

# Rectocele repair with stapled transvaginal rectal resection

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## Abstract

**Background** Constipation is a clinical symptom in patients suffering from slow transit and/or obstructed defecation. Proper treatment requires the identification of all associated disorders and the quantification of symptoms. Rectocele can cause the symptoms of obstructed defecation syndrome (ODS). The aim of this study was to evaluate the clinical and functional outcomes of a novel technique of transvaginal stapled rectal resection (TVSRR) using a straight staple line, to treat rectocele.

**Methods** The study included 84 females [median age 51 years (range 29–73 years)], with obstructed defecation, grades II–III rectocele, and multiple abnormalities on defecography. The magnitude and degree of ODS were quantified by the Altomare ODS scoring system. Continence status was evaluated using the Pescatori scoring system. The rectal and vaginal manometric study, the index of patient satisfaction using a visual analog score (VAS), and the validated Patient Assessment of Constipation Quality of Life (PAC-QOL) questionnaire results were recorded. All patients underwent TVSRR.

**Results** There were no intraoperative complications. Early postoperative complications were defecatory urgency in seven patients (8.3 %), dyspareunia in two (2.4 %), and rectovaginal fistula in one (1.2 %). Five patients (6 %) had recurrence of ODS symptoms. There was no significant

change in continence pre- and postoperatively. The ODS score and VAS revealed significant improvement within the first postoperative year in 94 % of patients. The PAC-QOL questionnaire mean total scores indicated an improvement in both the patient satisfaction and the QOL during the 12-month follow-up. The self-reported definitive outcome was excellent in 46 patients (54.7 %), good in 29 (34.5 %), fairly good in 20 (23.8 %), and poor in five (6.0 %).

**Conclusions** Vaginal repair carries no risk of fecal incontinence. Large anterior rectocele is considered the main indication for this technique. Using the linear stapler is a cost-effective, simple, and easy technique.

**Keywords** Constipation · Rectocele · Obstructed defecation · Linear stapler · Vaginal repair

## Introduction

Obstructed defecation syndrome (ODS) is defined as inability to evacuate the rectum satisfactorily in spite of a normal urge to defecate [1]. ODS is associated with anatomical changes: rectocele, rectoanal intussusception, mucosal rectal prolapse, and perineal descent and/or functional changes (non-relaxation or paradoxical contraction/anismus) [2]. Rectocele can be described as an outpouching of the rectovaginal septum into the vaginal lumen and involves both the anterior rectal and the posterior vaginal wall. Rectocele is frequently found in elderly women and women who have had multiple vaginal deliveries, and symptomatic rectocele is a cause of obstructed defecation [3]. The stress of vaginal delivery or chronic straining at defecation in the setting of paradoxical contraction of the levator muscle or the anal sphincter result in

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increased pressure in the anterior rectum and lead to the formation of a pulsion diverticulum [4]. ODS is characterized by a spectrum of symptoms including difficult evacuation, excessive straining during defecation, sensation of incomplete evacuation, prolonged time to defecate, anal bleeding, and use of external assistance to aid defecation. It has been estimated that approximately 20 % of the adult female population suffer from ODS [5, 6]. The most common clinical signs and pathological alterations associated with ODS are rectocele and rectal intussusception [7].

Normally, the vaginal introitus is closed on straining as a result of contraction of the bulbocavernosus muscle [8]. The vagina is transformed into a closed cavity with a high pressure that not only counteracts the increased intra-abdominal pressure on straining and the uterine tendency to prolapse, but appears to also support the rectovaginal septum against the high rectal pressure during straining [9].

A variety of surgical techniques including transvaginal, transperineal, transanal, and combined abdominal and vaginal approaches have been described for the treatment for rectocele with ODS. However, none of them is considered superior to the others because they are all associated with complications and high recurrence rates.

The aim of the current study was to evaluate the clinical and functional outcomes of a novel technique of transvaginal stapled rectal resection (TVSRR) using a straight staple line.

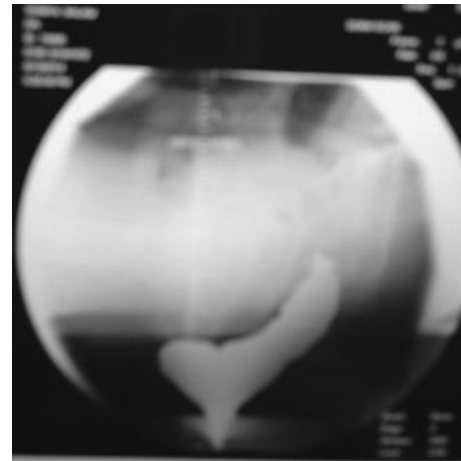
## Materials and methods

This was a prospective clinical study conducted at Cairo University Hospital and Ahmed Shafik Coloproctology Hospital, between January 2011 and October 2013 on a consecutive series of 84 female patients who presented with ODS resulting from rectocele who were treated with TVSRR. The study was approved by the Ethics Committee of the Cairo University Coloproctology Department. The technique used in the study was explained to the patients all of whom gave a written informed consent.

