



Laparoscopic ventral mesh rectopexy with and without transverse perineal support using biological mesh for rectal prolapse and perineal descent: postoperative course and functional outcomes

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Purpose: Laparoscopic ventral mesh rectopexy (LVMR) is effective for the treatment of rectal prolapse. However, descending perineal syndrome may impair the outcomes of LVMR. The aim of this study was to assess the safety and functional outcomes of LVMR performed with and without transverse perineal support (TPS).

Methods: This was a retrospective study of 143 consecutive female patients treated with LVMR with or without TPS between 2018 and 2022. Patients with rectal prolapse and perineal descent who underwent surgery were included. Obstructed defecation syndrome and fecal incontinence were evaluated using the Cleveland Constipation Score (Wexner score) and St. Mark's Incontinence Score, respectively. Perineal descent was defined using defecography. Biological meshes were utilized in all cases.

Results: No significant differences were recorded between with- and without-TPS groups at baseline. TPS was performed in 110 patients (76.9%). Surgical morbidity was higher in the with-TPS group (12.7% vs. 0%, $P=0.047$), primarily due to seroma formation. Almost all complications were mild (Clavien-Dindo grades I–II). In both groups, digital aid for defecation ($P<0.001$), prolonged straining ($P=0.004$), and hematochezia ($P<0.001$) nearly disappeared postoperatively, though constipation and laxative/enema use persisted in 22.4%. Fecal incontinence significantly decreased from 43.4% to 11.2% ($P<0.001$). TPS appears to have a potentially favorable effect in reducing the constipation score. Both constipation and incontinence scores remained low up to 24 months after surgery. Operative time was significantly longer in the LVMR with-TPS group ($P<0.001$).

Conclusion: LVMR with TPS appears safe and feasible. TPS may provide better surgical outcomes compared to LVMR alone for patients with symptomatic rectoceles and descending perineum syndrome.

Keywords: Rectal prolapse; Laparoscopy; Surgical mesh; Defecation; Perineum

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INTRODUCTION

Rectal prolapse, or procidentia, is characterized by the protrusion of mucosal layers or a full-thickness outward sliding of the rectal wall through the anus. This protrusion may be confined to the anal canal (internal rectal prolapse/intussusception) or extend externally (external prolapse) [1]. Both forms can significantly impair patients' quality of life, both physically and psychologically. Causes of rectal prolapse include pelvic floor muscle weakness, pregnancy and childbirth, constipation, chronic diarrhea (due to prolonged pressure on pelvic floor muscles), obesity, prior pelvic surgery, and aging.

Rectal prolapse (internal and external), rectocele, and descending perineum should be considered anatomical alterations amenable to surgical correction that contribute to the etiopathogenesis of obstructed defecation syndrome (ODS) [2, 3]. ODS may also result from functional disorders, such as spastic pelvic floor syndrome, which are beyond the scope of this article. A combination of functional and anatomical factors may coexist in the same patient, complicating diagnosis and appropriate treatment planning.

Surgical treatments aim to restore anatomical physiology, thus improving constipation and continence. Both abdominal and perineal approaches have been described, with abdominal approaches generally associated with higher complication rates.

Laparoscopic ventral mesh rectopexy (LVMR), first described in 2004 by D'Hoore et al. [1], has become the preferred European technique for ODS treatment in cases of full-thickness rectal prolapse, rectoceles, and rectal intussusception. Among rectopexy techniques, LVMR has demonstrated low postoperative morbidity, favorable short- and long-term outcomes, low recurrence rates [4, 5], and the advantage of nerve sparing.

However, simultaneous descending perineal syndrome may cause LVMR to fail because LVMR alone cannot anatomically correct perineal descent [6]. In 2016, Renzi et al. [6] introduced transverse perineal support (TPS), a novel surgical procedure designed to correct pathological perineal descent. This procedure aims to reinforce the musculus transversus superficialis perinei using a biologic mesh and can be combined with other surgical procedures for rectal prolapse.

Thus, this retrospective study aimed to assess the safety and functional outcomes of LVMR combined with TPS using biologic meshes in patients with rectal prolapse and perineal descent, compared to patients treated with LVMR alone, and also to evaluate outcomes based on different prostheses.

METHODS

Ethics statement

This study was approved by San Camillo Hospital Ethical Committee (No. 1/2025). Informed consent for publication of the research details was obtained from the patients. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Patients

This is a retrospective study based on a prospectively updated database of 143 consecutive female patients treated with LVMR, with or without TPS, at the Department of General and Minimally Invasive Surgery, San Camillo Hospital (Trento, Italy) between July 2018 and December 2022. The follow-up duration was at least 12 months.

Inclusion criteria were female patients over 18 years of age affected by ODS and not responsive to medical therapy. Specifically, we included patients with symptomatic internal rectal prolapse refractory to medical therapy, symptomatic rectoceles, external rectal prolapse, and fixed or dynamic perineal descent. We excluded obese patients (body mass index [BMI] > 30 kg/m²) and those with absolute contraindications to general anesthesia. For all patients, a comprehensive medical history, physical examination, rigid anorectoscopy, complete colonoscopy, anorectal manometry, defecography, transperineal ultrasonography, and gynecological evaluation were performed preoperatively.

