Long-term Outcome After Laparoscopic Ventral Mesh Rectopexy

An Observational Study of 919 Consecutive Patients

Esther C. J. Consten, MD, PhD, Jan J. van Iersel, MD,* Paul M. Verheijen, MD, PhD,* Ivo A. M. J. Broeders, MD, PhD,*† Albert M. Wolthuis, MD,‡ and Andre D'Hoore, MD, PhD‡*

Objective: This multicenter study aims to assess long-term functional outcome, early and late (mesh-related) complications, and recurrences after laparoscopic ventral mesh rectopexy (LVR) for rectal prolapse syndromes in a large cohort of consecutive patients.

Background: Long-term outcome data for prolapse repair are rare. A high incidence of mesh-related problems has been noted after transvaginal approaches using nonresorbable meshes.

Methods: All patients treated with LVR at the Meander Medical Centre, Amersfoort, the Netherlands and the University Hospital Leuven, Belgium between January 1999 and March 2013 were enrolled in this study. All data were retrieved from a prospectively maintained database. Kaplan-Meier estimates were calculated for recurrences and mesh-related problems.

Results: 919 consecutive patients (869 women; 50 men) underwent LVR. A 10-year recurrence rate of 8.2% (95% confidence interval, 3.7–12.7) for external rectal prolapse repair was noted. Mesh-related complications were recorded in 18 patients (4.6%), of which mesh erosion to the vagina occurred in 7 patients (1.3%). In 5 of these patients, LVR was combined with a perineotomy. Both rates of fecal incontinence and obstructed defecation decreased significantly ($P < 0.0001$) after LVR compared to the preoperative incidence (11.1% vs 37.5% for incontinence and 15.6% vs 54.0% for constipation).

Conclusions: LVR is safe and effective for the treatment of different rectal prolapse syndromes. Long-term recurrence rates are in line with classic types of mesh rectopexy and occurrence of mesh-related complications is rare.

Keywords: laparoscopic ventral rectopexy, mesh-related complications, mesh erosion, rectal prolapse, recurrence

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INTRODUCTION

Rectal prolapse (RP) and concomitant rectocele and enterocele can be associated with pelvic discomfort and a varying degree of symptoms, such as obstructed defecation, and/or fecal incontinence.[1–4] Throughout the past century, more than 100 different surgical techniques have been described to repair RP.[5,6] Heterogeneity of studies makes it difficult to determine the optimal surgical technique.[7]

Laparoscopic ventral mesh rectopexy (LVR), as described by D'Hoore et al, has gained increasing acceptance to correct RP.[8–11] The technique corrects the descent of the posterior and middle pelvic compartment and reinforces the rectovaginal septum. Dissection is limited to the anterior aspect of the distal rectum followed by a mesh suspension to the sacral promontory. Avoidance of extensive rectal mobilization minimizes the risk for autonomic nerve damage and related new-onset constipation. A recent systematic review of 760 patients (15 studies) provides support for the safety and short-term efficacy of the procedure.[12]

In 2008 and again in 2011, the US Food and Drug Administration (FDA) expressed its concern about the high rate of mesh-related complications in pelvic organ prolapse (POP) surgery.[13] Although this warning was primarily intended for transvaginal procedures, also considerable uncertainty was created about the safety of abdominally placed meshes. Therefore, the aim of this study was to further assess safety and effectiveness of LVR and report in detail on mesh-related morbidity in a large cohort of patients with substantial follow-up.

PATIENTS AND METHODS

Study Design

This observational cohort study is a retrospective analysis based on 2 prospectively maintained databases and was performed in a large teaching hospital in the Netherlands, and a university hospital in Belgium. All consecutive patients older than 18 years who underwent LVR between January 1999 and April 2013 were included. The study was approved by the medical ethics committees of both the centers.

Patients were seen in the outpatient clinic at 6 weeks and 3 months postoperatively. The majority of patients received longer follow-up in accordance with 2 previous studies.[14,15] All the patients were instructed to return in the event of symptoms of recurrence.

