BENHA MEDICAL JOURNAL bmj

Print ISSN 1110-208X

Online ISSN 2357-0016

Original article

Laparoscopic Ventral Mesh Rectopexy versus Posterior Sutured Rectopexy for Treatment of Complete Rectal Prolapse in Females

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Received:

Accepted:

Abstract

Background: Complete Rectal prolapse is full-thickness intussusception of the rectal wall extending beyond the anal canal. Women are more commonly affected. It is a surgically correctable problem. There are over 100 surgical techniques that have been described to repair rectal prolapse all of which have a risk of recurrence, and none have been declared as a gold standard. Aim of the Study: Comparing short-term outcomes after laparoscopic ventral mesh rectopexy versus those after laparoscopic posterior sutured rectopexy. **Patients and Methods:** The current study is a prospective comparative randomized study where the patients had been recruited from the General Surgery Department, Benha University Hospital. Enrollment of eligible patients started in April 2020 and continued till reaching a target of 40 patients in June 2022 subdivided into two groups, A and B, 20 for each. Results : In group A (LVMR); the median operative time was 120.9 min, there is statistically non-significant change in Wexner constipation score, there is statistically significant decrease in Wexner incontinence score and the recurrence rate was 5.3%. In group B (LPSR); the median operative time was 77.21 min, there is statistically non-significant change in Wexner constipation score, there is statistically significant decrease in Wexner incontinence score, the recurrence rate was 11.1%. Conclusion : LVMR has a lower recurrence but longer procedure time, technically demanding with a longer learning curve and so recommended if there is other pelvic organ prolapse that could be repaired by this procedure. LPSR provides comparable outcomes through a simple technique.

Keywords: Complete rectal prolapse; laparoscopic ventral mesh rectopexy ; laparoscopic posterior sutured rectopexy.

Introduction

Complete Rectal prolapse is the circumferential, full-thickness intussusception of the rectal wall extending beyond the anal canal that may lead to progressive anal sphincter damage and worsening incontinence [(1)] . Women are more commonly affected than men representing 80-90% of the affected population. The anatomic changes that occur with rectal prolapse lead to symptoms that are not life threatening but can be lifestyle limiting for patients. Those patients usually present with complaints such as a mass protruding per anus,

bleeding per rectum, constipation, faecal incontinence and painful irreducible mass per rectum[2] . Approximately 50% to 75% of patients with rectal prolapse report fecal incontinence, and 25% to 50% of patients report constipation [3]. The underlying cause of rectal prolapse remains unclear. There are certain risk factors for the development of rectal prolapse which include : the presence of an abnormally deep pouch of Douglas, lax and atonic muscles of the pelvic floor and anal canal, weakness of both internal and external anal sphincters, often with evidence of pudendal nerve neuropathy, and the lack of normal fixation of the rectum with a mobile mesorectum and lax lateral ligaments.

Other predisposing factors include connective tissue disorders, neurological illnesses and high parity [4]. The diagnosis of complete rectal prolapse is often made on physical examination alone. However, other tests are often used in the evaluation of a patient with rectal prolapse. These may include colonoscopy, defecography, transit studies, and anal manometry [5]. Complete rectal prolapse is a surgically correctable problem. There are over 100 surgical techniques that have been described to repair rectal prolapse. All of these techniques have a risk of developing recurrence, and none have been declared as a gold standard. Choosing the optimal surgical repair for a patient can involve many factors, including general health, bowel function, bothersome symptoms, and concomitant pelvic organ prolapse [6]. The various approaches used can be divided into abdominal and perineal. The goal of any surgical option advocated for the treatment of rectal prolapse is to restore the altered anatomy and to re-establish the capacitative function of the rectum [2].

Two of the most widely adopted abdominal techniques are laparoscopic posterior sutured rectopexy (LPSR) and laparoscopic ventral mesh rectopexy (LVMR). LVMR was introduced by D'Hoore et al [7] to improve the functional outcome with low risk of recurrence, but concerns over mesh complications have prompted alternative methods, such as LPSR, to be used. The main differences between the two procedures are the method of rectal mobilization and fixation. Unlike LPSR, there is no posterior dissection in LVMR; in addition, the anterior wall of the rectum is fixed to the sacral promontory with a mesh. [8]

Aim of the Work:

The aim of this study is to compare the short-term outcomes after laparoscopic ventral mesh rectopexy versus those after laparoscopic posterior sutured rectopexy in female patients presenting with complete rectal prolapse. The main outcomes of interest are the improvement in constipation and incontinence scores in addition to the recurrence rates.

