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ORIGINAL ARTICLE

Ventral rectopexy with biological mesh for recurrent disorders of the posterior pelvic organ compartment

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Abstract

Purpose Recurrent prolapse of the posterior pelvic organ compartment presents a management challenge, with the best surgical procedure remaining unclear. We present functional outcome and patient satisfaction after laparoscopic and robotic ventral mesh rectopexy (VMR) with biological mesh in patients with recurrence.

Methods We analyzed data from 30 patients with recurrent posterior pelvic organ prolapse who underwent VMR with biological mesh from August 2012 to January 2018. Data included patient demographics and intra- and postoperative findings; functional outcome as assessed by Cleveland Clinic Constipation Score (CCCS), Obstructed Defecation Score Longo (ODS), and Cleveland Clinic Incontinence Score (CCIS); and patient satisfaction.

Results CCCS, CCIS, and ODS were significantly improved at 6–12 months postoperatively and at last follow-up. Patient satisfaction (visual analog scale [VAS] 6.7 [0 to 10]), subjective symptoms (+ 3.4 [scale − 5 to + 5]), and quality of life improvement (+ 3.0 [scale from − 5 to + 5]) were high at last follow-up. The rates of morbidity and major complications were 13% and 3%, respectively. There were no mesh-related complications or deaths. Difference in type of previous surgery (abdominal or transanal/perineal) had no significant effect on results.

Conclusions VMR with biological mesh is a safe and effective option for patients with recurrent posterior pelvic organ prolapse. It reduces functional symptoms, has a low complication rate, and promotes patient satisfaction.

Keywords Recurrent rectal prolapse · Recurrent posterior compartment prolapse · Laparoscopic ventral rectopexy · Functional outcome · Biological mesh

Introduction

Over the past decades, a variety of surgical options for the repair of posterior pelvic organ prolapse has been described. Existing techniques can be divided into transabdominal and perineal/transanal approaches. The latter is often used in elderly patients as it is considered less invasive, with resultant lower morbidity. However, it is associated with a higher recurrence rate [1]. Recommendations for which method to use are not consistent [2].

Recently, laparoscopic ventral mesh rectopexy (VMR) has gained broad acceptance as a minimally invasive, safe, and effective procedure for various disorders in the posterior pelvic compartment (e.g., rectal prolapse, rectocele, intussusception, enterocele, pelvic-floor insufficiency) [3, 4]. In addition to the acknowledged advantages of laparoscopy (shorter hospital stay, faster recovery), the advantage of VMR lies in the reduced risk of autonomic nerve injury owing to the avoidance of posterior rectal dissection. This low invasiveness provides an assurance of safety, even in elderly patients [5, 6]. The use of biological mesh may increase its safety even further by reducing complications reported with synthetic mesh (e.g., infection, mesh erosion, fistula formation, and dyspareunia) [7, 8].

Although numerous studies have proven the clinical effectiveness of VMR [9–11], the majority involve patients with primary prolapse. Recurrence after surgery for posterior pelvic organ

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prolapse is described in up to 30% [4, 12, 13]. Its management is challenging, and the best surgical procedure remains unclear. A recent systematic review that aimed to develop a treatment algorithm for recurrent rectal prolapse was limited by the great variety of surgical techniques and insufficient data [14]. As yet, only one study has focused on the use of VMR in patients with recurrent full-thickness rectal prolapse [15].

The aim of this study was to assess the clinical effectiveness of VMR in patients with recurrent posterior pelvic organ prolapse and, in particular, to evaluate the impact of the type of previous prolapse surgery on functional outcome and patient satisfaction.

Methods

From August 2012 to January 2018, laparoscopic or robotic VMR with biological mesh was performed in 30 patients with recurrent posterior pelvic organ prolapse in whom conservative treatment (including behavioral training, modification of dietary habits and medication, constipating or laxative/prokinetic medication, rectal irrigation, and biofeedback training) had failed. Data were prospectively obtained and retrospectively analyzed.

Preoperative diagnostic investigations included a clinical examination with proctoscopy and rigid rectoscopy in all and MRI-defecography (or conventional defecography if MRI was contraindicated) in all, except those with full-thickness rectal prolapse (17%).