Patients and Evaluation

All patients suffered from an external rectal prolapse (ERP) or an Oxford grade III/IV internal rectal prolapse (IRP) with symptoms of fecal incontinence or obstructed defecation. In addition, a descent of the middle pelvic compartment (rectocele, enterocele) could be present. The extent of the anatomical defect was assessed by dynamic MRI or colpo-cysto-defecography.[16] Fecal continence was graded as proposed by Browning and Parks[17] (grade 1, continent; grade 2, incontinent to flatus; grade 3, incontinent to flatus and liquid stools; grade 4, incontinent to flatus, liquid and solid stools). Grade 1 and 2 were graded as "continent," grade 3 and 4 as "incontinent." Incontinent patients had further sphincter evaluation. In case of fecal incontinence combined with an insufficient sphincter function, the prolaps was corrected first. Rome II criteria were used to assess constipation and to arbitrarily differentiate between obstructed defecation and slow transit constipation according to D'Hoore et al.[10,18] A radiopaque marker test was performed if patients revealed a pattern

From the *Department of Surgery, Meander Medical Centre, Amersfoort, The Netherlands; †Institute of Technical Medicine, Twente University, Enschede, The Netherlands; and ‡Department of Abdominal Surgery, University Hospital Gasthuisberg, Leuven, Belgium.

Dr van Iersel and Dr Consten contributed equally to the paper and should be considered co-first authors.

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Reprints: Andre D'Hoore, MD, PhD, Department of Surgery, University Hospital Gasthuisberg, Herestraat 49, 3000 Leuven, Belgium. E-mail: andre.dhoore@uzleuven.be.

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of low frequency constipation. The functional outcome was measured at the moment of last follow-up. In patients where a reintervention was indicated, the functional outcome was noted at the last follow-up before the intervention. Postoperative morbidity was classified according to the Clavien-Dindo (CD) classification.[19,20] Grade I and II were assigned as minor, grade III or more as major. Mesh related morbidity was recorded separately.

Surgical Technique

The surgical technique of LVR was performed according to the technique as described in detail by D'Hoore et al.[9] In Belgium a Marlex (Bard, Crawley, UK) mesh was used. In the Netherlands either a Hi-TEC mesh (Textiles Hi-Tec, Labastide-Rouairoux, France) (until mid2007) or a Prolene (Ethicon Inc., Johnson & Johnson, Hamburg, Germany) mesh (from mid-2007 and onwards) was inserted. The change of mesh was because of a new policy in stock acquisition, not on any surgical grounds.[14] The mesh was attached to the sacral promontory using titanium tacks (Autosuture Protack 5 mm, Covidien, Minneapolis, MN), a stapler (Endopath EMS; Ethicon Endosurgery, Norderstedt, Germany), and/or non-resorbable sutures. The mesh was sutured to the ventral aspect of the distal rectum. In patients with a concomitant symptomatic low rectocele (level III, perineocele), a small perineotomy was performed to complete the rectovaginal septum dissection to the level of the perineal body. The mesh was sutured on top of the anal sphincters to obtain complete rectovaginal septum reinforcement. Technical details were highlighted in references 15 and 21.

Statistical Analysis

Statistical Package for the Social Science, version 20.0 (IBM Corp., Armonk, NY) was used for statistical analysis. Data are presented as percentage, mean ± SD, median, and range. Because of difference in follow-up between patients, the Kaplan-Meier method was used to estimate the complication and recurrence rate at various timepoints. In the text, the risk estimates after a period of 10 years are presented. To evaluate differences in functional outcome, McNemar tests were used. $P < 0.05$ was considered statistically significant.

RESULTS

Patients Characteristics and Operative Data

A total of 919 patients (869 females; 50 males) underwent LVR (Table 1). One hundred six patients (11.5%) had an additional perineotomy to correct a level III perineocele.[15,21] Five hundred twenty one (56.7%) patients had previous pelvic or abdominal surgery; 338 (36.8%) received hysterectomy, 85 (9.2%) cystopexy, 96 (10.4%) posterior colporrhaphia, and 12 (1.3%) various sphincter operations. In 20 (2.2%) patients conversion to laparotomy was required. The reasons for conversion were extensive intra-abdominal adhesions in 13 patients, bleeding from the left iliac vein (n = 4), poor visibility (n = 1), small bowel perforation (n = 1), and an anesthesia-related cause (n = 1). In addition, intra-operative complications occurred in 3 patients (0.3%). In 2 patients, a posterior vaginal wall perforation occurred, and in 1 patient the rectum was perforated. All perforations were sutured during surgery. In both patients with vaginal lacerations LVR was continued. The procedure complicated by a rectal perforation was aborted and performed uneventfully at an interval of 4 months. No mesh-related complications occurred after these intraoperative complications.

