

Long-term Outcomes After Minimally Invasive Ventral Rectopexy for Rectal Prolapse Using Biological Graft Prosthesis: A 15-Year Retrospective Cohort Study

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BACKGROUND: Minimally invasive ventral rectopexy has widely become the preferred prolapse procedure. However, there have been recent concerns regarding the safety of permanent synthetic mesh in the pelvis. Biological grafts have also been commonly used as an alternative prosthesis, but data on their safety and the longevity of the prolapse repair have been lacking.

OBJECTIVE: To assess the short- and long-term safety and efficacy of biological grafts in minimally invasive ventral rectopexy.

DESIGN: Retrospective cohort study using data from a prospectively collected database.

SETTINGS: Single surgeon at a single tertiary hospital in Australia.

PATIENTS: There were 366 patients with minimum 6-month follow-up undergoing minimally invasive ventral rectopexy using a biological graft between January 1, 2008, and October 5, 2023.

MAIN OUTCOME MEASURES: Overall recurrence, complications, and functional outcomes.

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RESULTS: A total of 57 patients (15.6%) experienced a recurrence during the study period, with a median follow-up time of 35.5 months (range, 6–183 months). Of these, 17 (4.6%) were full-thickness recurrence. The Kaplan-Meier estimates of the overall 1-, 3-, and 5-year recurrence rates were 2.0%, 6.0%, and 16.0%, respectively. There was no statistically significant difference in recurrence for patients who presented with a full-thickness prolapse compared to those with other indications (16.8% vs 14.2%, $p = 0.29$). Overall, there were a total of 34 complications that occurred in 29 patients (7.9%). Nineteen patients (5.2%) required a return to theater. There was no reported graft-related complication or long-term pelvic pain. Ninety-eight percent of patients had symptomatic improvement and were satisfied with their outcome.

LIMITATIONS: Retrospective study and generalizability of the results from single surgeon experience. Late recurrences may have been missed.

CONCLUSIONS: Minimally invasive ventral rectopexy using a biological graft is both safe and effective, offering acceptable short- and long-term recurrence rates and overall complications with no graft-related morbidity. See **Video Abstract**.



RESULTADOS A LARGO PLAZO DESPUÉS DE LA RECTOPEXIA VENTRAL MÍNIMAMENTE INVASIVA PARA EL PROLAPSO RECTAL UTILIZANDO PRÓTESIS DE INJERTO BIOLÓGICO: UN ESTUDIO DE COHORTE RETROSPECTIVO DE 15 AÑOS

ANTECEDENTES: La rectopexia ventral mínimamente invasiva se ha convertido en gran medida, como el

procedimiento preferido para el prolapso. Sin embargo, recientemente ha habido inquietudes con respecto a la seguridad de la malla sintética permanente en la pelvis. Los injertos biológicos también se han utilizado comúnmente como prótesis alterna, pero faltan datos sobre su seguridad y la longevidad de la reparación del prolapso.

OBJETIVO: Evaluar la seguridad y eficacia a corto y largo plazo de los injertos biológicos en la rectopexia ventral mínimamente invasiva.

DISEÑO: Estudio de cohorte retrospectivo que utiliza datos de una base de datos recopilada prospectivamente.

AJUSTE: Un cirujano de hospital terciario en Australia.

PACIENTES: 366 pacientes con un mínimo de 6 meses de seguimiento sometidos a una rectopexia ventral mínimamente invasiva utilizando un injerto biológico entre el 1 de enero de 2008 y el 5 de octubre de 2023.

PRINCIPALES MEDIDAS DE RESULTADO: Recurrencia general, complicaciones y resultados funcionales.

RESULTADOS: Un total de 57 pacientes (15,6 %, n = 57) presentaron una recurrencia durante el período de estudio, con un tiempo de seguimiento medio de 35,5 meses (rango, de 6 a 183 meses). De estos, 17 (4,6 %) fueron recurrencias de espesor total. Las estimaciones de Kaplan-Meier de las tasas generales de recurrencia a 1, 3 y 5 años fueron del 2,0 %, 6,0 % y 16,0 %, respectivamente. No hubo una diferencia estadísticamente significativa en la recurrencia para los pacientes que presentaron un prolapso de espesor total en comparación con aquellos con otras indicaciones (16,8 % frente a 14,2 %, p = 0,29). En general, hubo un total de 34 complicaciones que ocurrieron en 29 (7,9 %) pacientes. 19 pacientes (5,2 %) necesitaron regresar al quirófano. No hubo complicaciones relacionadas con el injerto o dolor pélvico a largo plazo. El 98% de los pacientes presentaron una mejoría sintomática y se mostraron satisfechos con el resultado.