All consecutive rectopexies performed for recurrent posterior pelvic organ prolapse were included in the analysis.Four patients had had two previous pelvic surgeries (1 Altemeier + STARR in the same year; 1 resection rectopexy + STARR 1 year later; 1 STARR + resection rectopexy 6 years later; and one patient with 2 rectopexies without resection within 2 years). For subgroup stratification to previous transanal/perineal (PPPS) or abdominal prolapse surgery (PAPS), the most recent pelvic floor surgery was selected.

Data collection included patient demographics, type of previous surgery, preoperative diagnostic investigations, intra- and postoperative findings, complications, and hospitalization time. Functional outcome was evaluated with Cleveland Clinic Constipation Score (CCCS) [16], Obstructed Defecation Score Longo (ODS) [17], and Cleveland Clinic Incontinence Score (CCIS) [18]preoperatively, at 6 to 12 months postoperatively, and at last follow-up. Follow-up was at least 24 months in 26 patients (mean 36,range 24–65). Three of those were excluded because data with re-rectopexy ($n = 2$) and stoma creation ($n = 1$), in five follow-up data, were not available. Patient satisfaction was assessed by a visual analog scale from 0 (none) to 10 (full satisfaction) at 6 to 12 months and at last follow-up (mean 40 months [range 24–65], excluding the patients with re-rectopexy and stoma and 2 with no available data). Patients' symptoms and quality of life were measured by a VAS from − 5 (much worse) to 0 (no change) to + 5 (much better) at last follow-up (mean 40 months [range 24–65 months], excluding the patients with re-rectopexy and stoma and 3 with no available data). Coexisting micturition disorders, queried preoperatively and found to be present in 13, were investigated at last follow-up (mean 40 months [range 12–65]).

Surgical technique

All VMRs were performed by the same team of two surgeons. For the robotic approach, the da Vinci Si HD system (Intuitive Surgical, Inc., Sunnyvale CA, USA) was used. The surgical technique was based on that of D'Hoore, Cadoni, and Penninckx [3] with few modifications and has recently been described [11]. For all procedures a biological mesh was used (in 29 patients, an 18 × 4-cm strip of 1-mm-thick Permacol™, and in one patient a 20 × 4-cm Biodesign® mesh). During the first 3 months postoperatively, all patients were instructed to avoid extensive straining at stool and to use laxatives.

Statistical analysis

Data analysis was performed with SPSS software. Metric and ordinal data were compared by calculating with the Student *t*test or Mann–Whitney *U* test. Paired *t*test or Wilcoxon test was used for paired data, the chi-square test for categorical data. The threshold for statistical significance was $p < 0.05$.

Results

Demographics

Of the 30 patients with recurrent posterior pelvic organ prolapse(mean age 63.6 years), 17 underwent VMR after PAPS (11 rectopexy without resection, 6 rectopexy with resection) and 13 after PPPS (10 STARR procedure, 2 Altemeier procedure, and 1 Rehn Delorme procedure). Most patients were women (97%); mean BMI was 26.7 kg/m^2(range 16.8–40.5 kg/m^2). The mean number of previous abdominal surgeries was 2.2; 55% of the female patients ($n = 16$) who had a hysterectomy (Table 1).

Gender, BMI, number of previous abdominal surgeries, and number of patients with previous hysterectomy did not differ between the two groups (PPPS vs. PAPS), but age was significantly higher in those with PPPS.

Indications for surgery

Fecal incontinence (FI) was the leading symptom prompting reintervention in 40%; 27% had obstructed defecation (OD),

Table 1 Patient demographics

	Total	Previous prolapse surgery		*P* value
		Perianal (PPPS)	Abdominal (PAPS)	
Number	30	13	17	
Mean age in years [range]	63.6 [32–86]	69.4 [56–86]	59.1 [32–77]	*0.013*
Gender				1.000
Female	29/30 (97%)	13/13 (100%)	16/17 (94%)	
Male	1/30 (3%)	0/13 (0%)	1/17 (6%)	
Mean BMI in kg/m^2 [range]	26.7 [16.8–40.5]	28.5 [20.0–40.5]	25.3 [16.8–38.3]	0.123
Mean number of previoussurgeries [range]	2.2 [0–7]	1.8 [0–7]	2.4 [1–4]	0.081
Previous hysterectomy	16/29 (55%)	6/13 (46%)	10/16 (63%)	0.713
Previous pelvic floor surgery*		10× STARR 2× Altemeier 1× Rehn Delorme	11×rectopexy without resection 6×rectopexy with resection	