Patients and Methods

The current study is a prospective comparative randomized study where the patients had been recruited from the General Surgery Department (Colorectal Surgery Unit), Benha University Hospital. The study was conducted after approval of the local Ethics Committee in Faculty of Medicine **{M.S. 4.4. 2020},** Benha University. Enrollment of eligible patients started in April 2020 and continued till reaching a target of 40 patients in June 2022 subdivided into two

groups, 20 for each:

1. Group A was treated by Laparoscopic ventral Mesh Rectopexy.
2. Group B was treated by Laparoscopic Posterior Sutured Rectopexy.

Inclusion criteria:

Adult female patients presenting with complete rectal prolapse and fulfilling the following criteria had been included in the study and assigned randomly to either group:

- Patients aged 18 years or older.
- Patients with full thickness prolapsed rectum, externally visible on straining.
- Patients who have ASA Score of I-II.
- Patients who have normal colonic transit time.
- Patients who are candidates for both standardized surgical approaches.
- Patients who are able to cooperate.
- Patients who accept to give a written informed consent
- Patients with BMI less than 35 kg/m^2.

Exclusion criteria:

- Cases associated with intractable constipation (infrequent, painful defecation) confirmed by barium enema or prolonged total colonic transit time.
- Extensive adhesions from prior abdominal or pelvic surgery.
- Cases older than 60 years old or younger than 18.
- Cases of rectal polyps (secondary rectal prolapse).
- Recurrence of full-thickness rectal prolapse.
- Patients with stoma.
- Patients with inflammatory bowel disease.
- Pregnancy or breast feeding.
- Patients currently under chemotherapy.
- Active malignant disease and life expectancy less than 24 months
- Body mass index greater than 35 kg/m^2.
- Participation in another trial that may interfere with the outcome of this study

Preoperative assessment:

Patients had been personally interviewed. A full history was obtained that included an overview of the general health. The presenting complaint and its duration were recorded and analyzed with specific attention to pelvic floor symptoms and gastrointestinal complaints. Symptoms that had special concern with rectal prolapse included rectal/pelvic pressure, bowel habit irregularity, sense of incomplete evacuation of stool on defecation, seepage of mucous, occasional blood on stool or toilet paper, fecal urgency, outlet dysfunction and incontinence.

Detailed gynecological and obstetric history, any concomitant cardiovascular disease, diabetes mellitus and previous history of abdominal or pelvic operations all were recorded.

A full physical examination was performed with special attention to the abdomen and pelvis. Local physical examination of the patients included inspection, palpation, percussion and auscultation of the abdomen & pelvis and P/R examination. The digital rectal examination was performed to assess the anal sphincter tone and strength. The patient was asked to squeeze and bear down during the digital rectal examination to help in assessing her pelvic floor coordination.

Sometimes the patient was asked to bear down while sitting upright on a commode and using a mirror to visualize her perineum allowing for visualization of the rectal prolapse and vaginal protrusion.

The preoperative assessment included pelvi-abdominal ultrasonography, anorectal manometry, endoanal ultrasonography and colonoscopy when indicated to exclude any associated organic lesions.
The Wexner incontinence and constipation scores and the ASA score had been assessed and recorded for every patient before surgery. Also, Written informed consents had been obtained from all patients after explaining the details of the specified surgery and its possible complications.

Preoperative Preparation :

All patients underwent a brief bowel preparation by rectal enemas and restriction to liquid diet 24 hours preoperatively. One gram of cefotaxime and 500 mg of metronidazole were given intravenously about one hour before induction of anaesthesia. Patients wore anti-embolic stockings or a sequential calf compression device was used intra-operatively.

Operative procedure :

Laparoscopic Ventral Mesh Rectopexy:
The original procedure described by D'Hoore et al. had been adopted and was performed in the standardized manner with the patient under general anaesthesia.