Rectal prolapse was classified according to the Oxford rectal prolapse grading system, and rectocele size was reported from defecography findings [7]. ODS and fecal incontinence severity were assessed using the Cleveland Constipation Score (Wexner score) [8] and the St. Mark's Incontinence Score (SMIS) [9], respectively.

Although no universally established cutoff values for the Wexner score and SMIS are reported in the literature, we selected a threshold of 10 based on previous studies employing similar cutoffs, as well as on our clinical experience [3, 10–12]. This threshold was considered appropriate for distinguishing patients with clinically relevant symptom severity. Mild/moderate ODS was defined as a Wexner score of < 10, while severe/very severe ODS was defined as a Wexner score of ≥ 10. Similarly, mild/moderate incontinence was defined as an SMIS of < 10, and severe/very severe incontinence was defined as an SMIS of ≥ 10.

Pathological perineal descent was defined as fixed (perpendicular line length from anorectal angle to the perineal plane ≥ 3 cm at rest) and/or dynamic (extension ≥ 3 cm from rest position) [13, 14]. Postoperative complications were graded according to the

Clavien-Dindo classification [15]. TPS was offered to all patients presenting with symptomatic ODS characterized by fixed and/or dynamic perineal descent. After a thorough explanation of the procedure, each patient was given the opportunity to provide consent or decline participation.

Surgical technique

The surgical technique of LVMR combined with TPS has been described previously [16]. Briefly, a peritoneal incision is made on the right side of the sacral promontory, extended in an inverted J-shape along the rectum and across the deepest part of the pouch of Douglas. A pocket is created between the lower rectum and vagina, and the mesh is sutured to the anterior rectal wall, with the other end fixed to the sacrum. With the patient in the lithotomy position, bilateral 2.5 cm incisions are made over the skin of the ischial tuberosities. A subcutaneous tunnel is created between the

2 branches of the pubis via blunt finger dissection of the adipose tissue from the superficial perineal fascia. Nonabsorbable sutures are placed bilaterally into the periosteal membrane of the ascending branches of the pubis. The mesh is then positioned into the tunnel, just above the superficial perineal fascia, and bilaterally secured to the periosteal membrane of the ascending branches of the pubis (Fig. 1). All procedures were performed by the same colorectal surgeon (ADL).

Follow-up

Following surgery, outpatient follow-up was scheduled at 1, 3, 6, 12, 24, 36, and 48 months. Clinical status and surgical outcomes (complications, constipation and incontinence scores) were assessed at each visit. After the 48-month follow-up, patients continued to be followed annually. Median follow-up duration was 30 months (range, 12–48 months). No patients were lost during follow-up.