Early Postoperative Course

Postoperative in-hospital mortality occurred in 1 (0.1%) 85-year-old ASA IV patient as a result of urosepsis. Mean overall length of hospital (LOS) stay was 4.4 days (range 1–30, SD 2.45) with a median of 4 days. Mean LOS stay decreased from 5.92 days (first 50 patients per hospital) to 3.86 (last 50 patients per hospital). Early postoperative (<30 days) complications were observed in 110 (12.0%) patients. Only 1.6% of these patients had a major complication (Table 1).

Long-term Outcome

Late Postoperative Complications

Median follow-up after LVR was 33.9 months (range 0.4–143.6). Seven hundred and ninety patients (86.0%) were available for follow-up after 3 months. During follow-up, 23 patients (2.5%) died

TABLE 1. Patient Characteristics, Operative Data, Early Postoperative Course and Functional Outcome Per Hospital

	Total n = 919 (%)	Leuven n = 498 (%)	Amersfoort n = 421 (%)
Females/males [mean age]	869/50 [55.8]	463/34 [50.7]	405/16 [61.8]
Diagnosis—ERP	242 (26.3)	186 (37.3)	56 (13.3)
IRP or/and symp. rectocele	460 (50.1)	194 (39.0)	266 (63.2)
With enterocele	217 (23.6)	118 (23.7)	99 (23.5)
Conversion	20 (2.2)	10 (2.0)	10 (2.4)
Postoperative in-hospital mortality	1 (0.1)	0	1 (0.2)
Length of hospital stay (mean)	4.4	4.4	4.5
Early postoperative complications	114 (12.4)	82 (16.5)	32 (7.6)
Major	15 (1.6)	7 (1.4)	8 (1.9)
Minor	99 (10.8)	75 (15.1)	24 (5.7)
Preoperative fecal incontinence	344 (37.5)	121 (24.3)	223 (53.0)
Grade 3 B&P	18 (2.0)	3 (0.6)	15 (3.6)
Grade 4 B&P	326 (35.5)	118 (23.7)	208 (49.4)
Postoperative fecal incontinence	102 (11.1)	50 (10.0)	52 (12.4)
Grade 3 B&P	27 (2.9)	17 (3.4)	10 (2.4)
Grade 4 B&P	75 (8.2)	33 (6.6)	42 (10.0)
Preoperative obstructed defecation	496 (54.0)	269 (54.0)	227(53.9)
Postoperative obstructed defecation	143 (15.6)	73 (14.7)	70 (16.6)
ST	12 ST (1.3)	11 (2.2)	1 (0.2)

ERP indicates external rectal prolapse; IRP, internal rectal prolapse; symp, symptomatic, B&P, grading system as proposed by Browning and Parks; ST, slow transit.