LIMITACIONES: Estudio retrospectivo y generalización de los resultados a partir de la experiencia de un solo cirujano. Es posible que se hayan pasado inadvertidas las recurrencias tardías.

CONCLUSIONES: La rectopexia ventral mínimamente invasiva con un injerto biológico es segura y eficaz, y ofrece tasas de recurrencia aceptables a corto y largo plazo y complicaciones generales sin morbilidad relacionada con el injerto. (Traducción – Dr. Fidel Ruiz Healy)

KEY WORDS: Biological graft; Colorectal; Minimally invasive surgery; Proctology; Rectal prolapse; Rectopexy; Robotics; Ventral rectopexy.

Pelvic floor posterior compartment prolapse encompasses a number of pathologies, including external rectal prolapse, internal rectal intussusception, enterocele, sigmoidocele, and rectocele. Although these conditions are benign, they can lead to debilitating symptoms, including fecal incontinence, obstructive defecation, bleeding, and pain. Surgery remains the only definitive treatment option for the majority of these patients. Although a myriad of procedures have been described, the optimal surgical approach remains uncertain.^{1–4}

Over the past 20 years, ventral rectopexy (VR) using minimally invasive VR (MIVR) approaches has become the preferred method for the treatment of full-thickness rectal prolapse in many institutions.^{5–9} By limiting the rectal dissection to include only the rectovaginal septum and minimizing posterior dissection at the sacral promontory, VR spares the autonomic nerves and prevents prolapse while avoiding the development of de novo constipation.^{10,11}

The treatment of rectal prolapse is independent of treatment for anterior and middle compartment prolapse, but concerns for the use of synthetic mesh in the pelvis have arisen. Transvaginal mesh placement has resulted in unacceptably high rates of mesh erosion, infection, and pelvic pain for the repair of middle compartment prolapse and stress urinary incontinence.¹² In the United Kingdom, concerns regarding the safety of pelvic synthetic mesh have led to a virtual moratorium in many centers, whereby the results of the Cumberlage report of the Independent Medicines and Medical Devices Safety Review led to a pause in the use in transvaginal mesh and its use in VR being restricted outside of clinical trials and specialist centers with robust multidisciplinary team and audit of outcomes.^{9,12}

Biological grafts, which are completely absorbed and replaced with remodeled tissue, are commonly used as an alternative prosthesis. Although it has been postulated that the absorbable nature of biological grafts may lead to increased recurrence, short- to medium-term data have failed to show this, with Fu and Stevenson¹³ showing a decreased recurrence rate compared to synthetic mesh.^{14–16} Long-term data are currently lacking.

In the present study, we report the short- and long-term outcomes after MIVR by a single surgeon at a single institution. To the best of our knowledge, this is the largest series of MIVR using biological grafts.

PATIENTS AND METHODS

Patient Selection

All consecutive patients who underwent MIVR (both laparoscopic and robotic) using a biological graft between January 1, 2008, and October 5, 2023, under the care of a single surgeon at a single tertiary hospital (St. Vincent's Northside Private Hospital, Brisbane, Queensland,

Australia) were identified from a prospectively collected database and included. Patients with <6-month follow-up were excluded because this was considered the minimum time for recurrence. Ethics approval was obtained from the St. Vincent's Health and Aged Care Human Research Ethics Committee (HREC_23-14_ASTE).

Patient characteristics, including age, sex, BMI, ASA score, comorbidities, and previous pelvic surgery, were collected and assessed. Disease data collected included presenting symptoms, preoperative Wexner incontinence score, and preoperative clinical findings. When full-thickness rectal prolapse (FTRP) was not evident on clinical examination, patients were evaluated using defecating proctogram and examined using a circular anal dilator and rectal provocation to determine the grade of intussusception and/or rectocele. Additional preoperative assessment in most patients included anorectal physiology studies, including manometry, endoanal ultrasound, rectal compliance, and pudendal nerve terminal motor latencies. Colonoscopy was performed to assess for intraluminal pathologies. Pelvic floor multidisciplinary assessment was not available during the study period. Patients with significant anterior compartment symptoms or whose symptoms were considered higher priority than their bowel symptoms were referred for separate assessment. No combined operations were performed. For those with intussusception, MIVR was only performed for Oxford grade 3 and 4 with concomitant rectocele and/or enterocele.

