



# Laparoscopic Pelvic Organ Prolapse Suspension (Pops) Versus Laparoscopic Ventral Mesh Rectopexy for Treatment of Rectal Prolapse: Prospective Cohort Study

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## Abstract

**Background** This study aimed to compare ventral mesh rectopexy (VMR) and pelvic organ prolapse suspension surgery (POPS) in management of patients presenting with rectal prolapse.

**Methods** Our study was a prospective cohort trial in which 120 female patients with complete rectal prolapse were included, 60 patients had had VMR and the other 60 had had POPS as a surgical management for complete rectal prolapse. Results had been compared 6 months postoperatively regarding operative time, postoperative pain, hospital stay, complications of surgery including recurrence of the rectal prolapse, the efficacy of each operation in treatment of rectal prolapse and associated symptoms.

**Results** The patients were assessed 6 months postoperatively. There was no significant statistical difference regarding hospital stay and postoperative pain. Operative time was significantly shorter in POPS in comparison with VMR ( $P$  value  $< 0.05$ ). VMR showed slight improvement regarding constipation and continence scores; however, this was statistically significant. VMR showed less complications compared to POPS. Complications with rectopexy happened only with 4 patients compared to 24 patients in POPS groups, 2 cases of recurrence in rectopexy group compared to 6 cases of recurrence in POPS.

**Conclusion** POPS is comparable to VMR in management of rectal prolapse and in improving the ODS symptoms. Thus, POPS can be used as easier, faster option to treat rectal prolapse in selected patients.

## Introduction

Rectal prolapse and intussusception represent anatomical abnormalities which involve descent of full- or partial-thickness rectal wall that may affect the pelvic floor function. Although these are benign conditions, they can cause marked discomfort due to sensation of protruding tissue, discharge of mucus or blood and the common occurrence of fecal incontinence or constipation [1]. The rectal prolapse may be caused by one or more of the following: diastasis of the levator-ani, a patulous anal sphincter, a redundant sigmoid colon and loss of the rectal sacral attachments. In the past, procedures to treat rectal prolapse should restore normal anatomy.[1] However, the multiple procedures which have been described to treat this

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condition indicate the difficulty of achievement of complete cure [1]

Surgery is the main option for treatment of rectal prolapse. Two main approaches, the abdominal and the perineal, are considered in the operative repair of rectal prolapse. The choice of the surgical approach is usually tailored for each patient according to the general condition of the patient, the surgeon's preference and area of expertise, the patient's age and lastly bowel function. Many techniques have been described; however, only a few of them are actually used and many others are of historical interest only [1]

Females aged over 70 have the highest incidence of rectal prolapse which is often associated with other pelvic floor disorders such as vaginal prolapse, cystocele and rectocele. Multiparity and pelvic floor weakness are the main factors that are accused of predisposing to those diseases. Women are six times more common than men to present with rectal prolapse [2]

The current gold standard in Europe for rectal prolapse surgery is the laparoscopic ventral mesh rectopexy. Although laparoscopic ventral mesh rectopexy usually results in functional improvement with low morbidity and low rate of recurrence, it is very demanding technically with long learning curve that needs an advanced training to reach the professional level needed [2].

There are some criticism regarding the unfavorable outcomes of obstructed defecation syndrome (ODS) with commonly used surgical interventions. The improvement of ODS symptoms after surgical correction of prolapse is still doubtful [3]. Although paucity of studies that discuss this issue, there is variety of results; while some of them suggest an improvement in constipation levels, others report a worsening in symptoms or newly developed constipation.[3].

Pelvic organ prolapse suspension (POPS) surgery is a recent surgical procedure for one-stage treatment of multi-compartmental female pelvic prolapse. The technique is much easier than traditional treatments with significant improvement of the preoperative symptomatology [3].

This study aimed to compare ventral mesh rectopexy (VMR) and pelvic organ prolapse suspension (POPS) in female patients with rectal prolapse regarding the efficacy in treatment of rectal prolapse and associated symptoms including anal incontinence and constipation.