TABLE 2. Late and Mesh Complications After LVR–*Treatment**

	Total (%†)	CD Classification[19,20]	Months‡
Late complication	Minor		
Dyspareunia	21 (3.3)	21 I	8.2 [1.1–60.3]
Proctalgia fugax	17 (2.5)	17 II	5.4 [1.1–38.8]
Anal fissure	14 (2.4)	14 I	5.2 [1.3–70.9]
Chronic pelvic pain	1 (0.1)	I	1.1
SRUS/rectitis	1 (0.2)	II	13.5
Total minor late complications >30 days n = 54 (8.5%)			
Late complication	Major		
Perianal fistula—*fistulectomy*	4 (0.6)	4 IIIa	11.5 [3.2–13.5]
Incisional hernia—*primary closure*	5 (0.9)	5 IIIb	12.0 [5.1–52.3]
Anal fissure—*LIS*	2 (0.3)	2 IIIa	6.4 [4.4–13.6]
Chronic pain—*adhesiolysis/cleaving mesh*	3 (0.4)	3 IIIb	11.0 [4.3–14.4]
Neurinoma scar—*excision*	1 (0.1)	IIIa	7.5
Spondylodiscitis—*prolonged AB/orthopedic surgery (spondylodesis, stabilization titanium cage)*	1 (0.1)	IIIb	2.8
Rectal perforation/spondylodiscitis/sepsis—*mesh removal/double-barrel colostomy*	1 (0.1)	IIIb	1.5
Total major late complications, n = 17 (2.5%)			
Mesh complication			
Mesh detachment—*re-do rectopexy*	9 (2.7)	IIIb	45.6 [5.0–99.3]
Mesh erosion—*resection*	7 (1.3)	IIIb	8.9 [1.7–47.9]
Obstruction/presacral adhesions mesh—*adhesiolysis/partial enterectomy*	1 (0.4)	IIIb	69.6
(Chronic) mesh infection and fistula–*low anterior side to end coloanal anastomosis*	1 (0.2)	IIIb	18.2
Total mesh complications n = 18 (4.6%)			

*All minor late complications were treated conservative.
†All percentages are Kaplan-Meier (KM) estimates at 10 years of follow-up.
‡Median [minimum–maximum] duration in months between surgery and complication of the observed events (hence not based on the KM curve).
LIS indicates lateral internal sphincterotomy; SRUS, solitary rectal ulcer syndrome; AB, antibiotics.

of a cause unrelated to LVR. Seventy-eight patients suffered from 89 late complications (>30 days, Table 2). Three patients developed a septic spondylodiscitis. This was treated by antibiotics in 1 patient (early complication). The second patient required extensive orthopedic surgery and has, despite control of the sepsis, chronic invalidating lumbosacral pain. In the third patient the discitis was because of a rectal perforation for which the mesh was removed and a deviating colostomy was created (Table 2).

Mesh-related Complications

Eventually 18 patients developed a mesh-related complication. The estimated percentages (Kaplan-Meier) were 1.5% after 3, 2.9% after 5, and 4.6% after 10 years (95% confidence interval (CI) 2.1–7.1, see Fig. 1 for Kaplan-Meier curve). Erosion of the mesh to the vagina occurred in 7 (1.3%) patients (Table 2, all percentages are Kaplan-Meier estimates at 10 years). Five of these patients had received a perineotomy in addition to the standard LVR.[15,21] In all erosions, debridement of the mesh was performed and the vagina was closed over the defect. Most patients had pretreatment with topical estrogel. Two patients needed a second procedure and 1 patient underwent 3 interventions because of erosion, but at the end of follow-up all defects were closed without residual localized sepsis. In addition, 1 patient developed a complex fistula to the rectum and vagina. In this patient, a restorative resection with a low colorectal anastomosis was performed in 18.2 months after LVR. Dehiscence of the cranial side of the mesh (sacral promontory) was the reason for RP recurrence requiring refixation in 9 patients.

Functional Outcome: Fecal Incontinence

Preoperatively, 344 patients (37.5%) suffered from fecal incontinence and at final follow-up a postoperative improvement of 80.2% (n = 276) was reported. Two hundred and forty-seven patients went from grade 4 to 1/2, 16 from grade 3 to 1/2, 13 from grade 4 to 3, and the remaining 68 patients (66 grade 4, 2 grade 3) did not change. ERP showed a decrease of fecal incontinence complaints from 40.5% to 14.8%, IRP and/or symptomatic rectocele from 37.8% to 8.5%, and IRP and/or symptomatic rectocele combined with enterocele from 32.2% to 12.5% ($P < 0.0001$, Table 3). New onset incontinence was documented in 21 patients (2.3%).