Patients were catheterized and placed in a modified lithotomy or steep Lloyd-Davies position with shoulder supports and a vacuum beanbag under the sacrum.

A four-port technique had been used after the creation of a pneumoperitoneum. A 30-degree scope is placed in the subumbilical position (this may be changed according to the stature of the patient), right iliac fossa (5 mm) and right upper quadrant (5 mm) ports were then inserted, in addition to a left iliac fossa port (5 mm).

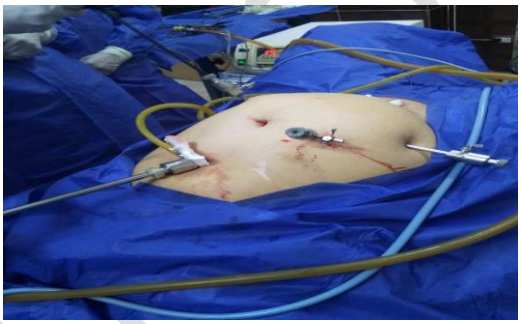

Figure 1: Port placement

Initial evaluation of the abdomen and pelvis was done then the uterus was hitched to the anterior abdominal using 0 prolene suture on a straight needle.

The rectosigmoid junction was retracted upwards and to the left to expose the peritoneum. After identification of the right ureter, very superficial peritoneal window is made using a hook dissector, with monopolar diathermy from the right sacral promontory over the right outer border of the mesorectum down toward the right side of the deep pouch of Douglas. The right hypogastric nerve (deeper) and ureter (more lateral) are spared, avoiding mobilization of the mesorectum. At the deepest point of the right pouch of Douglas, the longitudinal incision is terminated.

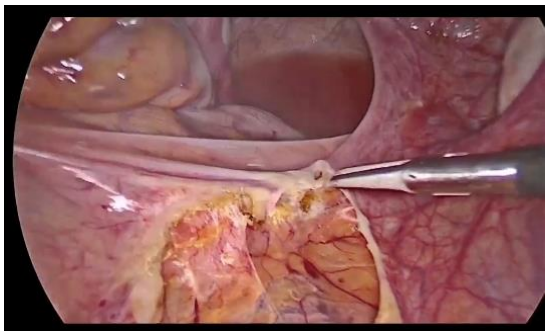

Figure 2: Superficial incision progressed caudally over the right border of the mesorectum towards the pouch of Douglas

The overlying peritoneum just posterior to the apex of the rectovaginal septum is grasped and retracted posterocranially. A narrow Deaver retractor placed in the vagina is retracted antero-caudally exerting equal and opposite retraction. The areolar plane opens nicely with the first transverse incision in the peritoneum overlying the apex of the rectovaginal septum.

A purely anterior rectal dissection is then undertaken in this areolar tissue to create a 4-cm wide pocket from the depth of the pouch of Douglas to the level of the pelvic floor. The distal limit is confirmed by digital rectal exam. No posterior rectal mobilization or lateral dissection was conducted.

A 3 by 17 cm strip of polypropylene mesh was introduced and positioned as distally as possible on the anterior side of the rectum. The mesh was sutured, using polypropylene (2/0), to the ventral aspect of the distal rectum avoiding full-thickness rectal bites and further fixed to the lateral borders of the rectum by two parallel rows of sutures. The mesh is very slightly obliquely angled from the midline distally to the right sacral promontory to which it is secured. The mesh was fixed upon the sacral promontory ensuring that the rectu was not under tension.

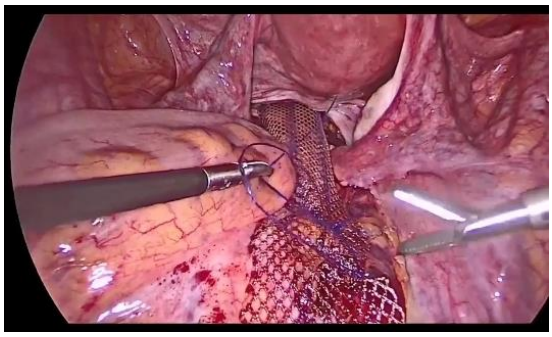

Figure 3: The mesh is fixed to the rectum

The peritoneum was then closed to cover the mesh. A shallow neo-pouch of Douglas was created by reefing the edges of the peritoneal incision in the midline with 2–0 Vicryl sutures. No traction was exerted on the rectum, which remained in the sacrococcygeal hollow.