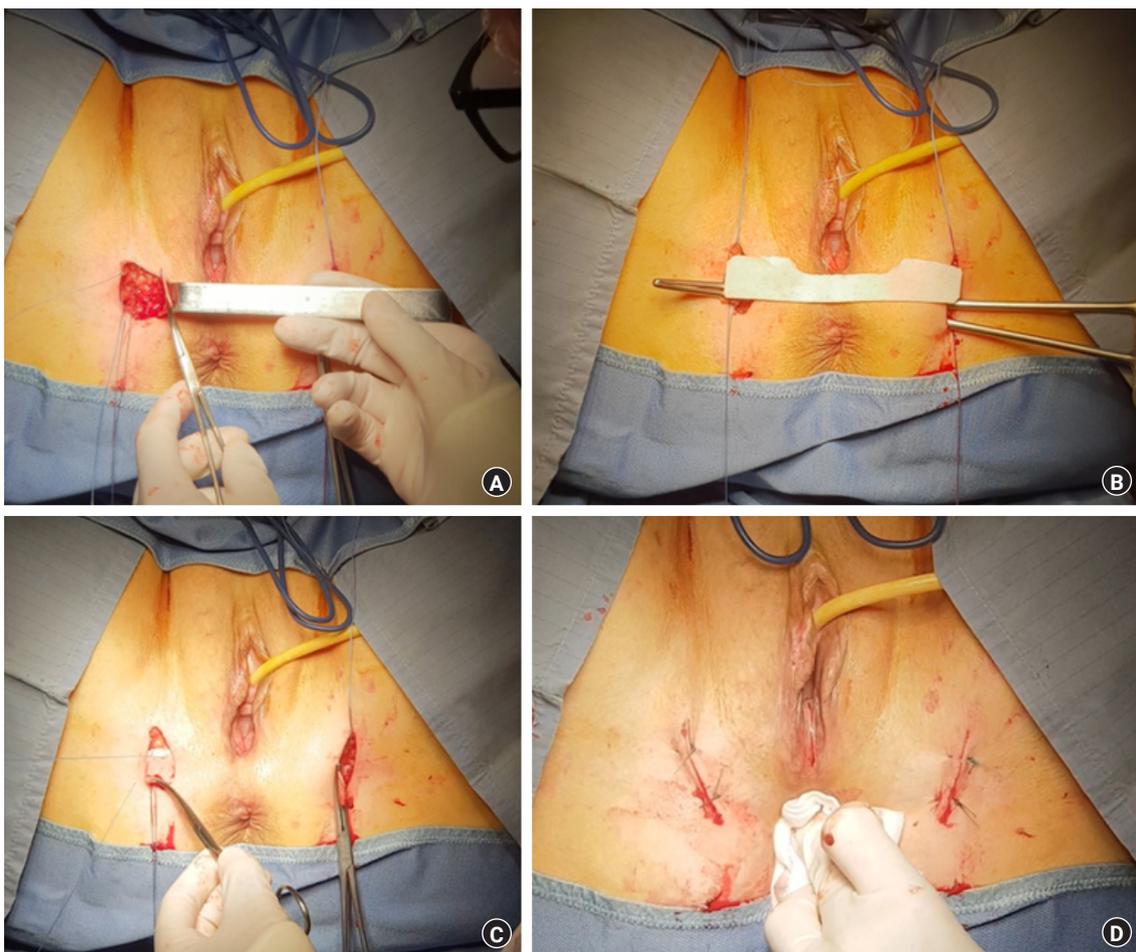


Fig. 1. Surgical procedure. (A) Two nonabsorbable stitches are fixed to the periosteum membrane of the ascending branches of the pubis. (B) A blunt dissection of the subcutaneous adipose tissue is performed with fingers between the 2 incisions to create a tunnel. In the image, a surgical instrument is placed in the tunnel. Above, a previously shaped porcine dermal implant, which was positioned for illustrative purposes. (C) The dermal porcine implant is placed in the tunnel and fixed with the 2 stitches bilaterally to the periosteum membrane of the ascending branches of the pubis. (D) Skin incisions are sutured with separate stitches.

Statistical analysis

Statistical analyses were performed using Stata ver. 16.1 (Stata Corp). Categorical variables (deliveries and natural births, American Society of Anesthesiologists [ASA] physical status, cardiovascular diseases, diabetes) were expressed as counts (percentages), and continuous variables (age, BMI, number of deliveries) were presented as median (interquartile range), as data were not normally distributed according to the Shapiro-Wilk and Shapiro-Francia tests. Differences between with- and without-TPS groups were tested using the chi-square or Fisher exact tests for categorical variables and the Wilcoxon-Mann-Whitney rank sum test for continuous variables. The nonparametric McNemar test was also employed to compare incontinence scores between groups.

Quantile regression was used to evaluate changes in ODS and incontinence scores over time as a function of surgery type (with vs. without TPS), adjusting for age, ASA physical status, and BMI. Standard errors were adjusted to account for intraindividual clustering.

RESULTS

Baseline conditions

The median age was 66 years (interquartile range [IQR], 57–75 years) and the median BMI was 23.8 kg/m² (IQR, 21.3–26.2 kg/m²). Information on pregnancy and deliveries was available for 128 patients, of whom 109 (85.2%) had at least 1 natural childbirth, with an average of 2.3 ± 1.0 deliveries per patient (range, 1–5). Nearly half of the women who had delivered underwent an episiotomy (70 of 143 patients, 49.0%), and 4 patients (2.8%) had a pelvic laceration during childbirth. Regarding ASA physical status, most patients were at low risk, with 83 (58.0%) classified as grade II, 41 (28.7%) as grade I, and 19 (13.3%) as grade III. Furthermore, 55 patients (38.5%) suffered from cardiovascular diseases, and 14 (9.8%) had diabetes. Of the total 143 patients, information on previous pelvic surgery and hysterectomy was available for 130 and 128 patients, respectively; 57 of 130 (43.8%) had undergone pelvic surgery, and 31 of 128 (24.2%) had undergone a hysterectomy.

TPS was performed in 110 patients (76.9%), predominantly between 2018 and 2021, when it was used in 101 of 108 cases (93.5%). In contrast, in 2022, most surgical procedures (26 out of 35 procedures, 74.3%) were conducted without TPS implantation.

No significant baseline differences were observed between patients with and without TPS. Women receiving TPS tended to be younger and had a slightly higher BMI, but these differences did not reach statistical significance. Additionally, there were no significant differences between groups in ASA physical status, cardiovascular disease, number of deliveries, natural births, prior

pelvic surgery, episiotomy, or hysterectomy rates. Baseline characteristics are summarized in [Table 1](#).

The most common preoperative symptoms were the need for digital assistance during defecation (45.5%), incontinence (43.4%), and constipation (36.4%) ([Table 2](#)). Other notable symptoms included hematochezia (11.9%), defecation urgency (9.1%), pain during defecation (7.7%), prolonged straining (7.7%), and soiling (6.3%). Tenesmus was uncommon, reported by only 5 patients (3.5%). The use of laxatives/enemas was frequent (60.1%). The frequency of these baseline symptoms individually did not significantly differ between with- and without-TPS groups, nor did the use of laxatives or enemas.