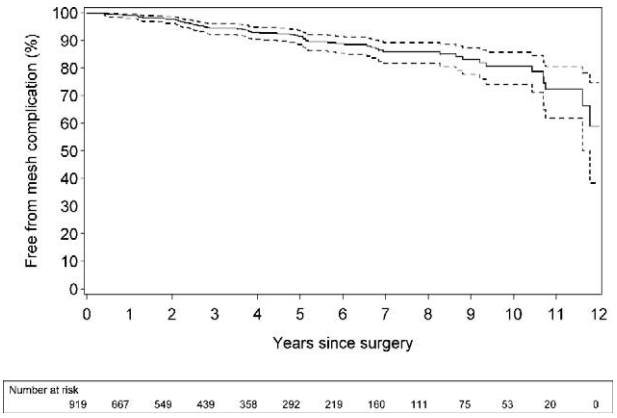

FIGURE 1. Kaplan-Meier curve for mesh-related complications for the total cohort (continuous line, n = 919) and the confidence interval (dotted line). The duration of event-free survival was measured from date of surgery to the time of the event (complete) or the last follow-up (censored). At the bottom of the figure a table with the number of patients left for analysis at each time point is presented.

TABLE 3. Functional Outcome and Recurrence

Functional Outcome	Total n (%)	ERP (n = 242)	IRP and/or Symptomatic Rectocele (n = 460)	IRP and/or Symptomatic Rectocele with Enterocele (n = 217)
Fecal incontinence				
Pre-op	344 (37.5)	98 (40.5)	174 (37.8)	72 (33.2)
Grade 3	18	3	8	7
Grade 4	326	95	166	65
Last FU	102 (11.1)	36 (14.8)	39 (8.5)	27 (12.5)
Grade 3	27	10	9	8
Grade 4	75	26	30	19
P	<0.0001	<0.0001	<0.0001	<0.0001
Obstructed defecation				
Pre-op	496 (54.0)	82 (33.9)	291 (63.3)	123 (56.7)
Last FU	143 (15.6)	32 (13.2)	75 (16.3)	36 (16.6)
ST	12 (1.3) ST	4 (1.7) ST	7 (1.5) ST	1 (0.5) ST
P	<0.0001	<0.0001	<0.0001	<0.0001

Recurrence	Total	ERP (n = 242)	IRP and/or symptomatic rectocele with or without enterocele (n = 677)
Duration* between surgery and recurrence	24.1 (1.0–139.4)	22.0 (3.8–64.6)	24.8 (1.0–139.4)
Initial diagnosis			
ERP	21	13	8
IRP and/or symp. rectocele with/without enterocele	47	2	45
Total recurrences	68	15	53

*Median [minimum–maximum] duration in months between surgery and recurrence of the observed events (hence not based on the Kaplan Meier curve).
ERP indicates external rectal prolapse; IRP, internal rectal prolapse; pre-op, preoperative; FU, follow-up; ST, slow transit constipation; symp., symptomatic.

Functional Outcome: Obstructed Defecation, Constipation

Twenty-two (2.4%) patients developed new onset constipation and 12 patients with slow transit colonic constipation did not improve after LVR.

The preoperative presence of outlet obstruction (n = 496, 54%) declined significantly after surgery (n = 143, 15.6%, $P < 0.0001$). In patients with IRP and/or symptomatic rectocele, symptoms of obstructed defecation resolved in 74.2%. This was the case in 70.7% of patients with IRP and/or symptomatic rectocele combined with enterocele, and in 61.0% of those with ERP ($P < 0.0001$, Table 3). Overall functional differences between the 2 hospitals are shown in Table 1.

Recurrence

A total of 68 patients developed a recurrence (Table 3). The estimated recurrence percentages for the whole cohort according to the Kaplan-Meier method were 7.0% after 3, 10.7% after 5, and 14.3% after 10 years (95% CI, 10.6–18.0).

Recurrence After LVR for ERP

Thirteen patients with ERP (13/242) developed a clinical full-thickness external prolapse recurrence generating a recurrence percentage (Kaplan-Meier estimates) of 4.2%, 7.2%, and 8.2% (95% CI, 3.7–12.7) after 3, 5, and 10 years (Fig. 2). In addition, 8 patients developed a symptomatic IRP with/without enterocele recurrence requiring surgical correction.