Operative and outcome details collected included operative approach, type of prosthesis, method of fixation, operative time, length of stay, postoperative Wexner incontinence score, and patient-reported symptomatic improvement. Complications were graded using the Clavien-Dindo classification.¹⁷ The technical details of the operation have been described previously, along with the modifications to the technique over time.¹³ Since 2014, the standard technique has used an L-shaped 8-ply Biodesign Rectopexy graft (Cook Medical, West Lafayette, IN) with fixation to the distal and mid rectum using 4 rows of 3-0 polydioxanone sutures (PDS; Ethicon, Johnson & Johnson, Somerville, NJ) with sacral fixation using 2-0 PDS with the most medial suture used to perform an additional sutured rectopexy. Glubran 2 (GEM SRL, Viareggio, Italy) was then applied between the graft and the rectum at 2-cm intervals for additional fixation before peritoneal closure using 3-0 PDS. In cases of recurrent prolapse, any preexisting synthetic prosthesis was excised in its entirety before taking the steps outlined above.

All patients were followed up at 6 weeks and 6 months and then planned for yearly review thereafter to assess for recurrence. At each follow-up, clinical examination and proctoscopy were performed and Wexner incontinence scores were recorded. Patient satisfaction and degree of symptomatic relief were recorded at each review, and the most recent response was used for analysis. A defecating

proctogram was performed for symptomatic patients with no clinical evidence of recurrence. Recurrence was defined as symptoms in addition to anatomical evidence of recurrent FTRP, intussusception, rectocele, solitary rectal ulcer syndrome (SRUS), or rectal mucosal prolapse on either clinical examination, proctoscopy, or imaging.

Statistical Analysis

Continuous variables were summarized as median and range. Categorical variables were presented as percentages. The primary outcome assessed was overall recurrence at 1, 3, and 5 years. Recurrence-free survival was estimated using Kaplan-Meier survival curves, and univariate analysis using the log-rank test was performed for the following variables: age, BMI, ASA score, operative approach, year of surgery, type of prosthesis, type of sacral fixation, preoperative incontinence score, and previous pelvic surgery. Secondary outcomes assessed were longitudinal functional outcomes, including Wexner incontinence scores, patient satisfaction, postoperative complications, operative time, and length of stay. Where there were missing variables in a patient record, the nonmissing variables were used in the remainder of the analysis. Statistical analysis was performed using Stata (version 17.0). Statistical significance was defined as a *p* value of <0.05.

RESULTS

A total of 366 patients met the inclusion criteria with a median follow-up time of 35.5 months (6–183). Table 1 describes the patient demographics and disease characteristics in detail. Follow-up data available at each time point are presented in Table 2. The majority of patients were women (99.7%) with a median age of 64 years, a BMI of 24.8, and an ASA score of 2.

The main presenting complaints were prolapse (56.3%) and incontinence (16.1%) with obstructive defecation, pain, and other symptoms (including SRUS, bleeding, etc) accounting for the remainder. Seventy-one patients (19.4%) had had previous rectal prolapse surgery and 123 (33.6%) had a previous hysterectomy. Of the 366 procedures, 226 (62%) were performed laparoscopically and 140 (38%) robotically. Since 2020, 98% of cases were performed robotically. There were no conversions to an open procedure during the study period. The median operative time was 90 minutes for laparoscopic procedures versus 110 minutes for robotic procedures, with 91 minutes of console time. The overall length of stay was 1 day (0–5 days), with 34% performed as day-case procedures. There was no significant difference in the percentage of day-case procedures over time or between operative approach.