## Patients and methods

This prospective study was conducted upon 120 female patients with rectal prolapse. The study went in 2 arms in 2 consecutive periods. The first arm included 60 patients who had had ventral mesh rectopexy as a surgical treatment for

their rectal prolapse in the period from June 2016 to August 2017. The other arm also included 60 patients who had had POPS in the period from September 2017 to December 2018. Patients were enrolled from outpatient clinics of General surgery department, Faculty of medicine, Cairo University (see the flowchart in Fig. 1).

## Inclusion criteria

All adult female patients with complete rectal prolapse (i.e., protrusion of a full thickness of the rectal wall through the anus).

## Exclusion criteria

- 1- Patients with the previous operative management for complete rectal prolapse.
- 2- Patients who were unfit for surgery.
- 3- Long prolapse more than 10 cm.
- 4- Associated cystocele or genital prolapse.

## Primary end points

Comparison was done between ventral mesh rectopexy and POPS in female patients with rectal prolapse regarding the efficacy in treatment of rectal prolapse and associated symptoms including anal incontinence and constipation which were assessed postoperatively during weekly visits with full reassessment and scoring after 6 months from the surgery.

## Secondary end point

Comparison was done between both procedures regarding operative time, hospital stay, postoperative pain, those were assessed in the immediate postoperative period.

Comparison was done between both procedures regarding complications (e.g., urine retention, dragging pain); recurrence was assessed at 6 months and 1 year after the operation.

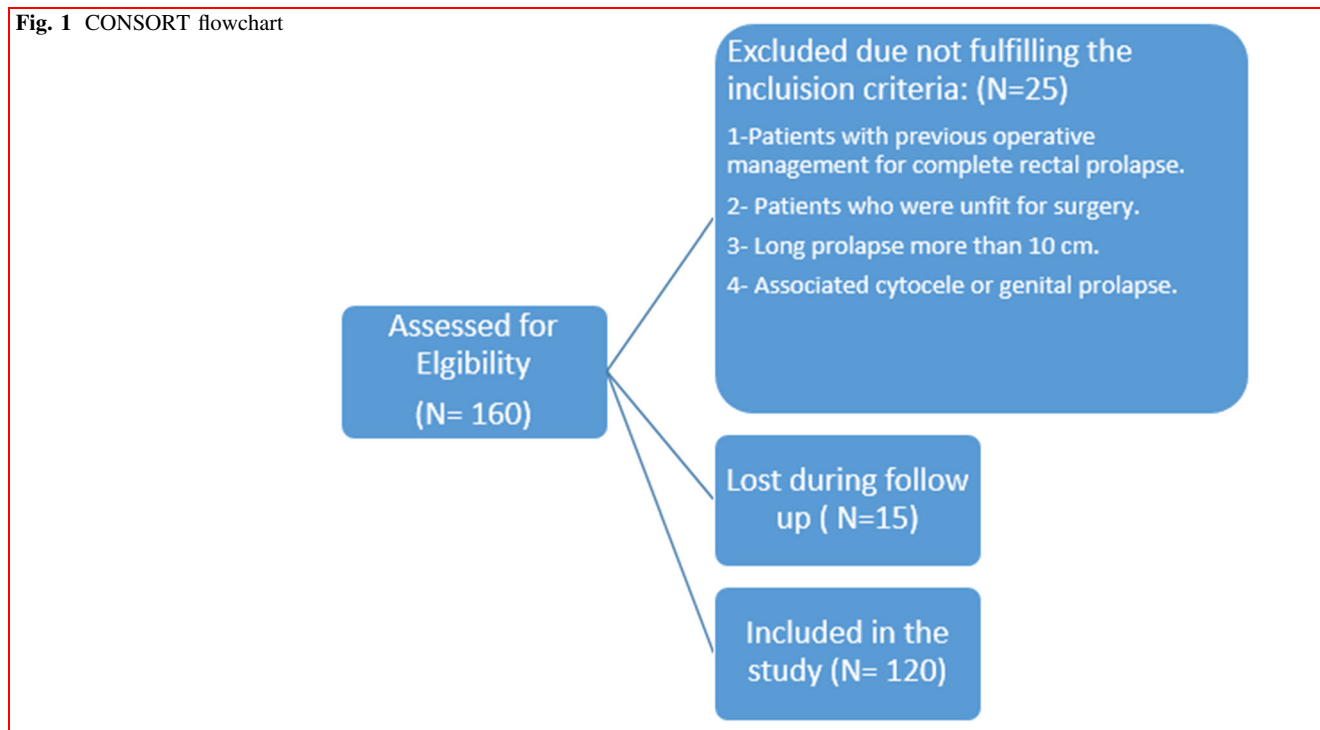
## Methods

### Preoperative assessment

1. 1-History and examination:

All patients were subjected to proper **history taking** and full general and **local examination**

By inspection: If the patient is asked to bear down or squat for a while, the full thickness rectal wall prolapse and its concentric folds can be seen which is different from the

**Fig. 1** CONSORT flowchart

radial folds which can be detected in patients with prolapsing internal hemorrhoids. Frequently, the mucosa shows superficial ulceration caused by repeated trauma. By palpation (per rectal examination): to assess the integrity of the anal sphincter, palpate the puborectalis muscle and finally of course to detect any abnormalities in the anal canal as presence any masses.

### 2. Assessment of obstructed defecation and continence score

Detailed continence history and assessment according to Wexner score [4] and Cleveland Clinic scoring system [5] are used for constipation to simplify the evaluation of constipated patients.

### 3. Imaging

All patients were subjected to MR defecography to evaluate the 3 axes (systems) of the pelvic cavity.

### 4. Routine preoperative laboratory tests

It includes complete blood count, liver, kidney function tests and coagulation profile. Anal manometry was done in patients who had had symptoms of obstructed defecation or incontinence.

### Operative details

The perioperative management was standardized in both groups (see **Appendix A**).

### Selection of surgery

The first group of patients ( $n = 60$ ) had had ventral mesh rectopexy as a surgical treatment for their rectal prolapse in the period from June 2016 to August 2017. The other arm also included 60 patients had had POPS in the period from September 2017 to December 2018. This was because VMR was the main procedure used in treating rectal prolapse in our unit in the first period, then we introduced the POPS procedure and continue doing it in the second period, and then we compare the results of both procedures saved in our registry. All surgeries were done by 2 surgeons randomly with the same level of training and seniority.

Under general and Trendelenburg's position, examination under anesthesia was performed prior to the procedure. The patient's abdomen from xiphi-sternum to pubis is prepared with betadine solution. The tower was placed on patient's left side.

### A-Ventral mesh rectopexy

After creating pneumoperitoneum through a 10-mm umbilical port using Hasson technique, a two 5-mm working ports were inserted in the right lower quadrant under direct visualization. One was placed low down laterally (a 12-mm port can be used to facilitate mesh insertion); the other was placed a handbreadth above the umbilicus lateral to the rectus abdominis (see **Fig. 2**).

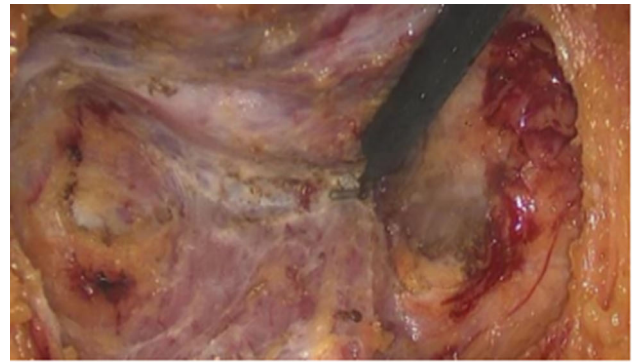
The peritoneal cavity was assessed; then, the omentum and small intestine were delivered out from the pelvis and backed up. The upper rectum was pulled up, anteriorly and to the left. After that, the peritoneum was incised with caution to the right of the sacral promontory and then continued anteriorly along the right outer border of mesorectum till reaching the Douglas pouch. The right hypogastric nerve, gonadal vessels and ureter should be identified and preserved. The dissection then extended anteriorly dividing the rectovaginal septum and continued as inferiorly as possible, to the level of the levator plate and laterally to the pelvic side walls. Once the anterior space was mobilized, polypropylene mesh (the size of the mesh is about 15\*4 cm introduced through the umbilical port site) was secured to the anterior aspect of the rectum with several interrupted sutures (3/0 PDS), 1–2 cm apart working caudocranially, then the mesh was tacked and secured to the sacral promontory by 2–3 tacks. The peritoneum was then closed over the mesh with continuous vicryl sutures (see Fig. 3).