Of 143 patients, 109 (76.2%) presented with severe/very severe ODS, while nearly half (69 of 143 patients, 48.3%) exhibited severe/very severe incontinence ([Supplementary Table 1](#), [Supplementary Fig. 1](#)). Most patients with severe/very severe ODS (90 out of 109 patients, 82.6%) underwent LVMR combined with TPS. In patients with mild/moderate ODS, slightly over half received LVMR with TPS (20 of 34 patients, 58.8%). Concerning incontinence, among those with severe/very severe incontinence, the majority (47 out of 69 patients, 68.1%) underwent LVMR with TPS, a statistically significant difference ($P=0.018$).

Clinical perineal descent was observed in nearly all women (91.6%). Information about the type of perineal descent (dynamic or fixed), assessed via defecography, was available for 79 patients. Among these, 77 (97.5%) exhibited dynamic perineal descent, and 63 (79.7%) had fixed perineal descent as well ([Supplementary Table 2](#)).

On defecography, according to the Oxford grading system, 39 patients (27.3%) had recto-rectal intussusception (grade I–II), 50 (35.0%) had recto-anal intussusception (grade III–IV), and 30 (21.0%) had external rectal prolapse (grade V) ([Supplementary Table 2](#)).

Rectocele (posterior vaginal prolapse) was present in nearly all women (136 patients, 95.1%), whereas enterocele, sigmoidocele, and cystocele affected 67 (46.9%), 57 (39.9%), and 36 patients (25.2%), respectively. Women with perineal descent more frequently received TPS (102 of 131, 77.9%) ([Supplementary Table 2](#)).

Surgical techniques

As regards the type of prosthesis, Permacol (Medtronic) was used most frequently (80 patients, 55.9%), followed by SurgiMend (Integra; 54 patients, 37.8%), and Peri-Guard (Baxter; 9 patients, 6.3%) ([Supplementary Table 3](#)). Specifically, Permacol was predominantly used in 2018, 2021, and 2022, accounting for 55 out of 80 cases (68.8%). SurgiMend was the most commonly used material in 2020 (21 out of 54 patients, 38.9%). Surgical fixation

Table 1. Baseline demographic and clinical characteristics of the study population

| Characteristic | Total (n = 143) | With TPS (n = 110) | Without TPS (n = 33) | P-value ^a |
|--|------------------|--------------------|----------------------|----------------------|
| Age (yr) | 66 (57–75) | 65 (57–74) | 71 (62–77) | 0.132 |
| Body mass index (kg/m ²) | 23.8 (21.3–26.2) | 24.0 (21.4–26.5) | 22.9 (21.3–25.9) | 0.229 |
| Natural birth (n = 128) ^b | 109 (85.2) | 89 (80.9) | 20 (60.6) | 0.123 |
| No. of deliveries (n = 109) | 2 (2–3) | 2 (1–3) | 2 (2–3) | 0.871 |
| Episiotomy | 70 (49.0) | 62 (56.4) | 8 (24.2) | 0.194 |
| With laceration | 4 (2.8) | 3 (2.7) | 1 (3.0) | |
| Hysterectomy (n = 128) ^b | 31/128 (24.2) | 24 (21.8) | 7 (21.2) | 0.798 |
| Previous pelvic surgery (n = 130) ^b | 57/130 (43.8) | 45 (40.9) | 12 (36.4) | 0.651 |
| ASA physical status | | | | 0.816 |
| I | 41 (28.7) | 33 (30.0) | 8 (24.2) | |
| II | 83 (58.0) | 62 (56.4) | 21 (63.6) | |
| III | 19 (13.3) | 15 (13.6) | 4 (12.1) | |
| Cardiovascular disease | 55 (38.5) | 43 (39.1) | 12 (36.4) | 0.840 |
| Diabetes | 14 (9.8) | 8 (7.3) | 6 (18.2) | 0.091 |

Values are presented as median (interquartile range) or number (%).

^aAnalyzed by Wilcoxon–Mann–Whitney rank sum test for age, body mass index, and number of deliveries and by Fisher exact test for ASA physical status. ^bInformation on deliveries and hysterectomy were available for 128 patients, and information on previous pelvic surgery were available for 130 patients.

Table 2. Changes in symptom prevalence before and after the surgical procedure (n = 143)

| Symptom | No. of patients (%) | | P-value ^a |
|-----------------------------|---------------------|---------------|----------------------|
| | Preoperative | Postoperative | |
| Need for digital assistance | 65 (45.5) | 0 (0) | <0.001 |
| Incontinence | 62 (43.4) | 16 (11.2) | <0.001 |
| Hematochezia | 17 (11.9) | 0 (0) | <0.001 |
| Use of laxatives/enemas | 86 (60.1) | 32 (22.4) | <0.001 |
| Constipation | 52 (36.4) | 32 (22.4) | 0.003 |
| Prolonged lifting | 11 (7.7) | 1 (0.7) | 0.004 |
| Soiling | 9 (6.3) | 1 (0.7) | 0.011 |
| Urgency | 13 (9.1) | 3 (2.1) | 0.012 |
| Pain | 11 (7.7) | 3 (2.1) | 0.033 |
| Tenesmus | 5 (3.5) | 1 (0.7) | 0.103 |

^aAnalyzed by McNemar test.

employed Ti-Cron (Medtronic) in 126 patients (88.1%).