Recurrence After LVR for IRP

Forty-five patients were diagnosed with recurrent IRP with/without enterocele, (45/677) and 2 patients developed an ERP (2/677, Table 3). The Kaplan-Meier estimates for recurrence for patients initially diagnosed with IRP was 7.5% after 3, 11.1% after 5, and 14.2% after 10 years.

DISCUSSION

Surgery for rectal prolapse not only aims to correct the anatomical defect but should also improve anorectal function and avoid postoperative functional sequelae. LVR is rapidly becoming the procedure of choice to correct rectal prolapse syndromes.[11] In our cohort half of the patients had previous abdominal or pelvic surgery, which is high as compared to similar smaller studies.[9,10] Nonetheless, a low conversion rate (2.2%) was found, comparable to recent literature.[8–10] During the dissection of the sacral promontory, it

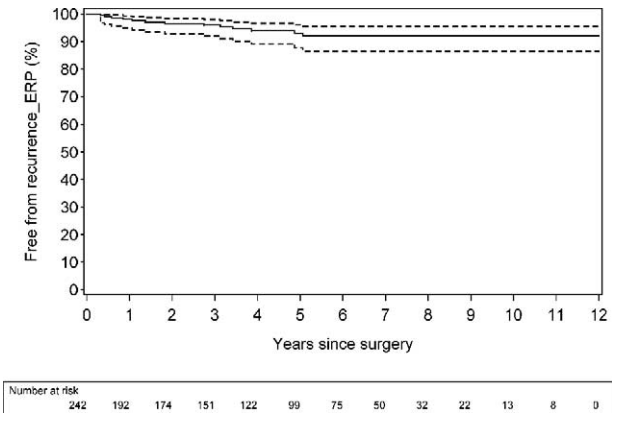

FIGURE 2. Kaplan-Meier curve patients with an ERP recurrence within the ERP group (continuous line, n = 242) and the confidence interval (dotted line). The duration of recurrence-free survival was measured from date of surgery to the time of recurrence (complete) or the last follow-up (censored). At the bottom of the figure a table with the number of patients left for analysis at each time point is presented.

should be noted that the left iliac vein is at risk. Inadvertent vaginal or rectal perforation should be treated with meticulous suture closure and delayed mesh rectopexy. Most postoperative morbidity is minor and underscores the safety and reproducibility of the technique.[22–24] Sacral discitis is a rare complication; prompt diagnosis should prevent long-term sequelae.[12,25] Considering the low perioperative and postoperative complication rate, LVR can be considered safe.

Over time the risk for recurrence increases. The actuarial 10-year ERP recurrence rate in our study is 8.2% (CI 3.7–12.7). In a multicenter pooled analysis of 643 individual patients, data on different abdominal surgical techniques to treat RP showed a 5- and 10-year recurrence of 6.61 and 28.9%, regardless of the technique being used.[26] Foppa et al. reported a crude 5-year recurrence rate of 6% but an actuarial 10-year recurrence rate of 20% (95% CI, 10.8–20.1) in 179 patients after laparoscopic suture rectopexy.[27] LVR studies with shorter follow-up consequently show lower ERP recurrences rates varying from 1.6% to 5.6%,[9,10,28–32] with 1 small report with a percentage of 15.4%.[33] These studies reflect the need to have long-term follow-up data to evaluate the ultimate efficacy of rectopexy. In total (ERP/IRP), 68 recurrences were seen generating a 10yrs KM of 14.3%. This number is high compared to recurrence rates in recent studies including both ERP and IRP, and describing recurrences of both entities (0%–9.4%[14,34–38]). However, these are small studies with large differences in follow-up. The study of Mackenzie and Dixon compares best to our series (9.4% total recurrence ERP/IRP).[38] Recurrence rates in our cohort are comparable with other rectopexy techniques that require more extensive rectal mobilization.[22,39,40] Most recurrences occur after dehiscence of the mesh from the sacral promontory. However, we reinforce the mechanical fixation with 1 or 2 additional nonresorbable sutures.