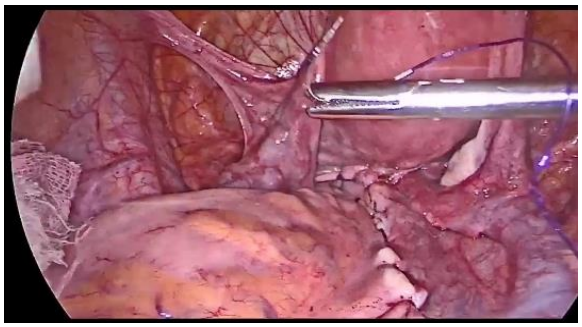

Figure 4: Closure of peritoneum over mesh at completion of LVMR

Laparoscopic Posterior Sutured Rectopexy:

The surgery had been performed under general anaesthesia. Patients were catheterized and placed in Trendelenburg position with shoulder supports and a vacuum beanbag under the sacrum.

A four-ports technique had been used after the creation of a pneumoperitoneum. A 30-degree scope was placed in the subumbilical position (this may be changed according to the stature of the patient), right iliac fossa (5 mm) and right upper quadrant (5 mm) ports were then inserted, in addition to a left iliac fossa port (5 mm).

Initial evaluation of the abdomen and pelvis was done then the uterus was hitched to the anterior abdominal using 0 prolene suture on a straight needle.

The dissection started by opening peritoneum on right side of rectum using harmonic scalpel / diathermy after identifying the right ureter and safeguarding it. Then, dissecting rectum from presacral fascia in the holy plane of safety staying close to rectum was done to avoid injury to the autonomic nerves and presacral venous plexus.

On left side dissection was done after identifying the left ureter. Dissection was carried out downwards till the pelvic floor. The anterior peritoneal fold in the Douglas pouch was cut, lifting the rectum completely from sacral hollow. The lateral ligaments were not cut during the procedure.

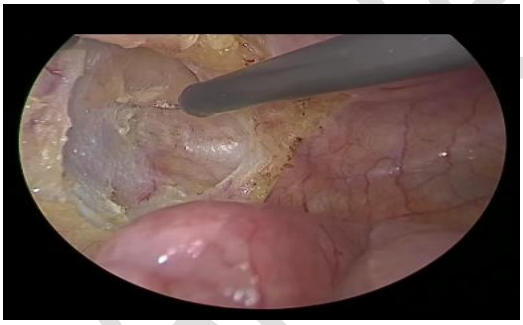

Figure 5: Dissecting rectum from presacral fascia

Polypropylene sutures were used to stitch the mesorectum to the presacral fascia in the midline, with the first suture being as low as possible and the last being at the sacral promontory.

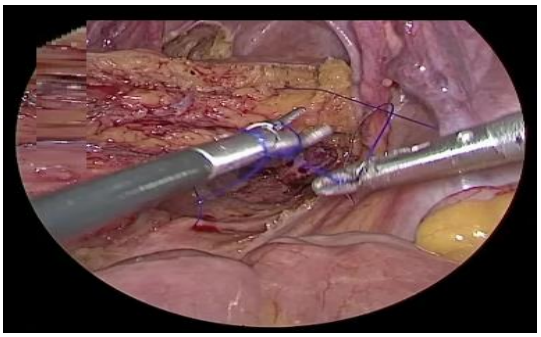

Figure 6: Stitching the mesorectum to the presacral fascia

Postoperative care:

Postoperative management included intravenous fluids administration until tolerance of oral feeding, parenteral broad-spectrum antibiotics (Cefotaxime, 1gm/12 hours and metronidazole, 500mg/8 hours) for 24 hours. All patients received non-steroidal analgesic ampoules according to their need for postoperative pain relief. The patients were encouraged to drink, eat and mobilize as soon as possible after surgery.

Oral feeding was allowed after the return of bowel function, and the pain medication was changed to oral NSAID formulations. The urethral catheter was removed on the postoperative day one unless other comorbidities were present. Upon discharge, the patient was instructed to avoid heavy lifting. Dietary goals were addressed. Avoidance of constipation or overly loose stool was discussed.