Permacol was used in 48 of 74 patients (64.9%) without ODS, while SurgiMend was used in 34 of 69 patients (49.3%) with ODS ($P = 0.038$). In the with-TPS group, SurgiMend was used in 52 patients (47.3%), but in the without-TPS group, it was used in only 2 patients (6.1%). Surgical fixation type did not significantly differ between with- and without-TPS groups (Supplementary Table 3).

TPS implantation required a longer surgical time and exhibited higher morbidity than procedures without TPS implantation (Supplementary Table 3). Specifically, the median operative time was approximately 23 minutes longer with TPS. Moreover, no

surgical morbidity was recorded in patients who did not receive TPS, whereas 14 patients (12.7%) in the with-TPS group experienced complications, primarily wound seromas (11 patients, 10.0%). Nearly all complications were mild (Clavien-Dindo grade I), with only 1 moderate complication (pulmonary edema, Clavien-Dindo grade II).

Short-term surgical outcomes

All symptoms significantly improved following surgery, except tenesmus, which was initially rare, limiting statistical power. Certain symptoms (digital assistance, hematochezia) completely resolved postoperatively, whereas others (pain, soiling, tenesmus, urgency, prolonged straining) became rare. Constipation and laxative use persisted in 32 patients (22.4%), as did mild incontinence (16 patients, 11.2%) (Table 2).

Long-term outcomes

Rectopexy effectively reduced constipation and incontinence scores, with substantial improvement evident as early as 1 month postoperatively, and therapeutic benefits remained stable throughout the initial 2-year follow-up (Table 3). A slight rebound increase in constipation and incontinence scores was observed after 2 to 3 years (Fig. 2). Long-term benefits were particularly notable in patients with complete prolapse (Supplementary Fig. 2). A substantial improvement in constipation scores occurred in both with- and without-TPS groups (Fig. 3).

Multivariable quantile regression analysis further evaluated fac-

Table 3. Constipation and incontinence scores before rectopexy and at different follow-up times

| Variable | Preoperative (n=143) | Postoperative | | | | | |
|------------------------|----------------------|---------------|--------------|--------------|--------------|--------------|--------------|
| | | 1 mo (n=139) | 3 mo (n=128) | 6 mo (n=110) | 12 mo (n=87) | 24 mo (n=62) | 36 mo (n=32) |
| Constipation score | 15 (11–18) | 1 (0–4) | 1 (0–2) | 0 (0–2) | 0 (0–1) | 1 (0–1) | 1 (0–2) |
| P-value (preoperative) | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| P-value (previous) | | | <0.001 | 0.156 | 0.938 | 0.205 | 0.047 |
| Incontinence score | 2 (0–9) | 0 (0–0) | 0 (0–0) | 0 (0–0) | 0 (0–0) | 0 (0–0) | 0 (0–3) |
| P-value (preoperative) | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| P-value (previous) | | | 0.202 | 0.453 | 0.570 | 0.027 | 0.126 |

Values are presented as median (interquartile range).

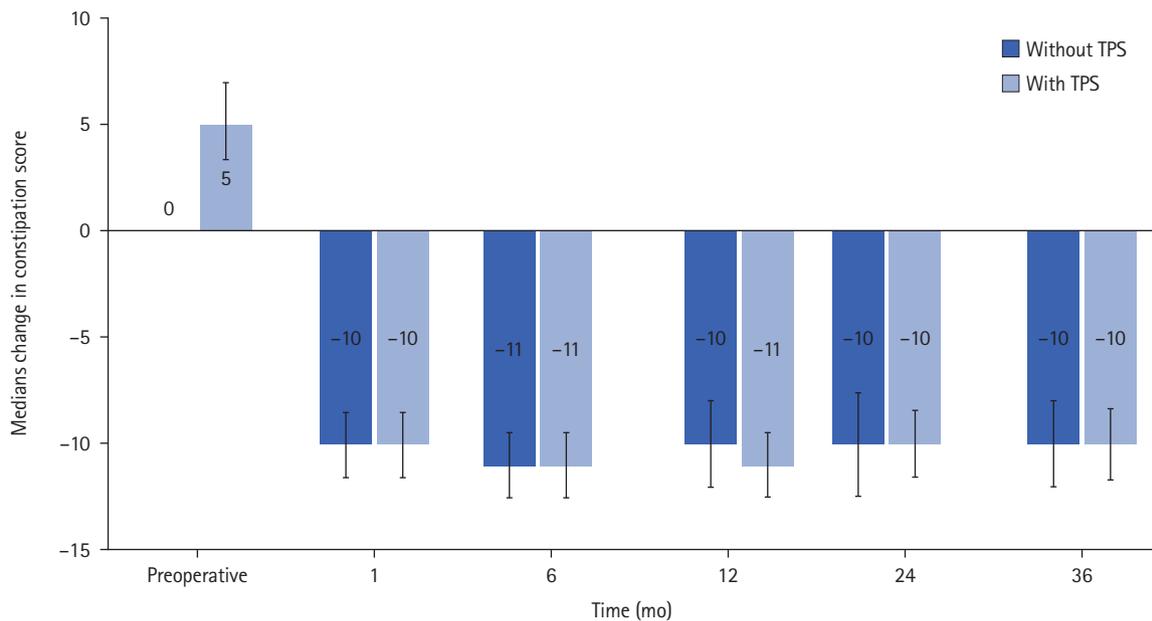


Fig. 2. Time trend in constipation scores, as a function of transverse perineal support (TPS) placement.

tors influencing constipation improvement (Supplementary Table 4). The analysis confirmed a significant reduction (median decrease of 14 points) in constipation score following surgery, without statistically significant differences between with- and without-TPS groups. Notably, baseline ODS scores were 5 points higher in the with-TPS group but converged with the without-TPS group after surgery.