The risk for mesh related complications is key importance. The FDA warning is based on data from 110 studies including 11.785 women, where approximately 10% of women undergoing transvaginal POP repair with mesh will experience mesh erosion within 12 months.[41] A large systematic review (21 studies, n = 1,869) on sacral colpopexy showed an erosion rate of 4.7% (median 4.0%) for nonabsorbable synthetic mesh, thus, showing that abdominal POP surgery using mesh generates lower rates of mesh complications as compared to transvaginal POP surgery with mesh.[42] The laparoscopic route for rectovaginal septum reinforcement using synthetic mesh is more safe with an actuarial 10-year risk for erosion of only 1.3% in this series. Furthermore this risk can be reduced by avoiding an additional perineotomy to correct low rectoceles, considering the incidence of erosion in the perineotomy group (5/106, 10yrs KM 6.2%). A review comparing multiple techniques for RP using mesh, reported 2% to 16% of patients with prosthetic rectopexy developing significant pelvic sepsis.[40] However, specific literature on mesh-related complications following LVR is limited. Mesh complication rates from 0% to 6.7% with mesh erosion percentages between 0% and 3.7% are described.[14,22,24,31,32,35–38,43,44] Although there are serious concerns about mesh complications in POP surgery, based on this study and the literature it seems this is less of an issue regarding LVR. The use of biologicals is still under debate and more data are needed to balance between the risk for recurrence and graft-related morbidity. The behavior and tissue incorporation of the available biological grafts differ which makes outcome comparison difficult. Recent literature shows no statistical difference between biologic and non-absorbable mesh, but follow-up is short for studies concerning biologicals.[43,44]

Surgical prolapse repair also aims to improve anorectal function. We observed a significant decrease in symptoms of obstructed defecation and a significant improvement of fecal continence. These findings correlate with literature on LVR without posterior rectal mobilization showing rates from 15.4% to 83.3%, and a mean decrease of 40.3% for constipation, and 13.6% to 77.3% with an overall weighted mean decrease of 44.9% for fecal incontinence.[22] In our cohort, new-onset constipation was only noted in 22 (2.4%) patients. A systemic review on functional outcome of different rectopexy techniques reported new-onset constipation in 5.5% to 10.5% for LVR without posterior rectal mobilization.[22]

The most important limitation of this study are the differences in follow-up between patients because of the retrospective character. Although the Kaplan-Meier method yields appropriate estimates for recurrence and complication rates at various points in time, underestimation remains possible. In the evaluation of functional scores, differences in follow-up were even ignored. Therefore, selection bias may have occurred, as the probability of a revisit might be related to the degree of complaints. Furthermore, we cannot draw any conclusion on the within-patient evolution of the functional score, because these data are cross-sectional. These limitations should be taken into account interpreting the long-term outcomes.

CONCLUSION

Laparoscopic ventral rectopexy is a safe and reliable technique to repair different rectal prolapse syndromes. It results in acceptable long-term recurrence rates while functional improvement is significant. Mesh-related problems are rare.

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DISCUSSANTS

S. Biondo (Barcelona, Spain):

I congratulate the authors for this series on consecutive patients that underwent laparoscopic ventral rectopexy (LVR). The strengths of the study are related to the large number of patients, the low recurrence rate for external rectal prolapse, the functional improvement on fecal incontinence and obstructed defecation, as well as a low mesh-related complication rate; a main point of concern after that technique. The study presents however some flaws because of its retrospective design and the heterogeneous type of diseases included.

In my opinion, even if results are reported on a Kaplan-Meier curve, those cannot be considered consistently reliable because of the lack of systematic follow-up. Therefore, it is difficult to draw strong conclusions on functional results in the long-term. I also think reporting results separately for internal prolapse, rectocele and enterocele would help in understanding functional results. Patients that underwent additional perineotomy for rectocele presented a higher rate of mesh-related problems.

Do you consider a combined approach always necessary? In patients with symptomatic rectocele alone, wouldn't you consider a perineal or tranvaginal approach as a first step, reserving the LVR in case of failure? Although it occurred only once, you stressed in the discussion that inadvertent rectal perforation should be sutured and mesh rectopexy delayed. What is the reason to preclude a recto-sacropexy without mesh in that situation? It could eventually avoid a reoperation that can be difficult in a previously dissected field. When evaluating young women for LVR, have you considered its potential impact on fertility?

