# *Laparoscopic Ventral Rectopexy for Internal Rectal Prolapse Using Biological Mesh: Postoperative and Short-Term Functional Results*

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ORIGINAL ARTICLE

# Laparoscopic Ventral Rectopexy for Internal Rectal Prolapse Using Biological Mesh: Postoperative and Short-Term Functional Results

**Pierpaolo Sileri · Luana Franceschilli · Elisabetta de Luca · Sara Lazzaro · Giulio P. Angelucci · Valeria Fiaschetti · Carolina Pasecenic · Achille L. Gaspari**

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**Abstract**
*Background* Laparoscopic ventral mesh rectopexy is a novel procedure to correct internal and external rectal prolapse. Several authors have shown that this approach is safe and improves obstructive defaecation symptoms and faecal incontinence, without inducing new-onset constipation, possible after posterior rectopexy. Over the last decade, as for other procedures, biological meshes are used to correct pelvic floor disorders. Literature data are scant. In this study, we present our experience with this procedure using biological mesh.
*Patients and Methods* Prospectively collected data on laparoscopic ventral mesh rectopexy for internal rectal prolapse were analysed. All patients underwent preoperative evaluation with defaecating proctography and/or pelvic dynamic MRI, full colonoscopy, anal physiology studies and endo-anal ultrasound. End-points were to evaluate surgical complications and functional results of this technique such as changes in bowel function (Wexner Constipation Score and Faecal Incontinence Severity Index) at 3 and 6 months. Analysis was performed using Mann–Whitney *U* test for unpaired data and Wilcoxon signed rank test for paired data (two-sided *p* test).
*Results* Thirty-four consecutive patients underwent laparoscopic ventral mesh rectopexy (median age 59, range 25–78 years, mean follow-up was 12 months). Twenty-eight patients (82%) had a constipation score ≥5, while 14 (41%) a FISI score ≥10. Nine patients (26%) had mixed obstructed defaecation and faecal incontinence. One patient required conversion to open (3%). Median length of stay was 2 days. Overall complication rate was 23.5%. Preoperative constipation (median Wexner score 15) and faecal incontinence (median FISI score 12) improved significantly at 3 months (Wexner 5, FISI 5, both $p<0.001$). Two patients experienced prolapse persistence or recurrence. No patients had function worsening or complained of sexual dysfunction.
*Conclusions* Laparoscopic ventral mesh rectopexy using biological mesh for internal rectal prolapse is safe and effective in ameliorating symptoms of obstructed defaecation and faecal incontinence.

**Keywords** Laparoscopy · Ventral rectopexy · Mesh · Obstructed defaecation · Faecal incontinence

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## Background

Over the last decades, numerous procedures have been proposed to treat rectal prolapse (RP) often with contrasting results, underlying the continuing search for the ideal surgical treatment.[1] This should correct RP and/or rectal intussusception (RI) and derived symptoms, which range from faecal incontinence (FI) to obstructed defaecation (OD).[2] Traditionally, abdominal approaches are preferable to perineal because of lower long-term recurrences and superior correction of incontinence.[3] However, when RP is treated with posterior rectopexy, although incontinence is improved, the associated constipation tends to get worse after

surgery.[2,3] Occasionally, a new-onset constipation is a possible consequence of rectal denervation secondary to posterolateral mobilization and division of the lateral ligaments. Concomitant colonic resection to overcome this problem is effective, but followed by an anastomotic leakage risk or anastomotic stricture. Moreover, recently, it has been suggested a key role of the sigmoid colon as faecal reservoir and second level of FI.[4]