Incontinence scores also improved markedly over time (Fig. 4). Improvements occurred irrespective of complete rectal prolapse presence (Supplementary Fig. 3). However, a multivariable model using incontinence scores as the outcome failed to converge and could not be fitted.

DISCUSSION

LVMR is recognized as a cornerstone procedure in the surgical

management of rectal prolapse. Its safety profile and positive clinical outcomes have contributed significantly to its widespread adoption by colorectal surgeons worldwide. Nonetheless, several issues persist, including the long-term recurrence of rectal prolapse, its applicability in male patients, effectiveness for internal rectal prolapse, the emergence of new functional symptoms, chronic pain, and mesh-related complications. Additionally, rectal prolapse often coexists with prolapses of other pelvic organs, representing a multidisciplinary condition that may require a combined surgical approach.

Recurrence of rectal prolapse can result from anatomical factors such as mesh slippage at anchoring points (caused by excessive mesh tension, perineal descent, or inadequate distal/proximal dissection) [17], prolapse of the mid-rectum, or biological mesh dissolution.

Concomitant perineal descent is also a significant factor con-

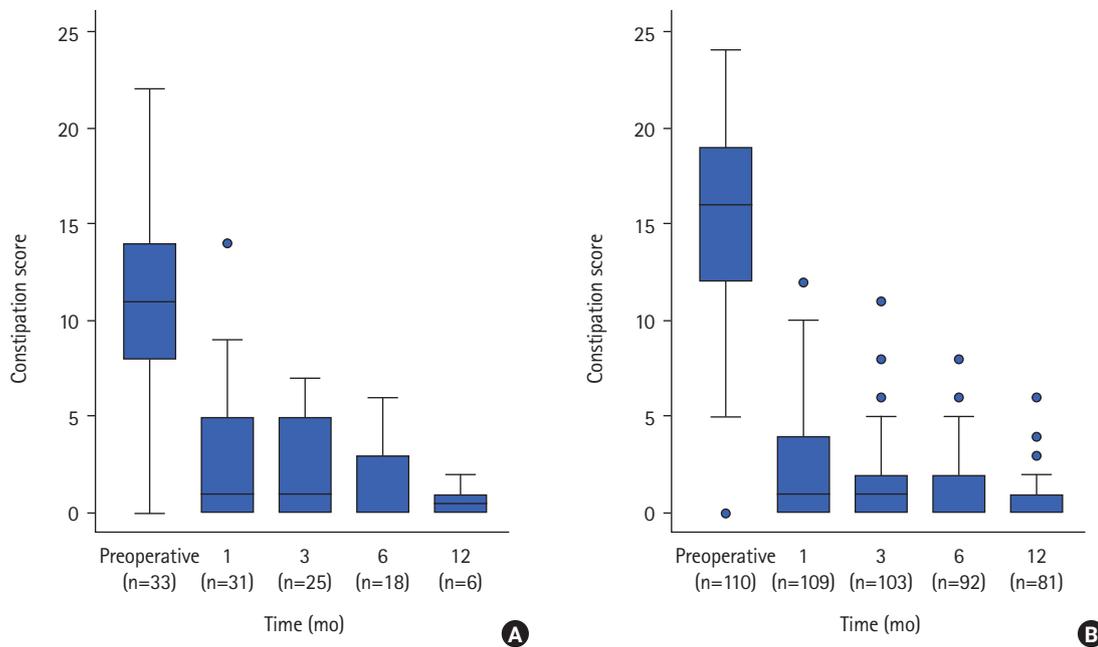


Fig. 3. Constipation scores over time. (A) Without transverse perineal support. (B) With transverse perineal support.