Response From A. D'Hoore (Leuven, Belgium):

Thank you Dr. Biondo for your comments and questions. A limitation of this study is the difference in follow-up among patients. Although the Kaplan-Meier approach yields appropriate estimates for recurrence and mesh-related complication rates, we ignored differences in follow-up for the functional outcome. However, the presented exploratory analysis reveals that after 1 to 2 years the probability of improved function (in regard to fecal incontinence and obstructed defecation) stabilizes. As these functional data are cross-sectional, no conclusion can be drawn for the functional outcome in a single patient.

The procedure was initially designed to treat total rectal prolapse (external prolapse) and over time indications were enlarged to internal prolapse and rectocele (with or without an enterocele). Functional outcome in this group of patients is very dependent from the preoperative work-up and indication. Today, in view of the risk for vaginal erosion of the mesh in the combined approach (laparoscopic and perineal approach), we prefer a deep laparoscopic dissection to avoid a perineotomy. If, during the laparoscopic dissection, the rectum or vagina is breached the defect should be sutured and another technique performed (like suture rectopexy). No nonabsorbable mesh should be inserted at that time.

As the mesh is covered by peritoneum, we believe that there is no impact on fertility. We advise, however, to perform a primary caesarean.

S. Wexner (Weston, FL):

Congratulations on your very nice paper, which I think is possibly one of the largest homogenous series of a single operation to treat prolapse. The reason that we have over 100 different abdominal and perineal options to treat rectal prolapse is because none of them is a *panacea.* We know that the longer we follow each one, the higher the recurrence rate becomes. In addition, patients may experience exacerbation of preexisting and or other development of new functional problems. One potential problem with your otherwise excellent series is that the minority of patients actually had rectal prolapse. The majority of patients seem to have had recto-anal intussusception with or without a rectocele, which means that a functional assessment is very important.

First, I think you need a longer term follow-up because you have 20 months in Meander and 44 months overall, which is not enough. Even though you have various actuarial methods, I do not think that is sufficient. Second, as you mentioned one of the benefits of your operation is to preserve the rectal ampulla. Therefore, you should be able to demonstrate with much finer detail changes in constipation and in incontinence. I am wondering why did not you use a validated constipation score? Why was it more of a crude measurement of obstructed defecation, and why did not you use a validated incontinence score and instead used a grade? Grades are far less accurate and have not been as extensively validated. I am wondering what information you have after this operation on dyspareunia, and other types of sexual dysfunction given that deep vaginal dissection, undertaken especially in the latter part of the series, when you avoided a perineotomy.

Lastly, what do you do with a long redundant sigmoid loop. Either one that you know preoperatively exists because of imaging or endoscopy or one discovered during surgery. Thank you and again please accept my congratulations on your work.

Response From A. D'Hoore (Leuven, Belgium):

Thank you Dr. Wexner for your comments. The length of follow-up differs between the 2 centers. At least for the Leuven cohort a substantial group of patients do have a follow-up of more than 10years. The Kaplan-Meier estimates further compensates for the lack of a consistent follow-up. In regard to your second questions, I completely agree that the instruments used to assess functional outcome were rather "generic," but was the only possibility to compile outcome data from the 2 centers. In former publications, we used more validated instruments such as the Wexner incontinence score, PAC-Sym and PAC-QoL to describe functional improvements after the operation.

In this cohort study, no adequate information on sexual function can be derived. However, the group from Nantes, France looked in detail into sexual function in patients, who had the procedure done for symptomatic rectoceles. They documented a significant improvement of sexual function, and only very rarely did new onset dyspareunia occurred.

Finally, most patients with prolapse do have a redundant sigmoid colon. This is not an indication for sigmoid resection. Only in patients with a history of diverticular disease would we do a resection and suture rectopexy. In the rare situation of slow trans-constipation we first do a ventral mesh rectopexy to improve the outlet obstruction and recovery of the sphincters. If needed, and if the patient has adequate sphincter function, a subtotal colectomy will be done at a second stage (after an interval of 6–12 months).