Ventral rectopexy (VR) involves mobilization of the anterior wall of the rectum down to the levator ani muscle and anterior placement of a mesh, which is sutured distally on the anterior wall of the rectum and secured proximally to the sacral promontory.[5] The initial description of VR was the Orr–Loygue procedure, which consisted in the full rectal anterior mobilization and suturing two meshes on the anterolateral rectal wall.[6] However, a purely anterior rectal mobilization that limits posterior dissection has been proposed by D'Hoore and Penninckx, who reported successful long-term results of laparoscopic ventral rectopexy (LVR) to treat RP.[5] Few other authors have shown reproducible safety of this abdominal procedure that combines the effectiveness of the abdominal approaches, in terms of longer-term cure of the RP and RI, to the lowest morbidity of the minimally invasive surgery.[5,6] Since the dissection is completely anterior between the rectum and vagina and only a very superficial peritoneal window is open starting from the sacral promontory on the right side of the rectum, the nerves are respected and no rectal denervation inertia or new onset constipation is expected.[7] It would improve anorectal function and even have advantages for the middle pelvic floor compartment.[3]

XGrowing experience in the literature shows definite functional improvements in terms of FI and, more in constipation, even if reported data are little.[3] This evidence is mainly based using synthetic mesh for rectal fixation, which augments the efficacy of the reconstructive procedure while reducing recurrences. However, prosthetic-related complications, such as erosions and infections, are challenging complications associated with the use of synthetic mesh.[8] The recent introduction of biological mesh, capable of soft tissue remodelling and replacing of native tissue, might offer the potential for a 'safer' reconstructive procedure in absence of a permanent foreign material with an increased resistance to infection.[9] Despite this, current evidence does not suggest the indisputable superiority of any biologic mesh in terms of clinical outcomes including longer-term efficacy.[10] Nonetheless, data on the use of biological meshes to treat RP are particularly scant. In this study, we aimed to evaluate our surgical and functional results with this abdominal, minimally invasive and nerve sparing technique using biological meshes, which might offer a more 'natural' repair.

## Patients and Methods

From April 2009 to February 2011, 34 consecutive patients with internal rectal prolapse were treated by LVR and entered in a prospective pelvic floor database. All patients were women with a mean age of 59 years ranging from 25 to 78.

The diagnosis of rectal prolapse was made clinically and confirmed by defaecating proctography and/or dynamic pelvic MRI. Proctograms were evaluated using the Oxford Prolapse Grading system.[2,3] Anorectal function was evaluated using two different scores: Wexner Constipation Score (WSC) and Faecal Incontinence Severity Index (FISI). All patients underwent anal manometry as well as rectal examination. A full colonoscopy or CT colography to exclude colonic disease was also performed, while a colonic transit study was reserved to young patients with severe constipation. Indications to surgery were grade III or IV RP (internal rectal prolapse) at proctogram with a FISI score >10 and/or a WCS >5. All patients were listed after failure of conservative management including bowel regimen, laxatives and a 12-week course of biofeedback therapy by specialized pelvic floor therapist. All patients were evaluated by urogynecologist in order to study middle and anterior compartment disease. Patients with concomitant anterior or middle compartment abnormalities requiring additional surgery to LVR were excluded from this study. All surgeons involved in the procedure have been trained in Oxford according to the technique already described by d'Hoore and Penninckx.[5] Written informed consent was obtained. All patients received a single dose of antibiotic (amoxicillin/clavulanic acid or cephalosporin in case of penicillin allergy) at induction. Urinary catheter was inserted. Briefly, an anterolateral dissection was carried on between the rectum and the vagina starting from the sacral promontory, down to the levator ani muscle using a four-trocar technique and a 30° scope. A 3×18 strip of biological mesh (Permacol, TSL plc, UK) was positioned in this pocket at the level of the levator ani muscle and sutured to the anterior wall of the rectum using two parallel rows of non-absorbable 2–0 sutures (Tycron, Covidien, Tyco Healthcare, UK, Ltd). During this manoeuvre, the rectum was gently and fully retracted cranially in order to visualize the levator ani muscle and the level of the first two distal sutures confirmed to be approximately at 2–3 cm above the dentate line by rectal examination or proctoscopy. The mesh was then secured on the sacral promontory using the Protack device (Autosuture, Covidien, Tyco Healthcare, UK, Ltd), and the vaginal vault (or cervix) was fixed to the mesh without traction by two additional absorbable sutures (vicryl 2–0). The surgery was concluded with the closure of the peritoneal incision edges using a running absorbable suture 2–0 (V-Lock, Covidien, Tyco Healthcare UK, Ltd). A drain was left in situ for 24 h. Postoperatively opiates or epidural anaesthesia was avoided