### B-Pelvic organ prolapse suspension surgery (POPS)

The pneumoperitoneum was established via supra-umbilical open technique, and a 30° laparoscope was introduced. One 10-mm trocar was inserted under vision into the cross-between umbilical-transverse line in the right side, and another 5-mm trocar was inserted symmetrically in the left side. The procedure included the following steps: peritoneal cavity was explored with the patient in Trendelenburg position (30° degrees). Using a 30 × 30 cm prolene mesh, a V-shaped 25 cm length strips and 2 cm wide were prepared. The mesh was introduced into the abdominal cavity through 10-mm trocar; 2-cm incision of the peritoneum, in the apex of the anterior vaginal fornix, was made and the mesh was fixed by a n. 0 prolene stitch on the anterior vaginal vault or on the vaginal apex if the patient



**Fig. 2** Ports insertion in VMR procedure



**(a)** Dissection till the level of pelvic floor



**(b)** Mesh fixation

**Fig. 3** Steps of ventral mesh rectopexy, **a** dissection till the level of pelvic floor, **b** Mesh fixation

had hysterectomy. On the right side, 2-cm cutaneous incision was made 2 cm above and 2 cm posteriorly to the anterior superior iliac spine. The aponeurosis of the external oblique muscle was incised, and dissociating the fibers of the internal oblique and transverse abdominis muscles by scissors, the sub-peritoneum was reached. Through this incision, a long clamp was introduced, and we can follow it through the transparency of peritoneum. With this clamp, under laparoscopic vision a subperitoneal tunnel was created until you reach the anterior fornix of the vagina. The tunnel passes 2 cm above the peritoneal reflection, 2–3 cm below the insertion of the round ligament in the internal inguinal orifice. So, stretching the broad ligament with an upward pull, the tunnel was practiced in its lower third, reaching the anterior vaginal fornix. Afterward, the end of the used clamp is pushed out from the incision previously made in the peritoneum. The same steps were then repeated on the left side. The right and left strips of the previously fashioned V-shaped mesh were then pulled out through both peritoneal tunnels till they were delivered from the lateral skin incisions and then fixed to the fascia above and lateral to both anterior superior iliac