A complete medical history was taken, and the presence and extension of any anatomical or functional abnormality was evaluated by means of clinical examination and appropriate investigations such as proctoscopy, colonoscopy, colonic transit time, manometry, and defecography (Fig. 1).

### Inclusion criteria

All patients were females complaining of chronic constipation and with at least three these specific ODS symptoms: feeling of incomplete evacuation, prolonged painful



**Fig. 1** Defecography of rectocele

straining, frequent calls to defecate, prolonged toilet time, digital assistance, pelvic pain or pressure, rectal bleeding, soiling or a feeling of prolapse. All patients had a wide and everted introitus, a rectocele  $\geq 3$  cm on straining, no anismus on defecography. Before enrolling in our study, all patients had failed conservative treatment with a high fiber diet and 1–2 l of water per day, laxatives and enemas.

### Exclusion criteria

The exclusion criteria were based on the consensus statement published by Corman et al. [10] Hence, the following patients were excluded: all males, females who had responded well to conservative treatment, those treated for psychological disorders, and those with slow transit constipation, enterocele, sigmoidocele, cystocele, genital prolapse, external rectal prolapse, pelvic floor dyssynergia, chronic diarrhea, inflammatory bowel disease, neoplasia, anorectal stenosis, previous anterior resection with rectal anastomosis, anal incontinence (Pescatori continence score  $>4$ , C3), foreign material (such as mesh) adjacent to the rectum, rectocele of  $<3$  cm on straining, or rectocele with internal intussusception, general contraindications for surgery.

### Study design

The primary end points were complications and outcome. Details of the patients' preoperative status as well as intra- and postoperative complications were recorded. The magnitude and degree of ODS were quantified by the Altomare validated questionnaire, consisting of eight 3- or 4-point Likert scale symptom items. Each of the items had four or five possible answers with scores ranging from 0 to 4 (4 = most severe symptoms). The ODS score was the sum of all points, with a maximum possible of 31 points [11]

The continence status was evaluated using the Pescatori incontinence score pre- and postoperatively which measured the degree of incontinence (A = flatus/mucus (1 point), B = diarrhea (2 points), C = solid stool (3 points)), and frequency of incontinence, less than once a week (1 point), at least once a week (2 points), daily (3 points), with an overall score from 0 (continent) to 6 (severe total incontinence) [12].

Moreover, the index of patient satisfaction was evaluated by visual analog scale (VAS) from 0 to 10 (10 = greatest satisfaction) [13]. The validated Patient Assessment of Constipation Quality of Life (PAC-QOL) questionnaire was used to determine the QOL in patients with ODS [14]. The first three subscales of the self-reported questionnaire were used to assess the patient dissatisfaction index with an overall score ranging from 0 to 96 (96 = worst QOL). The satisfaction subscale included four items with a global score ranging from 0 to 16 (16 = best QOL), so that the patient's self-reported outcome was defined as either poor (0–4), fairly good (5–8), good (9–12), or excellent (13–16) [14, 15].

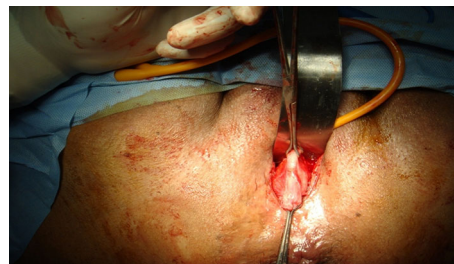
Preoperatively and 3 months after surgery, manometric studies were performed on all patients to measure the rectal and the vaginal pressures at rest and on coughing or straining.

### Surgical procedure

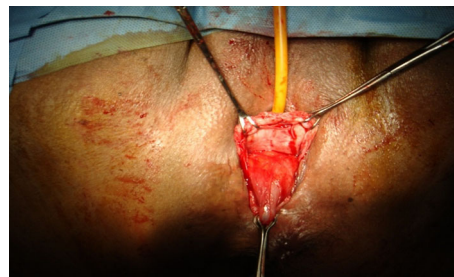
Preoperative bowel preparation and colonic washout were performed by means of polyethylene glycol electrolyte solutions. The patients received routine broad-spectrum antibiotics immediately after induction. The operation was performed under spinal anesthesia, with the patient in the lithotomy position and with prophylactic urethral catheterization for 24 h. Anal dilatation was performed using a dilator from a PPH<sup>®</sup> stapler set (Ethicon). A transverse incision was made in the mucocutaneous border of the vaginal introitus; the posterior vaginal wall was dissected and separated from the anterior rectal wall up to the posterior fornix. Dissection was extended laterally to the maximum length of the rectocele. Two Babcock