Follow-up:

The patients were instructed to attend to the outpatient clinic after one week of discharge or to the emergency department at any time if there was any unexpected event.

The next visit was after the following two weeks then every two months for the six months. During every visit the anorectal function was assessed clinically and by using Wexner incontinence and constipation scores. Patients were evaluated for the presence of recurrence, constipation, use of laxative, fecal incontinence, urinary or sexual problem as dyspareunia or any other complications.

Variables Assessed:

Variables assessed included intraoperative complications and early postoperative morbidity, operating time, postoperative hospital stay and hospital readmission, recurrent prolapse, presence and severity of postoperative faecal incontinence, presence and severity of postoperative constipation and its treatment (including laxatives and enemas), dyspareunia or sexual dysfunction, and any related subsequent surgery including urogynaecological procedures.

Statistical analysis:

Data was collected, tabulated, statistically analyzed, using IBM SPSS Statistics for windows, version 26.0. Armonk, NY: IBM Corp, where the following statistics had been applied:

a- Descriptive statistics: in which quantitative data is presented in the form of mean, standard deviation (SD), range, and qualitative data is presented in the form numbers and percentages (%).

b- Analytical statistics:

- P value of (>0.05) is considered not statistically significant.
- P value of (≤0.05) is considered statistically significant.
- P value of (≤0.001) is considered statistically highly significant.

Results

Operative time in group A ranged from 105 to 138 minutes with the mean operative time of 120 ± 9.53 as a median. In group B operative time ranged from 70 to 85 minutes with the mean operative time of 77.21 ± 5.32 as a median. There is statistically significant difference between the studied groups regarding the operative time which was significantly higher in the ventral mesh rectopexy group (group A).

Table (1): Comparison between the studied group regarding operative time

	LVMR	**LPSR**	**Test**	
	Mean ± SD	**Mean ± SD**	**t**	**p**
Operative time (min)	120.9 ± 9.53	77.21 ± 5.32	17.791	<0.001**

**p≤0.001 is statistically highly significant, t independent sample t test

Table (1): show on follow up of patients for 6 months, one patient within the ventral mesh rectopexy group and two patients within posterior sutured rectopexy group respectively were missed. So 19 patient within ventral mesh rectopexy group and 18 patients within posterior sutured rectopexy group were followed up for at least 6 months.

The preoperative Wexner Constipation Score in group A ranged from 4 to 20 with

the mean score of 9 as the median. In group B the preoperative Wexner Constipation Score ranged from 4 to 15 with the mean score of 8.5 as the median. The 6 months postoperative Wexner Constipation Score in group A ranged from 5 to 16 with the mean score of 9 as the median. In group B the 6 months postoperative Wexner Constipation Score ranged from 4 to 16 with the mean score of 6 as the median

Table (2): Comparison between the studied group regarding Wexner constipation score pre and 6 months postoperatively

Wexner constipation score	LVMR	LPSR	Test	
	Median (IQR)	Median (IQR)	Z	p
Preoperative	9 (8 – 11)	8.5 (6 – 14)	-0.747	0.455
6 months postoperative	9 (7.5 – 10)	6 (6 – 10)	-1.633	0.103
P(wx)	0.209	0.195		

Z Mann Whitney test, IQR interquartile range, Wx Wilcoxon signed rank test

Table (2): show there is statistically non-significant difference between the studied groups regarding Wexner constipation score preoperatively or six months postoperatively. Within each group, there is statistically non-significant change in Wexner constipation score after 6 months postoperatively. In group A; the preoperative Wexner Incontinence Score ranged from 5 to 16 with the mean score of 12 as the median and the 6 months postoperative score ranged from 2 to 16 with the mean score of 4 as the median. In group B the preoperative Wexner Incontinence Score ranged from 6 to 15 with the mean score of 10 as the median and the 6 months postoperative Wexner Incontinence score ranged from 2 to 7 with the mean score of 4 as the median

Table (3): Comparison between the studied group regarding Wexner incontinence score pre and 6 months postoperatively

Wexner incontinence score	LVMR	LPSR	Test	
	Median (IQR)	Median (IQR)	Z	p
Preoperative	12 (9 – 14)	10 (7.75 – 12.5)	-0.464	0.643
6 months postoperative	4 (3 – 5)	4 (3 – 5)	-0.797	0.426
P (Wx)	<0.001**	<0.001**		

Z Mann Whitney test, IQR interquartile range, Wx Wilcoxon signed rank test **p≤0.001 is statistically highly significant

Table (3): show there is statistically non-significant difference between the studied groups regarding Wexner incontinence score preoperative or six months postoperatively. Within each group, there is statistically significant decrease in Wexner incontinence score after 6 months postoperatively.

