagen disorder that predisposed the patients to pelvic organ prolapse, with and without ODS, in the first instance. Synthetic mesh has the advantage of high tensile strength, immediate availability, lower cost [18] and better tissue integration [19]. A study of 446 patients [20] undergoing laparoscopic sacral colpopexy with polypropylene reported a 1% risk of mesh extrusion.

Learning LVMR presents two types of challenges: anatomical and technical. For trainee surgeons the anatomy and dissection planes must be learned. For experienced surgeons, the transition from open to laparoscopic sur-

gery requires adjustment to a new perspective of pelvic and abdominal anatomy. Cognitive and technical skills modulated by judgment are the components of competency, particularly in the case of 'difficult' operations, such as LVMR. However, it is these innate technical abilities (such as visual hand response, visual information processing and visual spatial memory) that are the limiting factors in determining the ultimate level of operator skill aspects of performance that may not always improve with practice [21]. Trainees need to develop their skills through mentorship and practice outside the operating theatre [22]. Human cadavers offer realistic anatomy and tissue haptics. However, they are expensive, restricted and lack objective assessment. Performance feedback helps improvement, and performance improvement reinforces the rate of learning of trainees [23]. Objective assessment of surgical performance, including judgment, can only be obtained by reviewing unedited videotapes of surgical procedures for errors and quality of performance by at least two unbiased experts. Within the LAPCO National Training Programme in Laparoscopic Colorectal Surgery, 40% of consultants fail this type of 'sign-off' assessment.

This study highlights the importance of achieving the required competence and specialist experience of LVMR and implies the need for interested surgeons to have undertaken a relevant supervised training programme and be willing to submit data to a national prospective clinical audit scheme. The reality, however, is that the adoption of new procedures, such as LVMR, tends to occur without thought to the careful assessment and credentialing of the surgeon's technical proficiency. Given the complexity of benign pelvic floor disease, technical competence needs more robust examination. As this report demonstrates, revisional surgery is appropriate in most patients who develop failure or complications after LMVR, but it should only be undertaken in a specialist centre.

In conclusion, revisional surgery by specialist units following failure or severe complications after LVMR is appropriate and can improve function and QoL. The choice of mesh is a balance between a higher recurrence rate with a xenograft and higher rates of infection and extrusion with a synthetic mesh. Caution should be exercised on the widespread uptake of expensive xenografts for what is probably a group of patients with an underlying collagen disorder. The patients reported in the present study highlight the problems of uncontrolled uptake of a new interventional procedure. They demonstrate the importance of guidelines on training, service provision and commissioning and the need for a network of tertiary centres to provide help with difficult cases, especially those requiring revisional surgery.

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