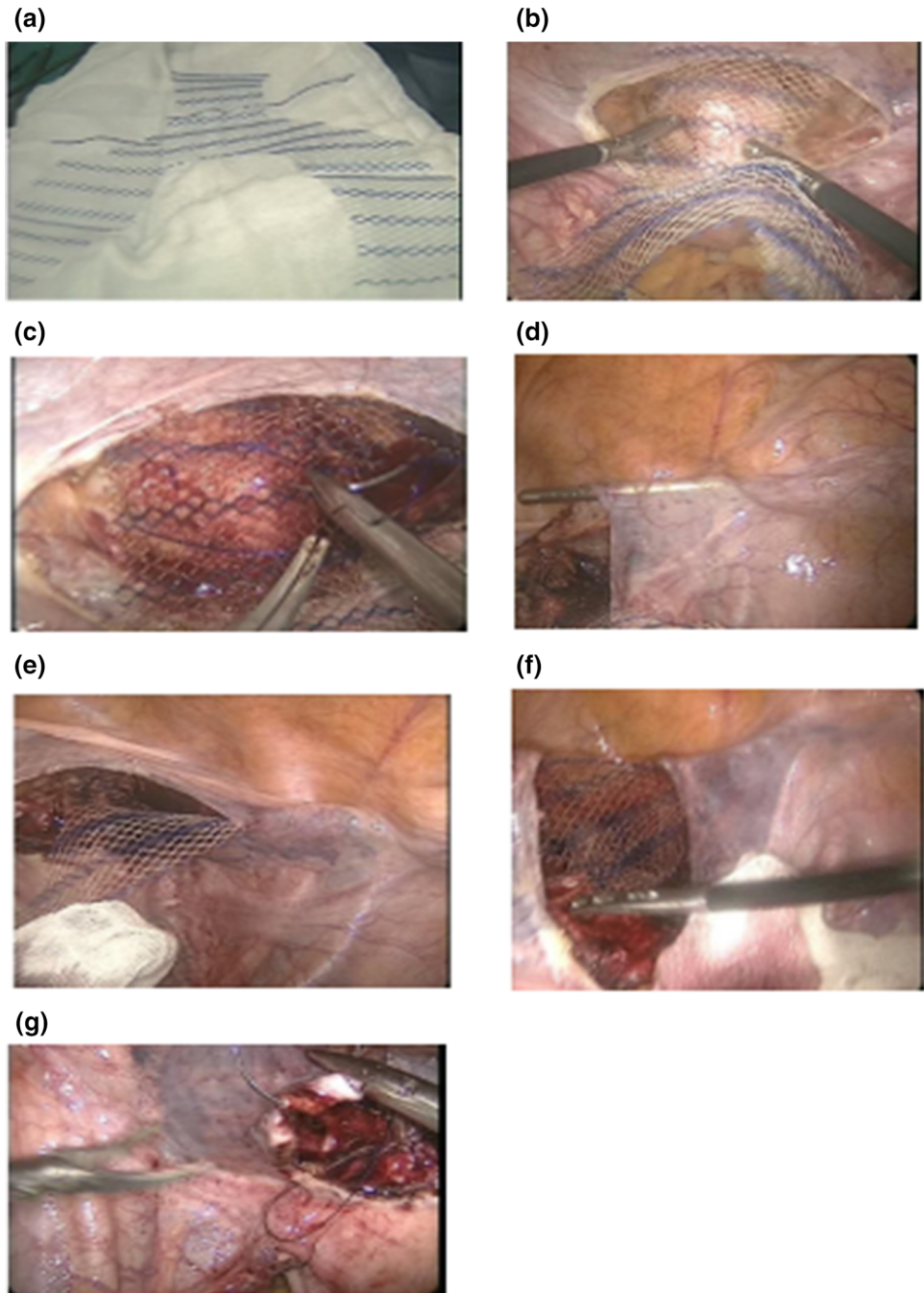
spines through a small tunnel by prolene 2/0 stitches; they should not be fixed at the site of the skin incision. One or 2 sutures were taken to the anterior rectal wall with vicryl 2–0 fixing it to the mesh. Equal and symmetrical traction on both strips of the mesh achieves the suspension of the pelvic organs. The peritoneum was then closed over the mesh with continuous vicryl sutures. This technique was described by F. Ceci et al. in 2013 [3] (see Fig. 4).

In both procedures, a dressing was placed in the vagina acting as a tampon to provide support for 1 day postoperatively.

#### Postoperative care and instructions

Antibiotics were prescribed in the form of amoxicillin 1 g twice daily, metronidazole 500 mg three times daily for 5 days, NSAIDs if there is pain, and proton pump inhibitor for gastric protection 40 mg once daily for 5 days. Patients

**Fig. 4** Steps of POPS surgery **a** Mesh fashioning; **b** mesh insertion; **c** mesh fixation; **d** creation of subperitoneal tunnel; **e** mesh passage through the subperitoneal tunnel; **f** traction on both mesh strips; **g** closure of the peritoneum



were instructed not to get constipated or to strain at the toilet, so postoperative laxatives were prescribed, not to ignore the urge to go to toilet, not to lift heavy objects for 6 weeks, not to have heavy exercise for 6 weeks and not to have sexual intercourse for 4 weeks. Assessment of degree of postoperative pain was done using 0–10 visual analogue score (VAS)

### Follow-up

Follow-up was commenced on weekly visits to the outpatient clinic and clinically assessed with the senior surgeon attending the clinic (registrar/senior registrar level). The patients' result was revised monthly by the consultants. After 6 months, rescoring (Wexner) [4] of the patients was done. Recurrence was assessed clinically and followed up to 1 year till the end of the study.

### Statistical methods

Version 24 of SPSS software was used for data entry and coding. Data were summarized using mean, standard deviation, median, minimum and maximum in quantitative data and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Kruskal–Wallis and Mann–Whitney tests. For comparison of serial measurements within each patient, the nonparametric Friedman test and Wilcoxon signed rank test were used. For comparing categorical data, Chi-square ( $\chi^2$ ) test was performed. Exact test was used instead when the expected frequency is less than 5. *P* values less than 0.05 were considered as statistically significant.