There was one case that had recurrence of the rectal prolapse in group A while there were 2 cases in group B that had recurrence. There is statistically non-significant difference between the studied groups regarding the incidence of postoperative recurrence.

Discussion

Surgery is the only curative treatment for complete rectal prolapse. Several different procedures have been described, but the optimal procedure has yet to emerge from the literature. Surgeons often tailor the surgery to the patient based on the patient's condition, previous surgical history, and their own personal experience [(9)].

The aim of surgery is to correct the anatomical alterations, mitigate symptoms (constipation, incontinence or obstructed defecation symptoms) and prevent urinary or sexual dysfunction. Surgery is mainly based on abdominal and perineal procedures. Abdominal procedures usually require a rectal suspensions (sutured or with a mesh) and may be associated with sigmoid resection. Perineal procedures aim to re-establish the function of the pelvic floor and may include mucosal or rectal resection from below [(10)].

The present study revealed that there is a statistically significant difference between the studied groups regarding the operative time which was significantly higher in the Laparoscopic ventral mesh rectopexy group (group A). The operative time of both procedures in the present study was similar to that mentioned in a double-blind randomized single-center study comparing bowel function after laparoscopic suture rectopexy versus laparoscopic VMR for patients with full-thickness rectal prolapse.

Operative time was significantly shorter in the LPSR group (90 min vs 125 min, $p < 0.0001$), while other intraoperative characteristics were similar between the two groups [(11)].

There is statistically non-significant difference between the studied groups regarding Wexner constipation score preoperatively or six months postoperatively. Within each group, there is statistically nonsignificant change in constipation score within each group but there was slight improvement in the score in most cases in both groups except for a case in group B that showed marked deterioration.

It had been documented that classical posterior rectopexy corrects constipation in some patients by stopping the rectum from intussuscepting, but it frequently worsens or induces new onset of constipation in others. The mechanism for postoperative constipation has been the subject of debate [(12)]. It has been suggested that rectopexy leaves a redundant sigmoid colon that might kink to produce a mechanical obstruction [(13)]. Also, it has been postulated in another study that posterolateral mobilization interrupts the autonomic innervation of the rectum, causing a hindgut “denervation inertia” and distal slow transit [(14)].

In the same line of our study, there are other randomized studies that have shown an improvement in constipation by avoiding division of the so-called lateral ligaments; or at least unilateral preservation of the lateral ligaments which is the technique that had been adopted in the present study[(15,16)]. This would explain why posterior rectopexy sometimes corrects and yet other times aggravates or induces constipation. The denervation inertia variably overrides any mechanical

improvement from fixation of the intussuscepting prolapse.

On the other hand, laparoscopic ventral mesh rectopexy (LVMR) is the newest operation for rectal prolapse. Its rationale is based on avoiding the well-documented problem of constipation after posterior rectopexy.

In a systemic review of ventral mesh rectopexy it was concluded that this operation is associated with a greater reduction in postoperative constipation if it is used without posterior mobilization.[17] In contrast, it was found in a another study that the total gastrointestinal transit time increased from baseline in both groups, but the increase was significantly shorter in the VMR group compared with suture rectopexy group.[11]

Regarding incontinence in the present study, there is statistically non-significant difference between the studied groups regarding Wexner incontinence score preoperatively or six months postoperatively. But within each group, there is statistically significant decrease in the Wexner incontinence score 6 months postoperatively.

The majority of patients with a continence disturbance would experience improvement once the prolapse has been treated as what was found in other studies [18, 19]. This is not surprising because in addition to the reduction of the prolapse, there will no longer be stretching and attenuation of the sphincter, the perineal descent distance during attempted defecation usually decreases, and the anorectal angle becomes more acute [20]. In a retrospective review of patients who underwent Laparoscopic VMR [21], it was found that there was significant improvement in incontinence scores postoperatively, findings that are similar to the present study.