and non-steroidal drugs and paracetamol used. Antibiotics were continued for 5 days after surgery until December 2010 when our protocol was changed to a three-dose regimen starting at surgery. The urinary catheter was removed and fluid therapy discontinued to allow hospital discharge starting from postoperative day II. Patients were discharged with high dose (three times per day) of osmotic laxative (polyethylene glycol 3350, Movicol, Norgine Italia Srl) that was weaned to one per day by 6 weeks after surgery.

After surgery, patients were seen after 1 week, 12 weeks, 6 months, and 12 months. Data on gender, age, mortality, morbidity, length of stay, recurrence, symptoms WSC and FISI were prospectively collected. Improvement in symptoms (OD or FI) was considered as a reduction in our two scores, WCS and FISI, of at least 25%. Analysis was performed using chi-square test and *T* test student.

## Results

Mean BMI at surgery was 26±5 kg/m$^2$ ranging from 17 to 36. Overall 29 (85.3%) patients had previous surgery including hysterectomy (eight patients), C-section (six patients), surgery for anal fissure or haemorrhoids (two patients), for anal fistula (one patient), and other gastrointestinal surgery (ten patients). Two patients had previous stapled trans-anal rectal resection (STARR) for obstructed defaecation. Mean symptom duration before surgery was 13± 6 years, ranging from 3 to 31. After the preoperative workup, 24 patients were listed for surgery to correct a grade IV prolapse according to the Oxford Rectal Prolapse grading system. Median follow-up was 12 months (range 6 to 30). Mean operative time was 110±30 min (mean ± SD, range 70–160).

There was one conversion because of severe pelvic adhesions secondary to a previous hysterectomy in a patient with a BMI of 36. There were no surgical re-interventions during the admission. Median postoperative length of stay was 2 days (ranging from 2 to 5). There was no postoperative mortality. Overall eight patients experienced nine complications (23.5%). One patient experienced incomplete small bowel obstruction (SBO) 25 days after surgery because of an adhesion between a protack clip and the terminal ileum and required uneventful laparoscopic adhesiolysis. Minor complications were observed in the remaining seven patients as follows: four urinary tract infection (UTI) successfully treated with oral antibiotics, two subcutaneous emphysemas which resolved spontaneously, and one sacral long lasting pain, successfully treated with low dose of corticosteroids and painkillers for 15 days and one wound hematoma treated by conservative management. There were no emergency room or hospital readmissions, a part for the patient who required adhesiolysis. There were no port-site hernia and no mesh-related complications. Of the 34 patients, 25 (74%) were sexually active and no patients reported sexual dysfunctions. Mean follow-up was 12 months ranging from 6 to 28 months.

### Incontinence

Mean FISI before surgery was 9±3 (range 0–41) with a median of 4 (inter quartile range 0–11). Fifteen out of 34 patients reported preoperative significant incontinence with a FISI≥10. Overall, considering the type of incontinence, two patients were incontinent to liquid stool, seven patients were incontinent to gas, and six to mucous. All incontinent patients to liquid or gas were older than 65 years. No patients younger than 45 years resulted incontinent.

At 3 months after surgery, mean FISI improved to 4 (range 0–34) ($p$=0.001) with a median of 0 (interquartile range 0–7). At 6 months after surgery, mean FISI improved to 3 (range 0–34) ($p$=0.001) with a median of 0 (interquartile range 0–5). Incontinence was cured or improved in nine out of 15 patients (60%) at 3 months and in 11 at 6 months follow-up (73%). Of those, seven patients were cured. No patients experienced incontinence worsening. Overall at the end of the follow-up, incontinence was still present in four patients.

### Constipation

Mean WCS before surgery was 16±5 (range 6–23) with a median of 16 (interquartile range 13–19). Twenty-eight out of 34 patients reported preoperative constipation with a WCS≥5. Nine patients presented mixed constipation and faecal incontinence abnormal scores (26%).