## Results

### (1) Demographic distribution

This prospective study with its 2 arms included 120 patients, one arm had had ventral mesh rectopexy and the other had had POPS as a treatment for the rectal prolapse, all were females, 60 patients in each arm. Demographic data are displayed in Table 1.

### (2) Clinical presentation

Table 1 shows the distribution of clinical presentation among patients in both groups. Also Wexner score for both constipation and incontinence scores is displayed in Table 1.

### (3) Postoperative scores

Table 2 shows the postoperative Wexner score and Cleveland Clinic constipation scores after 6 months and its analysis. This table demonstrates that there is more improvement in patients who had rectopexy as a treatment for rectal prolapse. However, it is statistically insignificant.

### (4) Differences between both procedures

Table 3 shows difference in operative time, postoperative pain score and hospital stay. There was significant difference in operative time between both procedures with *p* value less than 0.05 to the benefit of the POPS procedure. There was no significant difference regarding pain score between both groups, *p* value 0.378. There was no significant difference in hospital stay between both groups with average stay of 1 day postoperatively, *p* value: 0.73.

### (5) Postoperative complications

Table 4 shows the difference between both groups regarding urine retention, dyspareunia, residual prolapse, dragging pain and recurrence. Complications with rectopexy happened only with 4 patients compared to 24 patients in POPS groups, 2 cases of recurrence in rectopexy group compared to 6 cases of recurrence in POPS

## Discussion

The results of our study demonstrate improvement in functional outcome was comparable among the two groups. There was no difference between both procedures regarding postoperative pain and hospital stay, but POPS was much better regarding operative time. Regarding postoperative complications, although VMR is numerically better but with no statistical significance except for dragging pain which is more in POPS procedure.

The treatment of rectal prolapse should aim to control the prolapse, restore continence if affected, and prevent constipation or impaired evacuation. The choice of an optimal treatment is difficult due to the multiple options without exact guidelines so it is best to be tailored to patient and surgeon [6]. Although various abdominal and perineal procedures have been described, randomized trials comparing abdominal and perineal approaches failed to demonstrate any superiority of one modality over the other [6, 7].

In a study published in 2019, the authors stated that laparoscopic VMR is safe and effective in management of full-thickness external rectal prolapse with minimal recurrence and low complication rates [8]. However, laparoscopic VMR needs special skills and a highly trained surgeon who can perform a complete ventral dissection of

**Table 1** Demographic data and preoperative clinical presentation

	POPS group ( <i>N</i> = 60)	VMR group ( <i>N</i> = 60)	<i>P</i> value
Mean age distribution	46.87 ± 9.5 years,	47.87 ± 9.36	0.216
Obstetric history (multiparous from total <i>n</i> = 60)	52 (86.6%)	54 (90%)	0.488
Clinical presentation 1—Patients with symptoms of obstructed defecation (number and %)	46 (76.6%)	32 (53%)	0.388
2—Incontinence	2 (1.2%)	18 (30%)	0.006
3—Both presentations	12 (20%)	10 (16.67%)	0.466
Wexner constipation score (mean/SD)	14.10 ± 5.268	9.93 ± 8.017	0.364
Wexner incontinence score (mean ± SD)	1.83 ± 4.624,	3.77 ± 5.525,	0.079

**Table 2** Constipation and continence scores improvement 6 months postoperatively

	POPS group (mean ± SD)	VMR group (mean ± SD)	<i>P</i> value
Cleveland clinic score for constipation improvement	4.53 ± 2.837	6.03 ± 4.95	0.264
Wexner incontinence improvement	0.87 ± 1.852	2.8 ± 4.302	0.072

**Table 3** Operative time, postoperative pain score and hospital stay

	Operative time in minutes	Postoperative pain score	Hospital stay in days
POPS group (mean ± SD)	20 ± 2.837	4.2 ± 1.1	1 ± 0.8
VMR group (mean ± SD)	55 ± 10.23	4 ± 1.2	1.3 ± 1.1
<i>P</i> value	< 0.05 (0.002)	0.378	0.73