Also, it was noted in another study that the proportion of continent patients increased from 36% preoperatively to 74% postoperatively following simple suture rectopexy [22]. This is similar to what had been detected in the present study.

In a double-blind randomized single-center study comparing bowel function after laparoscopic suture rectopexy versus laparoscopic VMR for patients with full-thickness rectal prolapse [11], it was found that the reduction in fecal incontinence scores was similar between groups as had been found in the present study.

There was one case that had recurrence of the rectal prolapse in group A (5.3%), while there were 2 cases (11.1%) in group B that had recurrence. There is statistically non-significant difference between the studied groups regarding incidence of postoperative recurrence. The recurrent cases in both groups were treated by Delorm's procedure. Also, we reported a case of port site hernia in group A the needed surgical repair.

There is statistically non-significant difference between the studied groups regarding the need for surgical reintervention.

Regarding post-operative recurrence, a study [11], found that in the sutured rectopexy group, there was a 5% rectal prolapse recurrence rate and 11% mucosal prolapse rate within 12 months. In the VMR group, there were no rectal prolapse

recurrences but 5% had mucosal prolapse at 12 months. There were no mesh related complications reported during the study period. These findings are similar to the findings of our study and also there were no mesh related complications during our follow up period but our follow up period is shorter (6 months).

Another study [23] described a recurrence rate between 0–27% after sutured rectopexy, which was postulated to be due to the disconnection of the stitches to the sacrum.

After a 6-year follow up period in a double-blind, randomized study comparing laparoscopic suture rectopexy versus laparoscopic ventral mesh rectopexy , the recurrence rate was reported as 23.3% in the suture rectopexy group compared to 8.2% in the ventral rectopexy group. The functional outcomes, including obstructive defecation symptoms, incontinence, constipation, and quality of life scores which favored laparoscopic ventral mesh rectopexy [24].

Suture rectopexy was used in 43 patients in a study that detected only one recurrence at a mean follow-up of 28 months [22]. Another study [25] reported two recurrences out of 46 patients treated by suture rectopexy. These results are not far from those found in the present study.

It has been found on long-term follow up after LPSR that the recurrence rates are up to 20%.[26,27]. On the other hand, another study [28] found the recurrence rates after LVMR to be less than 10% on long-term follow-up. The causes of recurrence usually involve inadequate anterior rectal dissection, inadequate fixation of the mesh to the anterior rectal wall or to the sacral promontory, and incorrectly positioned staples to the upper sacrum [29].

Failure of LVMR after insertion of PermacolTM mesh was defined as the recurrence of symptoms and/or of prolapse in a study that reported it in 12% and 21% of patients at a median follow-up of 1 and 2 years, respectively [30] .

The degree of mobilization was independently associated with recurrence. Patients that had circumferential mobilization in combination with rectopexy had a lower risk of recurrent prolapse compared with those that had posterior or anterior only, a finding that had been concluded in a study performed on a pooled group of 532 patients treated with rectopexy [31].

Conclusions

LVMR seems to be associated with lower recurrence but longer procedure time compared to LPSR. Although no mesh related complications have been reported in our study, no definitive conclusions can be made considering that there are recent long term studies that have reported mesh related complications. Also, this procedure is technically demanding with a longer learning curve. So it should abe recommended if there is other pelvic organ prolapse that could be repaired by this procedure.

On the other hand; LPSR provides comparable functional outcomes and acceptable recurrence rates through a simple technique provided that at least there is unilateral preservation of the lateral ligaments and the posterior dissection is in the avascular plane

between the presacral fascia and the mesorectal fascia to decrease the risk of postoperative constipation. This procedure may be more suitable if there is no other pelvic organ prolapse.

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To cite this article: Medhat H. Mohammedy, Emad Eldin M. Abdelhafez, Mohamed F. Abdelhalim. Laparoscopic Ventral Mesh Rectopexy versus Posterior Sutured Rectopexy for Treatment of Complete Rectal Prolapse in Females. BMFJ XXX, DOI: 10.21608/bmfj.2023.210433.1815