At 3 months after surgery, mean WCS improved to 9 (range 0–20) ($p$=0.001) with a median of 9 (interquartile range 6–14) and remained stable thereafter. At 6 months after surgery, mean WCS improved to 7 (range 0–20) ($p$= 0.001) with a median of 9 (inter quartile range 3–14). At the end of the follow-up, constipation was cured or improved in 23 patients (82%). Of those 11 were cured. No patients experienced constipation worsening. Overall outcomes are resumed in Table 1. Two patients experienced symptoms persistence (one) or recurrence (one) and required STARR for residual posterior prolapse (only posterior STARR) or anterior and posterior STARR for complete prolapse.

## Discussion

According to the existing literature, it seems reasonable that patients who are fit for surgery should be offered abdominal rectopexy to manage RP and RI. Longer-term recurrence rates are lower (usually 5% or less) when compared to the perineal approaches (pooled series 18%).[3,11]

**Table 1** Outcome resume

| Outcome | |
|---|---|
| Conversion to open technique, *n* (%) | 1 (2.9%) |
| Operative time (min, range) | 110 min (range 70–160) |
| Median hospital length of stay (range, days) | 2 (range 2–5) |
| Overall complications *n*/*N* (% of patients) and management | 8/34 (23%) |
| UTI | 4 (oral antibiotics) |
| Subcutaneous emphysemas | 2 (conservative) |
| Wound haematoma (port site) | 1 (conservative) |
| Small bowel obstruction | 1 (reintervention and adhesiolysis) |
| Sacral long-lasting pain | 1 (corticosteroids for 3 weeks) |
| Symptoms improvements at 6 months (%) | |
| Constipation | 82% (48% cured) |
| Faecal incontinence | 73% (64% cured) |
| Prolapse recurrence and reintervention | 2 (5%) (STARR) |

*UTI* urinary tract infections, *STARR* stapled transanal rectal resection

Perineal procedures are usually employed in the elderly or infirm because of their reputation for safety.[3,12–17] The main disadvantage of the abdominal approaches is the residual or 'new-onset' constipation that can be as high as 50% regardless of the mode of access.[18] This finding can be related to the division of the lateral ligaments where ascending parasympathetic sacral nerves to the left colon and the rectum can be damaged leading to denervation inertia.

An anterior approach, limiting rectal mobilization and avoiding lateral dissection, has been proposed to possibly overcome this effect.[7] Early experiences with VR were followed by decreased incidence of postoperative constipation compared to posterior rectopexy.[7] In 2004, a novel approach named 'laparoscopic ventral mesh rectopexy has been proposed by D'Hoore and Penninckx.[5] This represents an evolution of the abdominal approach and could play a role in the treatment of RP and RI, minimizing complications and recurrences compared to standard abdominal, open, posterior rectopexy.

Improved results can be secondary to the limited anterior rectal mobilization without lateral ligaments divisions and prevention of RI by dividing the rectovaginal septum down to the pelvic floor and by fixation of the stretched rectum to the sacral promontory. Differently by other VR, even the minimal lateral mobilization is avoided, leaving the dissection to a pure anterior pocket between the rectum and the vagina with a very superficial peritoneal window laterally, just enough to allow anterolateral mesh placement. As indicated by Wijffels et al., the mesh should be fixed as low as possible to the ventral rectal wall, close to the pelvic muscles in order to minimize recurrence rates and allow repair of large rectocele.[1] Moreover, the creation of a shallow, elevated pouch of Douglas at the end of the surgery suturing the peritoneal incisions over the mesh corrects a concomitant enterocele and sigmoidocele.[3] Besides, it corrects middle compartment prolapse, usually evident as expression of a global pelvic floor disorders. Avoiding the perineal approach, a better effect on continence is achieved.[3]

A recent systematic review by Samaranayake et al. indicates that the anterior rectopexy is followed by very low recurrences rates, which range from 0% to 15.4% (estimated crude recurrence <4%).[19] Consequently, decrease in postoperative constipation rate is usually observed and to be close to 25%, while new onset of constipation after surgery to be as low as 3% (weighted mean rate of 14%). Similarly, decrease of FI is commonly seen and close to 50%, while new onset of postoperative FI is very rare. However, when 'pure' VR series are considered, the reduction in postoperative constipation is greater and new-onset constipation is a very rare.