**Table 4** Postoperative complications

	Urine retention (%)	Dragging pain and pain at anterior superior iliac spine (%)	Dyspareunia (%)	Residual rectal prolapse (%)	Recurrence (%)
POPS group (number, percentage)	2, 3.3	12, 20	0,0	4, 6.7	6, 10
VMR group (number, percentage)	0,0	0,0	4, 6.7	0,0	2, 3.3
<i>P</i> value	0.236	0.031	0.472	0.092	0.290

the rectovaginal septum (rectovesical in males) down to the pelvic floor and take sutures within the narrow pelvic space that make the mission very difficult, yet it is the current gold standard for treatment of rectal prolapse in European countries [2]. In spite of being the operation of choice, it has some troublesome complications and adverse outcomes especially related to mesh such as rectal stricture, pain, dyspareunia, mesh erosions, rectovaginal fistula and autonomic dysfunction related to pelvic nerve injury during rectal dissection which may result in worsening constipation postoperatively [9].

Some important observations can be obtained from literature review of colorectal pathology including the high incidence of ODS not improved with commonly used surgical procedures. There are few studies that explore the unclear impact of surgical intervention on ODS with mixed variety of data can be obtained; some of those studies suggest an improvement in constipation [10]; however, other studies reported a worsening in symptoms or even development of new constipation [11].

Also, the anatomical and functional description of the rectum which has a high impact in pelvic dynamicity is

rarely included in the preoperative clinical and instrumental evaluation neglecting as it is subjected to a lot of mechanical stress on daily basis. The persistence of ODS in patients underwent surgery for pelvic organ prolapse often results in intense straining which act as a continuous mechanical stress on all the pelvic organs and supporting structures which may lead to unpleasant recurrence [3]. Therefore, ODS should be corrected to decrease the incidence of relapses and improve the quality of life which can be achieved by performing operations that do not interfere with the rectal function and motility such as the procedures that may cause closure of the pouch of Douglas and that correct the rectal prolapse and rectocele. Based on those facts, F. Ceci, E et al. described the technique of POPS (pelvic organ prolapse suspension) in 2013 and preliminary results were reported [3].

POPS is a recent surgical procedure for one-stage treatment of multi-compartmental female pelvic prolapse. F. Ceci, E et al. reported an important reduction or completely disappearance of the preoperative symptoms with this simpler technique [3]. POPS procedure avoids dissection laterally to the rectum that may jeopardize the hypogastric nerves affecting the sexual performance and urinary evacuation [3, 12]. Also, POPS comes with the advantage of easier, faster and rapid learning curve technique that may lead to comparable results to the VMR [12].

Moreover, POPS procedure avoids the mesh erosion that may complicate VMR and lead to evolution of the use of the biological mesh which has a very high cost [13].

This goes with our study which showed improvement of the ODS symptoms which were statistically comparable to the VMR.

In conclusion, POPS is comparable to VMR in management of rectal prolapse and in improving the ODS symptoms. Thus, POPS can be used as easier, faster option to treat rectal prolapse in high-risk patients who cannot withstand lengthy operation; also, we do recommend using POPS in the multi-organ pelvic prolapse with ODS symptoms. However, we still recommend VMR in ODS related to rectal prolapse in healthy patients provided that experience and competence of the surgeon are available.

However, Our study may be criticized by short period of follow-up. Thus, longer period of follow-up is needed in future studies. Also from the limitations of our study, the non-randomized nature of the study, being a single center study and lack of using standardized quality of life scores. Also there was significant difference in the presentation of patients in both groups as there were a 30% of the VMR group complained of fecal incontinence compared to only 1.2% in the POPs group.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that there is no conflict of interest

**Ethical committee approval** The study was approved by the Research Ethics Committee of Cairo University.

**Informed consent** Informed consent was obtained from all individual participants included in the study

## Appendix A

**Preoperative preparation:** All patients were given enema at the night before the operation and one hour before the operation; patients were risk assessed for thromboembolic events and prescribed thromboembolic deterrent (TED) stockings and low molecular weight heparin as appropriate, the administration of which is determined after the surgical procedure. Prophylactic antimicrobials were administered at induction; in our unit, amoxicillin 1 g, metronidazole 500 mg (ideal body weight) IV are given to non-penicillin allergic patients.

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