*Last pelvic floor surgery listed (four patients had already had two previous pelvic floor surgeries)

Italicized*p* value = significant ($p < 0.05$)

and 30% had both. One patient (3%) had a full-thickness rectal prolapse without functional symptoms (see Table 2).

Five patients presented with full-thickness external rectal prolapse (17%). Of the remaining 25, MRI-defecography revealed a combination of various morphological alterations of the posterior compartment of the pelvic organs in 16 patients (64%) and showed descending pelvic floor in 80%, rectocele in 60%, enterocele in 28%, and intussusception in 24% of 25.

Surgery

Laparoscopic VMR was performed in 27 patients (90%) and robotic VMR in 3 (10%). One patient required conversion from the robotic to the laparoscopic approach because of massive adhesions in the pelvis after a previous operation. Median postoperative length of stay was 7 days [range 4–17].

Complications

Morbidity was 13% (4/30), major morbidity 3% (grade 3 or higher with the Clavien-Dindo classification), and mortality 0%. There were no significant differences between groups (PPPS vs. PAPS) (Table 3). Complications included one wound, which healed secondarily, one pleural effusion treated by diuretics, one intraoperative rectal perforation treated by intraoperative suturing and postoperative antibiotics, and one acute appendicitis in the immediate postoperative course requiring appendectomy. There were no mesh-related complications.

Re-interventions for recurrent or persistent symptoms

Up to the last follow-up (mean 40 months [range 12–65 months], four patients (13%) needed additional intervention for recurrence

Table 2 Indications for surgery: symptoms and morphological changes

	Total	Previous prolapse surgery		*P* value
		Perianal (PPPS)	Abdominal (PAPS)	
Predominant symptoms				0.241
Obstructed defecation (OD)	8/30 (27%)	2/13 (15%)	6/17 (35%)	
Incontinence (FI)	12/30 (40%)	7/13 (54%)	5/17 (29%)	
Combined OD and FI	9/30 (30%)	3/13 (23%)	6/17 (35%)	
Prolapse without functional symptoms	1/30 (3%)	1/13 (8%)	0/15 (0%)	
Morphological disorders				0.735
Descending pelvic floor	20/25 (80%)	7/9 (78%)	13/16 (81%)	
Rectocele	15/25 (60%)	9/9 (100%)	6/16 (38%)	
Enterocele	7/25 (28%)	2/9 (22%)	5/16 (31%)	
Intussusception	6/25 (24%)	1/9 (11%)	5/16 (31%)	
Full-thickness rectal prolapse	5/30 (17%)	4/13 (31%)	1/17 (6%)	

Table 3 Complications after laparoscopic or robotic ventral mesh rectopexy

	Total	Previous prolapse surgery		P value
		Perianal (PPPS)	Abdominal (PAPS)	
Complication grade*				1.000
• I	1/30 (3%)	0/13 (0%)	1/17 (6%)	
• II	2/30 (7%)	1/13 (8%)	1/17 (6%)	
• IIIb	1/30 (3%)	0/13 (0%)	1/17 (6%)	
Mesh-related complications	0/30 (0%)	0/13 (0%)	0/17 (0%)	1.000
Relapse/symptom persistencerequiring surgical reintervention	4/30 (13%)	2/13 (15%)	2/17 (12%)	1.000
Kind of surgical reintervention		1×re-rectopexy 1× SNS♮	1×re-rectopexy 1×stoma	

*Clavien-Dindo scale

at last follow-up (mean 40 months [range 12–65])

♮Sacral nerve stimulation (SNS)

or persistence of their functional disorder: One patient with previous Ripstein procedure, who had presented with a combination of OD and FI, reported persistent symptoms (OD and FI) and required a stoma. One patient after an initial STARR procedure suffered from persistent FI and underwent clinically effective sacral nerve stimulation (SNS). One patient with previous STARR operation underwent re-rectopexy owing to persistent FI. One patient with previous rectopexy without resection and ongoing OD symptoms underwent two surgical re-interventions: first, a laparoscopic exploration with adhesiolysis and, subsequently, laparoscopic re-VMR.