Postoperative outcomes and complications are summarized in Table 3. There were 57 (15.6%) recurrences, 17 (4.6%) of which were FTRP. Of the non-FTRP recurrences,

TABLE 1. Baseline demographics and disease characteristics

Characteristic	Overall (N = 366)	Full-thickness rectal prolapse (N = 197)	Rectocele, rectal intussusception, or SRUS (N = 169)	p
Female sex, n (%)	365 (99.7)	197 (100)	168 (99.4)	0.281
Age, y, median (range)	63.5 (18–90)	65 (18–90)	60 (20–89)	0.022
BMI, median (range)	24.8 (13.7–43.0)	24.6 (13.7–43.0)	25.0 (16.4–36.5)	0.250
ASA, n (%)				0.737
1	61 (16.7)	32 (16.2)	29 (17.2)	
2	216 (59.0)	114 (57.9)	102 (60.4)	
3	73 (20.0)	42 (21.3)	31 (18.3)	
4	4 (0.01)	3 (0.02)	1 (0.01)	
Presenting complaint, n (%)				<0.001
Prolapse	206 (56.3)	128 (65.0)	78 (46.2)	
Incontinence	59 (16.1)	35 (17.8)	24 (14.2)	
Obstructive defecation syndrome	42 (11.5)	13 (6.6)	29 (17.2)	
Pain	16 (4.4)	7 (3.6)	9 (5.3)	
Other	43 (11.8)	14 (7.1)	29 (17.2)	
Baseline Wexner Incontinence Score, median (range)	13 (5–20)	14 (5–20)	13 (7–18)	0.213
Previous rectal prolapse repair, n (%)	71 (19.4)	37 (18.8)	34 (20.1)	0.747
Previous hysterectomy, n (%)	123 (33.6)	63(32.0)	60(35.5)	0.477
Approach, n (%)				0.249
Laparoscopic	226 (61.8)	127 (64.5)	99 (58.6)	
Robotic	140 (38.3)	70 (35.5)	70 (41.1)	
Operative time, min, median (range)	100 (55–210)	100	100	0.780
Laparoscopic	90 (55–180)	90 (55–170)	90 (60–180)	<0.001
Robotic	110 (80–210)	110 (85–210)	110 (80–210)	
Robot console time	91 (65–165)	90 (65–165)	92 (65–145)	0.721
Length of stay, median (range)	1 (0–5)	1 (0–4)	1 (0–5)	0.233
Day-case procedures, n (%)	126 (34.4)	60 (30.5)	66 (39.1)	0.084

SRUS = solitary rectal ulcer syndrome.

TABLE 2. Follow-up data available at each time point during the study

Follow-up time point	Overall (N = 366)	Full-thickness rectal prolapse (n = 197)	Rectocele, rectal intussusception, or SRUS (n = 169)
1 y	299	157	142
3 y	183	96	87
5 y	122	66	56

SRUS = solitary rectal ulcer syndrome.

2 were intussusception, 1 SRUS, 1 rectocele, 6 minimal distal prolapse, and the remainder mucosal prolapse only. The overall 1-, 3-, and 5-year recurrence-free rates were 98.0%, 94.0%, and 84.0%, respectively (Fig. 1). When excluding those with SRUS, minimal distal prolapse, and mucosal recurrence, the overall recurrence rate was 5.5%. Of the recurrences, 23 occurred >5 years after the procedure and 10 occurred >10 years after the procedure.

There was a significant increase in recurrence at 5 years for those aged 75 years or older ($p = 0.003$). There was a decreased recurrence in patients who had ASA score 1 ($p = 0.006$) compared to ASA scores 2 and 3 (Fig. 2). There was no statistically significant difference in recurrence based on operative approach, BMI, preoperative

incontinence score, year of surgery, or previous prolapse or pelvic surgery.

Subgroup analysis was performed on those with FTRP ($n = 197$) compared to those without ($n = 169$). Those with FTRP were older and presented with prolapse as their main problem, but otherwise they had similar characteristics to those without (Table 3). There was no statistically significant difference in recurrence for patients who presented with a full-thickness prolapse compared to those with other indications (16.8% vs 14.2%, $p = 0.29$; Fig. 3). There were no significant differences between these groups in postoperative complications, symptomatic improvement, patient satisfaction, or the need for permanent sacral nerve stimulation.

Overall, there were a total of 34 complications that occurred in 29 patients (7.9%). Nineteen patients (5.2%) required a return to theater. Two patients required an additional second return to theater for laparoscopic washout for hematoma or seroma. Medical complications occurred in 1.4% of patients and included vaginal discharge in 3 patients, urinary retention in 1, and cardiac arrhythmia in 1. Although pain was one of the most common postoperative complications (3.0%), there was no long-term pelvic pain, with all pain resolving within 3 months. There were no prosthesis-related complications. Two patients had discitis that was managed with antibiotics alone, and