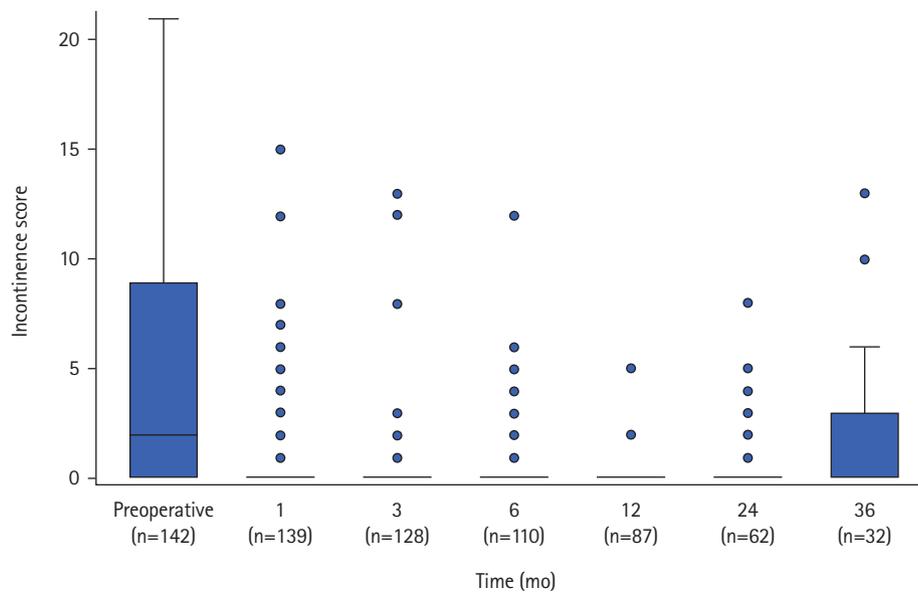


Fig. 4. Incontinence scores over time.

tributing to LVMR failure and may even lead to mesh detachment. Moreover, perineal descent has previously been suggested to correlate with increased severity of symptoms in patients with ODS [3]. Because LVMR primarily targets anatomical repositioning of the distal rectum without addressing perineal support, it cannot correct descending perineum when used alone. TPS provides additional structural perineal support by reinforcing the function of the superficial transverse perineal muscle [6]. There-

fore, we hypothesize that combining TPS with LVMR might enhance surgical outcomes, providing better and more sustained clinical benefits for patients.

In our patient series, the combination of LVMR and TPS proved safe and feasible, despite minor surgical morbidity. Patients receiving TPS experienced higher postoperative morbidity compared to those who did not (12.7% vs. 0%, $P=0.047$), mainly due to seroma formation (10.0%). However, complications were

mild (Clavien-Dindo grades I–II) and did not compromise overall clinical outcomes, making the combined approach acceptable.

Both surgical techniques led to substantial and sustained improvement in clinical symptoms. Digital aid in defecation ($P < 0.001$), prolonged straining ($P = 0.004$), and hematochezia ($P < 0.001$) nearly resolved completely, while both constipation and laxative/enema use persisted in 32 patients (22.4%). The prevalence of fecal incontinence decreased notably from 43.4% to 11.2% postoperatively ($P < 0.001$). TPS was particularly effective in reducing constipation scores. Patients receiving TPS initially had constipation scores approximately 5 points higher than those who did not, but scores equalized postoperatively. TPS was selectively performed in patients exhibiting symptomatic ODS with fixed and dynamic perineal descent, who had worse baseline constipation scores. Thus, this specific patient subset might especially benefit from adding TPS to LVMR, achieving postoperative outcomes comparable to those of patients with less severe preoperative symptoms. Good clinical outcomes were also observed among patients with complete rectal prolapse, for both constipation and incontinence scores (Supplementary Figs. 2, 3). These findings are consistent with a recent 2019 review, which included more than 1,200 patients across 17 primarily European studies, reporting favorable outcomes following rectopexy for complete rectal prolapse [17].

Long-term benefits of rectopexy were evident, as constipation and incontinence scores remained near 0 during the first 24 months of follow-up. A modest rebound increase in incontinence scores occurred at 36 months, with 7 out of 32 patients (21.9%) showing an incontinence score ≥ 3 (Fig. 4).

Regarding the surgical technique, Permacol was the most frequently used mesh (55.9%), chosen for 50.0% of patients undergoing LVMR with TPS and for 75.8% receiving LVMR alone (Supplementary Table 3). The choice of mesh was influenced by logistical supply constraints at our institution, including the occasional unavailability of specific products. All meshes utilized—Permacol, SurgiMend, and Peri-Guard—are biological, derived from dermal or pericardial tissues, serving as scaffolds for fibroblast and capillary infiltration, promoting durable support through fibrosis and remodeling. Given their similar biological behavior and intended function, the use of different meshes likely introduced minimal bias, unlikely significantly confounding outcomes.

No significant differences emerged regarding surgical fixation techniques, with Ti-Cron being the predominant suture in both LVMR and LVMR with TPS procedures (Supplementary Table 3). Operative time was significantly longer for LVMR with TPS, with a median difference of approximately 20 minutes; this duration increase is considered acceptable.

Strengths and limitations

A strength of this study was that all surgical procedures were conducted by the same experienced surgical team, ensuring consistency in technique and approach. While such consistency likely contributed positively to the outcomes, other factors, such as surgical expertise and familiarity with the procedures, could also have influenced results. Thus, although the findings support the potential advantages of adding TPS to LVMR, further multicenter research involving various experienced surgical teams is necessary to validate the reproducibility of these outcomes. Another strength is the standardized administration of preoperative and postoperative questionnaires in a controlled clinical setting, ensuring reliable and consistent data collection.

Despite the retrospective nature of this study, all preoperative and postoperative data were systematically collected and stored in a prospectively updated database, potentially minimizing information bias.