Functional outcome

Functional outcome, as assessed by CCCS, ODS, and CCIS, was significantly improved at 6–12 months and at last follow-up. Stratified to previous prolapse surgery, there was symptom improvement in both groups. However, in the PPPS group reductions in CCCS, CCIS, and ODS were only significant at last follow-up. In the PAPS group, reductions in symptom scores were significant for CCCS and CCIS at 6–12 months' follow-up, for ODS at 6–12 months and last follow (Tables 4, 5, and 6). The improvement in CCCS, CCIS, and ODS did not differ significantly between groups at either 6–12 months or at last follow-up. Denovo onset of OD or FI symptoms did not occur.

Patient satisfaction and patient-related outcome

Satisfaction was 7.8 at 6–12 months and 6.7 at last follow-up, with no difference between PPPS and PAPS. Patients reported an improvement of symptoms (+ 3.4) and quality of life (+ 3.0) after VMR, especially in the PPPS group (+ 4.1 and+ 3.4, respectively) (Table 7).

Outcome of coexisting urinary symptoms

Six (46%) of 13 patients (3 of 7 in the PPPS group and 3 of 6 in the PAPS group) who presented preoperatively with coexisting micturition disorders—most frequently urinary

Table 4 Outcome after ventral mesh rectopexy assessed by Cleveland Clinic Constipation Score (CCCS)

	Presurgery		6–12 months postoperative		Last follow-up*		Difference/*P* valuepre–12 months	Difference/*P* valuepre–last follow-up
	N	Value ±SD	*N*	Value ± SD	*N*	Value ± SD		
All patients	30	13.7 ± 6.9	23	10.0 ± 5.5	18	9.6 ± 7.6	*− 3.7/0.008*	*− 4.1/0.004*
Previous prolapse surgery								
Perianal	13	12.8 ± 8.1	9	8.4 ± 5.3	9	6.7 ± 8.4	− 4.4♮/0.128	*− 6.1♮/0.008*
Abdominal	17	14.3 ± 5.9	14	11.0 ± 5.6	9	12.4 ± 5.7	*− 3.3/0.038*	− 1.9/0.234

*Patients with a follow-up of at least 24 months ($n = 26$) excluding patients with re-rectopexy ($n = 2$), Stoma ($n = 1$) and no available data ($n = 5$). Mean 36 months [range 24–65 months]

no significant difference with 6–12 months postoperative

♮no significant difference with the previous abdominal surgery group

Italicized*p* value = significant ($p < 0.05$)

Table 5 Outcome after ventral mesh rectopexy assessed by Cleveland Clinic Incontinence Score (CCIS)

	Presurgery		6–12 months postoperative		Last follow-up*		Difference/*P* value pre–12 months	Difference/*P* value pre–last follow-up
	N	Value ± SD	*N*	Value ± SD	*N*	Value ± SD		
All patients	30	13.1 ± 5.1	23	8.4 ± 6.0	18	8.9 ± 6.0	*− 4.7/< 0.001*	*− 4.2/0.021*
Previous prolapse surgery								
Perianal	13	12.9 ± 5.1	9	10.6 ± 5.6	9	7.9 ± 6.1	− 2.3ǂ/0.109	**−5.0ǂ/ 0.045**
Abdominal	17	13.3 ± 5.3	14	7.1 ± 6.1	9	9.9 ± 6.2	*− 6.2/< 0.001*	− 3.4/0.297

*Patients with a follow-up of at least 24 months ($n = 26$) excluding patients with re-rectopexy ($n = 2$), stoma ($n = 1$), and no available data ($n = 5$). Mean 36 months [range 24–65 months]

no significant difference with 6–12 months postoperative

ǂno significant difference with the previous abdominal surgery group

Italicized *p* value = significant ($p < 0.05$)

incontinence (11/13, 85%)—reported symptom improvement after VMR. One patient in the PAPS group reported postoperative worsening of urinary incontinence. There were no new-onset micturition disorders.