TABLE 3. Postoperative outcomes and complications

Outcome	Overall (N = 366)	Full thickness rectal prolapse (N = 197)	Rectocele, rectal intussus- ception or SRUS (N = 169)	p
Clavien-Dindo grade of complications				0.26
1	11	4	7	
2	3	2	1	
3a	1	0	1	
3b	19	7	12	
Recurrence	57 (15.3)	33 (16.8)	24 (14.2)	0.50
Change in symptoms postoperatively				0.13
Significant improvement	220 (61.8)	119 (61.2)	101 (61.2)	
Some improvement	130 (36.5)	67 (35.1)	63 (38.2)	
No change	1 (0.3)	0 (0)	1 (0.6)	
Slightly worse	5 (1.4)	5 (2.6)	0 (0)	
Patient satisfaction with outcome				0.35
Completely satisfied	217 (61.5)	123 (65.8)	94 (58.8)	
Partially satisfied	127 (37.7)	63 (33.7)	64 (40.0)	
Not satisfied	3 (0.8)	1 (0.5)	2 (1.3)	
Permanent SNS required	46 (12.6)	30 (15.2)	16 (9.5)	0.10

SNS = sacral nerve stimulator; SRUS = solitary rectal ulcer syndrome.

**FIGURE 1.** Kaplan-Meier analysis for recurrence-free survival after minimally invasive ventral rectopexy with biological graft.

a third required laparoscopic washout. There was no significant difference in complications between robotic and laparoscopic procedures ($p = 0.49$; Table 4). There were no 30-day mortalities.

Further Procedures

Of the 57 patients who experienced recurrence, 36 required further prolapse surgery, with a total of 46 prolapse procedures performed (Table 5). Four patients ultimately chose to have either abdominoperineal resection or defunctioning stoma due to continued poor function.

Functional Outcomes

The majority of patients described either significant (61.8%) or some improvement in symptoms (36.5%) and were satisfied with their outcome, whereas 0.3%

reported no change in symptoms postoperatively and 1.4% described worsening symptoms. Baseline incontinence scores were available for 136 patients at presentation, with a median preoperative incontinence score of 13 (5–20). Unfortunately, due to significant missing data, postoperative scores were not available for comparison. Of the entire cohort, 46 patients (12.6%) subsequently underwent permanent sacral nerve stimulation implantation.

DISCUSSION

The results of this retrospective cohort study demonstrate that MIVR using a biological graft can be safely performed with low morbidity and acceptable recurrence rates. Overall complications in our series were low, with only 7.9% experiencing complication and no postoperative mortalities. These rates are in keeping with an international multicenter review of laparoscopic VR by Evans et al.¹⁸ Importantly, there was no mesh-related morbidity in our cohort. Mesh erosion can reportedly occur in 2% to 3% of patients undergoing MIVR, less commonly than with transvaginal placement, and the majority occur in association with the use of synthetic mesh.¹⁸ Previous studies that have shown mesh erosion in MIVR using biological grafts identified 3 cases of erosion, all using Permacol (a cross-linked graft), 2 of which were associated with fixation with nonabsorbable sutures.^{16,18} All cases in this current series used Biodesign Rectopexy Graft as the prosthesis, which is a non-cross-linked porcine small intestinal mucosa-derived collagen graft. This is a naturally occurring extracellular matrix containing collagen, glycosaminoglycans, proteoglycans, and glycoproteins. The open 3-dimensional structure provides a natural scaffold for cellular ingrowth, neovascularization,