As shown in Table 2, worldwide experience indicates recurrence usually between 4% and 5% (range 0–15%). Functional results are impressive, showing symptoms resolution in up to 90% of the patients in the short-term follow-up and above 80% in the longer-term follow-up for both constipation and FI.[2,3,5,6,20–27]

In the present study, 82% of the patients with a grade III and IV internal rectal prolapse complained preoperative constipation. Postoperative constipation improvement was over 80%, and we did not observe any new-onset constipation.

Incontinence was evident in 44% of our population, and it was significantly improved in almost two third of the patient after surgery. Similarly to literature experience, these improvements were immediately evident starting 3 months after surgery and improving during the first 6 months. No further improvements are observed thereafter.

These findings confirm the unique role of VR in ameliorating or preserving continence as well as on constipation cure with neglectable effects on new-onset constipation, thus indicating that sigmoid resection is not necessary. It should also be considered that postoperative constipation is not annulled and may remain or develop even after sigmoid resection along with a mortality rate as high as 10%.[28,29]

We observed a single case of recurrent prolapse, which was successfully treated with a single posterior STARR. Our results confirm that limited anterior mobilization offers low recurrences rates, and despite our series has a mean follow up of 12 months, these advantages seem to remain stable over time as shown by Boons et al. (2% at 19 months) and D'Hoore and Penninckx (5% at 5 years).[3,5] Moreover, as suggested by the same author, since the recurrences occurred early in the first 20 patients, these may have been related to the learning curve. Accordingly, our recurrence occurred in the second patient treated with biological mesh.

**Table 2** Literature experience with anterior rectopexy either open or laparoscopic

| Authors | Year | *N* | Follow-up (months) | Mean/median age (years) | Operation | Indication for surgery | Lateral ligament | Functional results | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | OD | FI |
| Silvis et al.[20] | 1999 | 27 | 48 | 56 | Open rectovaginopexy—Gore-Tex | OD, FI | Preserved | 71% improved<br>6% worsened | 53% improved |
| Bakshi et al.[21] | 2000 | 47 | 48 | 33 | Modified mesh rectopexy | Rectal prolapse, OD, FI | Preserved | 59% improved | 75% persisted |
| D'Hoore and Penninckx[5] | 2004 | 42 | 61 | 50 | LVR—Marlex | Rectal prolapse, OD, FI | Preserved | 84% improved<br>5% onset | 91% improved |
| Verdaasdonk et al.[22] | 2006 | 14 | 7 | 73 | Laparoscopic rectovaginopexy—prolene | OD, FI | Preserved | 66% improved | 69% improved |
| Portier et al.[23] | 2006 | 73 | 132 | 61 | Abdominal rectopexy Orr–Loygue technique | Rectal prolapse, OD, FI | Preserved | 54% cured<br>8.1% improved<br>32.4% unchanged<br>5.4% worsened | 62.5% cured<br>29.2% improved<br>8.3% unchanged |
| Auguste et al.[24] | 2006 | 54 | 97 | 53 | Laparoscopic rectopexy | OD, FI | Preserved | 13% worsened<br>40% unchanged<br>47% improved | 69% improved<br>31% cured |
| Cristaldi et al.[25] | 2007 | 58 | 3 | 63 | LVR | OD, FI | Preserved | 78% improved | 90% improved |
| Slawik et. al.[26] | 2007 | 36 | 54 | 59 | LVR—polypropylene | OD | Preserved | 80% improved<br>4% worsened | 91% improved |
| van den Esschert et al.[6] | 2008 | 17 | 38 | 55 | LVR—Gore-Tex or prolene | OD (FI not stated) | Preserved | No sig diff in ODS<br>88% improved | n/s |
| Boons et al.[3] | 2009 | 65 | 19 | 72 | LVR—polypropylene | OD, FI | Preserved | 72% improved<br>2% induced | 83% improved<br>5% induced/worsened |
| Collison et al.[2] | 2010 | 72 | 12 | 58 | LVR—polypropylene | OD | Preserved | 86% improved | 85% improved |
| Wong et al.[27] | 2010 | 84 | 29 | 64 | LVR—polyester | OD, FI | Preserved | 37% improved | 4% improved |
| Current series | 2011 | 34 | 12 | 59 | LVR—biologic | OD, FI | Preserved | 82% improved | 73% improved |