Discussion

As yet, most reports of surgical treatment of posterior pelvic organ prolapse have focused on primary prolapse. Recurrence after surgery for rectal and posterior pelvic organ prolapse occurs in up to 30% over the long-term, and management is challenging. Minimally invasive VMR is widely used for various presentations of posterior pelvic organ prolapse, but data in recurrent prolapse patients are limited. Many study cohorts contain patients with recurrence, but their outcome is not reported separately. This report represents the second series of VMR patients to focus especially on those with recurrent rectal and posterior pelvic organ prolapse.

Our results show significant symptom improvement, as measured by CCCS, CCIS, and ODS, high patient satisfaction with subjective symptom and quality of life improvement, and an improvement in coexisting urinary function (in about half of those in whom it was present), indicating that VMR is an effective treatment option for patients with recurrent prolapse and may contribute to stabilization of the entire pelvic floor and pelvic organs. These findings are in line with a recently published analysis that also found a significant improvement in functional outcome with VMR and synthetic or biological mesh in 36 patients with recurrent rectal prolapse [14].

We stratified our patients with regard to the type of previous prolapse surgery and found that, at last follow-up, the improvement in CCCS, CCIS, and ODS was more pronounced in the PPPS group than in the PAPS group, but the difference was not significant. This could be explained by the fact that the majority of patients had not only one morphological change of the pelvic floor but also a combination, which previous intervention had not addressed completely (e.g., in the presence of a coexisting enterocele, the transanal/perineal approach may have limitations) (Fig. 1). The lack of significance between PPPS and PAPS may also owe to a low number of cases.

In this series, the recurrence (13%) and complication (13%) rates as well as major complication rate (3%) were similar to those reported in other studies. According to a recent review,

Table 6 Outcome after ventral mesh rectopexy assessed by Obstructed Defecation Score Longo (ODS)

	Presurgery		6–12 months postoperative		Last follow-up*		Difference/*P* value pre–12 months	Difference/*P* value pre–last follow-up
	N	Value ± SD	*N*	Value ± SD	*N*	Value ± SD		
All patients	30	13.3 ± 5.8	23	9.8 ± 6.4	18	8.0 ± 6.7	*− 3.5/0.005*	*− 5.3/< 0.001*
Previous prolapse surgery								
Perianal	13	12.3 ± 6.5	9	9.3 ± 7.3	9	5.9 ± 7.3	− 3.0ǂ/0.164	*− 6.4ǂ/0.004*
Abdominal	17	14.1 ± 5.3	14	10.1 ± 5.9	9	10.1 ± 5.7	*− 4.0/0.018*	*− 4.0/0.043*

*Patients with a follow-up of at least 24 months ($n = 26$) excluding patients with re-rectopexy ($n = 2$), stoma ($n = 1$), and no available data ($n = 5$). Mean 36 months [range 24–65 months]

no significant difference with 6–12 months postoperative

ǂ no significant difference with the previous abdominal surgery group

Italicized *p* value = significant ($p < 0.05$)

Table 7 Outcome parameters after ventral mesh rectopexy assessed by Visual Analog Scale

	6–12 months postoperative		Last follow-up*	
	N	Value ± SD	*N*	Value ± SD
Patient satisfaction				
All patients	17	7.8 ± 2.3	21	6.7 ± 3.5
Previous perianal surgery	6	8.2 ± 2.6ǂ	10	7.5 ± 3.3ǂ
Previous abdominal surgery	11	7.6 ± 2.2	11	5.8 ± 3.6
Change of symptoms§	–	–		
All patients			20	3.4 ± 2.5
Previous perianal surgery			9	4.1 ± 1.7ǂ
Previous abdominal surgery			11	2.8 ± 3.1
Change of quality of life§	–	–		
All patients			20	3.0 ± 2.7
Previous perianal surgery			9	3.4 ± 3.2ǂ
Previous abdominal surgery			11	2.5 ± 2.2