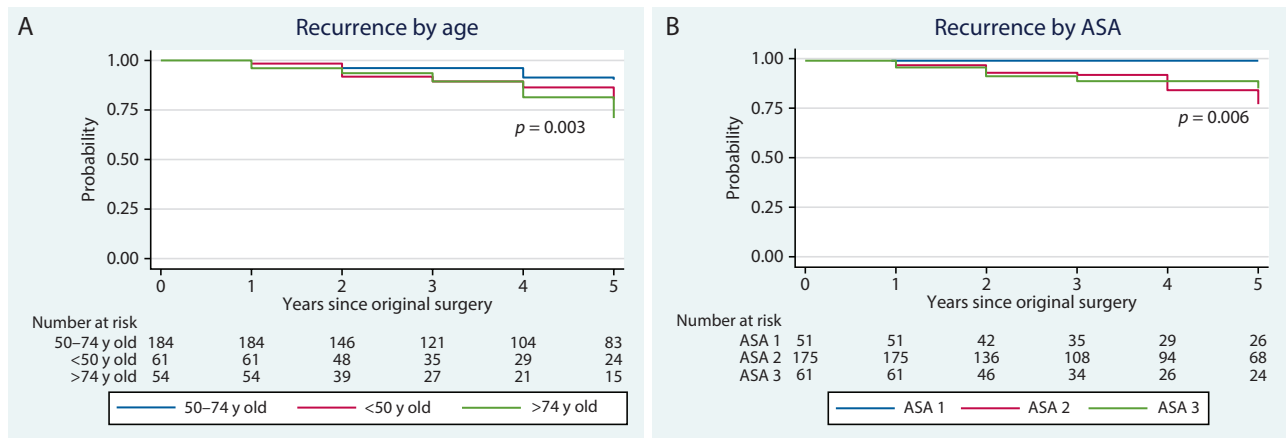


FIGURE 2. Kaplan-Meier analysis for recurrence-free survival after minimally invasive ventral rectopexy with biological graft stratified by age (A) and ASA score (B).

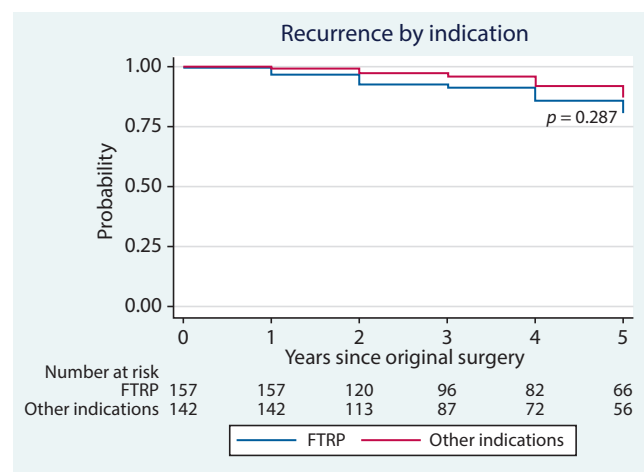


FIGURE 3. Kaplan-Meier analysis for recurrence-free survival after minimally invasive ventral rectopexy with biological graft stratified by indication for surgery. FTRP = full-thickness rectal prolapse.

and connective tissue deposition with eventual complete remodeling with host tissue.^{19,20} Cross-linking has been shown to prolong biodegradation and inhibit fibrovascular integration, thereby promoting long-lasting graft stability.^{21,22} Although this is beneficial in abdominal wall

repair, long-term foreign material in the pelvis is less desirable. We believe that the properties of Biodesign may ameliorate the risk of prosthesis-related complications when used in MIVR.

Complete remodeling may also explain the absence of persistent pelvic pain in our series. Persistent and de novo pelvic pain postsurgery for pelvic organ prolapse was raised in the Cumberlege report as one of the main complications for which patients were not appropriately counseled.¹² In 2023, Singh et al²³ reported the long-term outcomes from a large series of patients who underwent VR and reported that 15% of patients developed de novo pain and 12% of those with preexisting pain experienced a worsening of their pain postoperatively. Although those with de novo pain were more likely to have mesh erosion, 84% occurred in the absence of definitive pathology. The majority of patients in their series had a permanent synthetic mesh. Although any pelvic surgery can lead to chronic pelvic pain, the absence of this complication in our series suggests that prosthesis choice may impact this outcome.

The recurrence rates seen in our series are acceptably low. Follow-up times, recurrence definitions, and recurrence rates vary significantly in the literature. Data from randomized controlled trials are lacking, and of the 12 RCTs for rectal prolapse, only 4 have included VR with a

TABLE 4. Surgical complications by operative approach

Surgical complication	Approach, n (%)		Total, n (%)	p
	Laparoscopic	Robotic		
Pain	9 (4.0)	2 (1.4)	11 (3.0)	0.22
Abscess	5 (2.2)	6 (4.3)	11 (3.0)	0.35
Pelvic hematoma	1 (0.4)	1 (0.7)	2 (0.6)	1.0
Small bowel injury	1 (0.4)	1 (0.7)	2 (0.6)	1.0
Small bowel obstruction	1 (0.4)	0	1 (0.3)	1.0
Discitis	2 (0.9)	0	2 (0.6)	0.53
Overall complications ^a	19 (8.4)	9 (6.4)	28 (7.7)	0.49

^aMore than 1 complication occurred in a single patient.