*LVR* laparoscopic ventral rectopexy, *OD* obstructed defaecation, *FI* faecal incontinence

As shown in a recent Cochrane Collaboration review, the laparoscopic correction of the prolapse results in a significant reduction in postoperative pain, hospital stay and recovery time similarly to other procedures.[30] Literature data show that complication rates after VR range from 1.4% to 47%. Considering only LVR, these rates are significantly reduced in experienced centres to less than 20%. Wijffels et al. have proven LVR safe for elderly showing mortality, morbidity and hospital stay comparable with published rates for perineal procedures with a tenfold lower recurrence rate.[1] Similarly, D'Hoore and Penninckx in a subgroup of 42 patients reported a recurrence rate of only 5% with a 5-year follow-up and very low morbidity.[5]

Our complication rate is comparable to literature data being 23%, mainly secondary to minor complications such as UTI. We did observe a partial SBO secondary to adhesion, a very rare complication after this surgery. One conversion to open technique was required in our series, similar to the risk reported in the literature (usually less than 5%). Main reasons for conversion are similar to those observed in other laparoscopic procedures such as adhesions and obesity as in our case.

Postoperative mean hospital stay in our study was 2 days, comparable with that reported by experienced centres.[2,3,5] Compared to literature experience, our population was relatively young. This was due to a large referral of patients with anorexia nervosa, which is a possible under-recognized concomitant cause of rectal prolapse.[31]

According to the literature, polypropylene or polytetrafluoroethylene (Gore-Tex, WL Gore, Flagstaff, AZ, USA) meshes have been used routinely, while substantial data on biological implants are not available. The use of foreign material to fix or suspend the rectum aims to induce more fibrous tissue formation that is an ordinary suture rectopexy.

The main disadvantage of using synthetic meshes is the risk of post-implantation mesh-related complications. Among these, pelvic sepsis has been reported in 2% to 16% of patients with prosthetic rectopexy.[32] The risk of pelvic sepsis is higher if a resection is performed and if pelvic hematoma is present.[33] However, it is difficult to generalise about short- and long-term safety of synthetic mesh in pelvic reconstructive surgery since most of the reported studies are retrospective or uncontrolled series. This is even more difficult for rectal prolapse surgery due to the different approaches used, study design and different length of follow-up. After VR, the risk of mesh detachment, infection or erosion into the rectum or the vagina exists but it is extremely rare, but a fatal case secondary to septicaemia caused by a nylon strip infection 6 months after surgery has been reported.[34,35] When the mesh is completely covered by the peritoneum, mesh-related complications are theoretically avoided.[3] However, the risk of mesh erosion into the vagina can be as high as 21%, and according to a large review on sacrocolpopexy is 3.4%.[32,34,35] The mesh placement closer to the vaginal wall instead to the rectum might explain this difference.[3] Despite there is a lack of evidence against synthetic meshes and risks seem to be very low after VR, the recent introduction of biological meshes might temper the fear of a possible mesh-related complication.

The use of biological prostheses demonstrates high efficacy apart from the sector of pelvic organ prolapse, in which high recurrences rates have been reported in some small retrospective trials.[34] However, the cross-linked porcine dermal collagen (Permacol) seems to have the lowest recurrence rates.[8] Moreover, biological meshes have been used in infected areas, and we believe that their use could additionally minimize this risk of pelvic infections and this could justify the cost.[32] We believe that LVR possesses all the qualities for an ideal repair of RP and short-term functional results using biological meshes are comparable to non-biologic meshes and may also reduce possible mesh-related complications.

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