However, several limitations must be acknowledged when interpreting these results. Firstly, the nonrandomized study design introduces inherent selection bias, as patients opted for TPS based on individual preferences. While multivariable analyses were performed to adjust for baseline differences, unmeasured confounders might remain. Consequently, further prospective, randomized studies are required to generate stronger evidence and draw more definitive conclusions.

Conclusions

In our patient series, LVMR combined with TPS was safe and feasible. The addition of TPS may provide enhanced outcomes for patients with symptomatic ODS associated with internal or external rectal prolapse and perineal descent, with only a modest increase in operative time and a low rate of surgical morbidity. Further prospective, controlled studies are necessary to confirm these findings and clarify the clinical benefits of this combined approach.

ARTICLE INFORMATION

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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Author contributions

Conceptualization: ADL, MCG, GB; Data curation: GB, LC; Formal analysis: AT; Writing—original draft: MCG, GB, ADL; Writing—review & editing: all authors. All authors read and approved

the final manuscript.

Supplementary materials

Supplementary Table 1. Frequency of constipation and incontinence scores

Supplementary Table 2. Rectal and perineal disorders, as detected at medical examination

Supplementary Table 3. Characteristics of the surgical procedures

Supplementary Table 4. Determinants of constipation score, evaluated by multivariable quantile regression, with standard error adjusted for intraindividual clustering

Supplementary Fig. 1. Overall constipation scores over time.

Supplementary Fig. 2. Constipation scores over time depending on complete prolapse outcome.

Supplementary Fig. 3. Incontinence scores over time depending on complete prolapse outcome.

Supplementary materials are available from <https://doi.org/10.3393/ac.2025.00080.0011>.

REFERENCES

1. D'Hoore A, Cadoni R, Penninckx F. Long-term outcome of laparoscopic ventral rectopexy for total rectal prolapse. *Br J Surg* 2004;91:1500–5.
2. Parks AG, Porter NH, Hardcastle J. The syndrome of the descending perineum. *Proc R Soc Med* 1966;59:477–82.
3. Brilliantino A, Iacobellis F, Maglio M, Grillo M, Vicenzo L, Monaco L, et al. The relevance of the excessive perineal descent in the obstructed defecation syndrome: a prospective study of 141 patients. *Dis Colon Rectum* 2023;66:1508–15.
4. van Iersel JJ, Consten EC. Ventral mesh rectopexy for rectal prolapse: level-I evidence. *Lancet Gastroenterol Hepatol* 2016;1:264–5.
5. D'Hoore A. Fine-tuning indications for laparoscopic ventral mesh rectopexy. *Tech Coloproctol* 2017;21:593–4.
6. Renzi A, Brilliantino A, Di Sarno G, d'Aniello F, Bianco P, Iacobellis F, et al. Transverse perineal support: a novel surgical treatment for perineal descent in patients with obstructed defecation syndrome. *Dis Colon Rectum* 2016;59:557–64.
7. Bartram CI, Turnbull GK, Lennard-Jones JE. Evacuation proctography: an investigation of rectal expulsion in 20 subjects without defecatory disturbance. *Gastrointest Radiol* 1988;13:72–80.
8. Agachan F, Chen T, Pfeifer J, Reissman P, Wexner SD. A constipation scoring system to simplify evaluation and management of constipated patients. *Dis Colon Rectum* 1996;39:681–5.
9. Vaizey CJ, Carapeti E, Cahill JA, Kamm MA. Prospective comparison of faecal incontinence grading systems. *Gut* 1999;44:77–80.
10. Sileri P, Franceschilli L, de Luca E, Lazzaro S, Angelucci GP, Fiaschetti V, et al. Laparoscopic ventral rectopexy for internal rectal prolapse using biological mesh: postoperative and short-term functional results. *J Gastrointest Surg* 2012;16:622–8.
11. Sileri P, Franceschilli L, De Lorenzo A, Mezzani B, Todisco P, Giorgi F, et al. Defecatory disorders in anorexia nervosa: a clinical study. *Tech Coloproctol* 2014;18:439–44.
12. Roos AM, Sultan AH, Thakar R. St. Mark's incontinence score for assessment of anal incontinence following obstetric anal sphincter injuries (OASIS). *Int Urogynecol J Pelvic Floor Dysfunct* 2009;20:407–10.
13. Shorvon PJ, McHugh S, Diamant NE, Somers S, Stevenson GW. Defecography in normal volunteers: results and implications. *Gut* 1989;30:1737–49.
14. Jorge JM, Ger GC, Gonzalez L, Wexner SD. Patient position during cinedefecography: influence on perineal descent and other measurements. *Dis Colon Rectum* 1994;37:927–31.
15. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;240:205–13.
16. Di Leo A, Andreuccetti J. Laparoscopic ventral mesh rectopexy plus transverse perineal support using biologic mesh for rectal intussusception with rectocele and perineal descent: a video vignette. *Colorectal Dis* 2020;22:2341–2.
17. Emile SH, Elfeki H, Shalaby M, Sakr A, Sileri P, Wexner SD. Outcome of laparoscopic ventral mesh rectopexy for full-thickness external rectal prolapse: a systematic review, meta-analysis, and meta-regression analysis of the predictors for recurrence. *Surg Endosc* 2019;33:2444–55.