TABLE 5. Further procedures and final prolapse procedure after recurrence

Procedure	Final procedure performed	Total number of procedures performed
Redo MIVR	11	17
STAMP	16	19
STARR	2	2
Delorme's	2	3
Defunctioning stoma	2	2
APR	2	2
Resection rectopexy	1	1

APR = abdominoperineal resection; MIVR = minimally invasive ventral rectopexy; RR = resection rectopexy; STAMP = sutured transanal mucosectomy and plication; STARR = stapled transanal rectal resection.

total of 113 patients.^{24–26} Two systematic reviews, including nonrandomized studies, found overall recurrence rates up to 18.8% for VR with synthetic mesh and 15.4% for biological grafts.^{15,16} Before the present study, the largest series of VR using biological grafts was by McLean et al,²⁷ which reported the outcomes in 224 patients using a Permacol graft, with 1- and 5-year recurrence rates of 5% and 10.7%. Our short-term results are similar, with 1- and 3-year recurrence rates of 2% and 6%, respectively. Our 5-year recurrence, although higher at 16%, is in keeping with the literature. Our series also included all degrees of recurrent anatomical prolapse, with minimal distal or mucosal-only prolapse accounting for 63% (36/57) of the recurrences overall. When considering only FTRP, intussusception, and rectocele, the overall rate was much lower at 5.5%.

The present series includes patients with up to 15-year follow-up, and although we endeavored to review patients yearly, the median follow-up was 35.5 months. Patients who had no concerns at their 1- and 2-year follow-up often ceased attending further scheduled visits. The lack of long-term data has been one of the main issues when comparing surgical techniques for rectal prolapse. The Swedish rectal prolapse trial found that at least 20% of recurrences presented after 3 years, a time point at which many studies end.²⁸ Spivak et al²⁹ recently reported their long-term results comparing resection rectopexy and VR in patients with FTRP. After a median follow-up of 113 months, they reported an overall recurrence of 39% after VR, with a median time to recurrence of 28.5 months. They demonstrated an increasing recurrence rate with time, with 1-, 3-, 5-, and 10-year recurrence rates of 11%, 25%, 31%, and 54%, respectively, with much higher rates in those with recurrent compared to primary prolapses. In our study, nearly half of the recurrences occurred after 5 years, with 20% occurring after 10 years, though we found no difference in those with recurrent versus primary prolapse. These data support the long-term recurrence after MIVR, which is much higher than previously reported. The crude overall recurrence rate of 15.6% in our study suggests that biological grafts provide acceptable long-term results.

Risk factors for recurrence identified included higher ASA score and age 75 years or older, which aligns with the literature.^{2,13,30} The single male patient in our cohort did not have a recurrence. This finding likely reflects a selection bias as prolapse is less common in male patients and has been shown to have higher recurrence rates after VR.^{30,31} High BMI has also previously been shown to be a predictor of recurrence likely due to increased pelvic pressures and a more difficult dissection.³⁰ We did not find this association even when considering those with BMI >30. It is uncertain as to why this was the case.

The functional results using biological grafts also appear to be consistent with those of permanent synthetic mesh.^{15,27,32} Sixty-one percent of patients had significant improvement in symptoms, with almost all having at least some improvement and being satisfied with their outcome. Unfortunately, validated postoperative incontinence scores were unable to be evaluated because of missing data, which limits the assessment of functional outcomes in this cohort.

The main strengths of this study are the prospective nature of the database and the large cohort. Its limitations include the fact that it represents the outcomes of a single surgeon experienced in the MIVR technique and that the results may not be generalizable. It is also possible that late recurrences that did not re-present to our institution were missed. However, as the main referral center for patients with complex and recurrent rectal prolapse in the state of Queensland, this is less likely. Loss to follow-up may have introduced attrition bias. In addition, the outcomes used for pain and patient satisfaction were subjective only, which further limits the evaluation of functional outcomes. The very strong positive feedback may suggest a response bias. Validated obstructive defecation syndrome scores, quality of life, sexual function, pelvic pain measurements, and de novo constipation were not collected but remain an area for future study.

CONCLUSIONS

MIVR using a biological graft is both safe and effective, offering acceptable short- and long-term recurrence rates, functional outcomes, and overall complications while avoiding mesh-related morbidity. Considering the recent concerns about the long-term impacts of permanent synthetic mesh being used in pelvic surgery, the results of our study support the transition to the use of biological grafts as the standard of care in MIVR.

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