*Patients with a follow-up of at least 24 months ($n = 26$) excluding patients with re-rectopexy ($n = 2$), stoma ($n = 1$), and no available data ($n = 2$ respectively 3). Mean 40 months [range 24–65 months]

0 (no satisfaction) to 10 (full satisfaction)

ǂno significant difference with the previous abdominal surgery group

§− 5 (much worse) to 0 (no change) to + 5 (much better)

rates of recurrence, complications, and major complications after VMR with synthetic or biological mesh range from 0 to 20%, 0 to 23.4%, and 0 to 77%, respectively [4]. However, most patients included in these studies underwent primary prolapse repair and length of follow-up varied considerably. In the recent review cited above [14], in which 36 patients had previous prolapse surgery, their risk of recurrence was reported to be higher (25% at 3 years) than in those with primary prolapse.

We used biological mesh because it is safe and as effective as synthetic mesh [7]. Our mesh-related complication rate of 0% and the persistent improvement in functional outcome at last follow-up (mean 40 months) confirm the safety and sustainability of biological mesh's clinical effectiveness over time, even in more challenging patients.

This study has some limitations. A larger number of cases could enhance an evaluation of VMR in relation to previous types of surgery. Also, not all of our patients (19%) were available for all follow-up evaluations.Finally, the adequacy of symptom assessment in complex cases with CCCS and CCIS is under ongoing discussion, and the use of ODS and VAS has not been validated.

Conclusion

In patients with recurrent rectal or posterior pelvic organ compartment prolapse, ventral mesh rectopexy (VMR) with biological mesh is associated with low morbidity, significant symptom improvement (CCCS, CCIS, and ODS), and patient

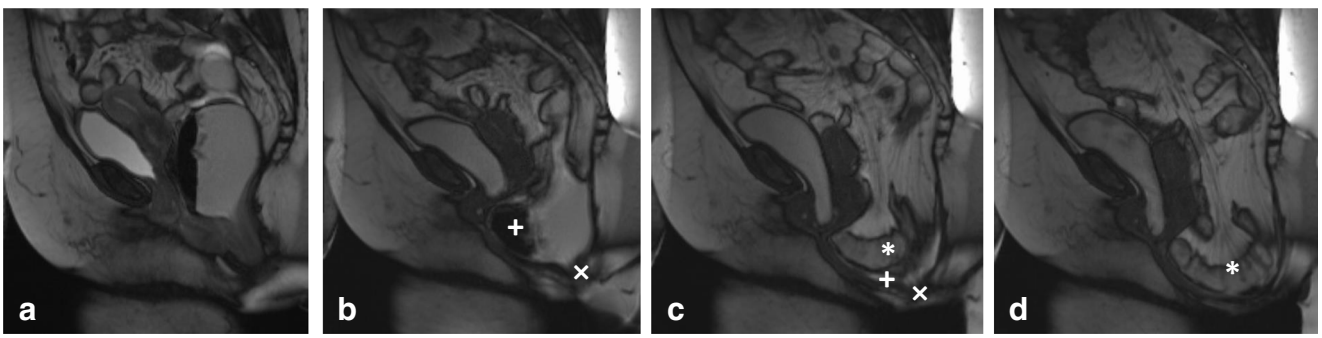

Fig.1 MRI-defecography (sagittal plane) of a female patient with recurrent rectal prolapse syndrome after previous STARR procedure: extensive pelvic floor descensus with large enterocele indicated by asterisk (*), rectal prolapse indicated by multiplication symbol (×), enlarged hiatus and anterior rectocele indicated byplus symbol (+). **a** Without pushing; **b**start of pushing; **c**strong pushing; **d**at maximum pushing

satisfaction. It can be considered a safe and effective treatment option.

Compliance with ethical standards

Conflict of interest K.E. Matzel is a medical adviser to Medtronic.The other authors declare that they have no conflict of interest.

Statement of human rights For this type of study, formal consent is not required.

Statement on the welfare of animals This article does not contain any studies with animals performed by any of the authors.

Informed consent This study contains no information that would enable individual patient identity.

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