**Fig. 2** Rectocele preoperative



**Fig. 3** Dissection of posterior vaginal wall from rectum



**Fig. 4** Dissected anterior rectal wall to posterior fornix and maximum laterally

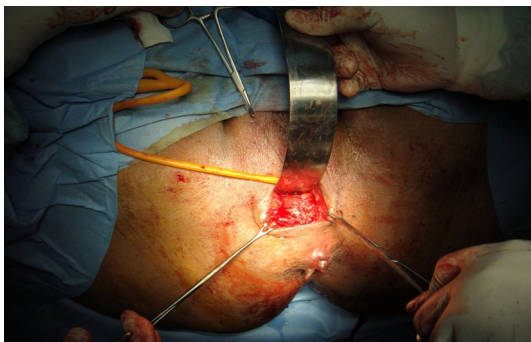


**Fig. 5** Linear stapler applied

clamps were applied longitudinally to the rectocele, and the stapler was fired to divide the rectocele (Figs. 2, 3, 4). Partial thickness stitches were applied over the staple line using vicryl 2/0 suture to reinforce the staple line and to invaginate it so that it was not in direct contact with the vaginal wall. A vaginal lift was done by excision of the redundant vaginal wall. Two sutures were placed in the endopelvic fascia, and the vaginal wall was sutured transversely to the mucosal border (Figs. 4, 5, 6, 7). A tampon was inserted into the vagina. An intravenous broad-spectrum antibiotic was given to the patient at the time of surgery and a second shot 3 days postoperatively. After 48 h, the tampon was removed. A transvaginal wound dressing, GYNO-DAKTARIN<sup>®</sup> VC vaginal cream (miconazole), was applied daily, and the wound was kept dry.



**Fig. 6** Linear stapler fired



**Fig. 7** Linear staple suture line after reinforcement

### Follow-up

Patients were followed up by clinical examination at 3, 6, and 12 months postoperatively. At each visit, digital vaginal and rectal examinations were performed to monitor the healing of vaginal and anal wounds, and to record postoperative complications within 1 month after surgery. Functional results were collected using the same standardized questionnaires (Altomare ODS score, VAS). At 6 months, all patients underwent rectal and vaginal manometry.

The procedure was considered successful at 12 months when PAC-QOL, (satisfaction index) scores were classified as excellent.

### Statistical analysis

Statistical analysis was performed using the paired *t* test for continuous variables and Wilcoxon's signed-rank test for quantitative variables. The total scores of ODS, VAS, and PAC-QOL were expressed as mean values with 95 % confidence intervals (CI). A *p* value of <0.05 was considered statistically significant.

### Results

A consecutive series of 84 female patients with ODS resulting from rectocele, dilated introitus, and airovagina (vaginal flatulence) underwent TVSRR in the period from January 2011 to October 2013. The median age was 51 years (range 29–73 years). All patients were presented with vaginal bulge and at least three symptoms of outlet obstruction. Fifty-eight patients (69 %) had experienced 1–6 vaginal deliveries and 21 (25 %) at least one episiotomy, and 31 (36.9 %) patients had undergone prior anorectal surgery (hemorrhoidectomy and fissurectomy). The manifest symptoms and defecographic findings are listed in Table 1. The mean size of the rectocele was  $39.1 \pm 4.1$  mm (Figs. 1, 2). The median operative time was 45 min (range 35–55 min). The mean vertical height of the resected specimens was  $5.6 \pm 3.2$  cm, and mean horizontal length was  $4.8 \pm 1.4$  cm. The mean hospital stay was  $4.24 \pm 2.3$  days (range 3.12–5.6 days).

As regards postoperative complications, in week 1, seven patients (8.3 %) had defecatory urgency which improved with time during the 12 months of follow-up. Patients had pain for the first 3 days which was managed by diclofenac injection. One case of rectovaginal fistula was diagnosed on postoperative day 5 and was found to be due to the passage of impacted hard stool through the rectum, damaging the staple line. Surgical treatment for the rectovaginal fistula was corrected with a mucosal flap. Two patients (2.4 %) complained of dyspareunia (2.4 %) (Table 2).

The symptoms of constipation improved in 79 patients; therefore, the success rate of the TVSRR for rectocele with ODS was 94 %. Symptoms persisted in five patients (6 %) at 12 months (Table 2). According to “iceberg diagram” [15] for evaluation of occult disorders in obstructed defecation, out of the five cases not improved; two patients had anxiety-depression, one had recurrent rectocele and two had rectal hyposensitivity. The remaining patient had recurrent rectocele. They all had been treated by with a high residue diet, bulk laxatives, pelvic floor rehabilitation, and transanal rectal stimulation. The patient with recurrent rectocele was managed by rectal block suture. Psychological counselling was advised for the two patients with anxiety/depression.

Overall, a significant reduction in the Altomare ODS score compared with baseline was observed at 12 months. The mean ODS score preoperatively was 12 (standard deviation (SD) 4.4), while postoperatively the mean score was 3 (SD 2.1) (Fig. 3). The differences indicated that TVSRR had improved the symptoms of obstructed

**Table 1** Presenting symptoms and defecographic parameters

Presenting symptoms	Patients: number (percentage)	Defecographic parameters
Excessive straining	84 (100 %)	Mean rectocele (mm)
Feeling of incomplete evacuation	81 (96.4 %)	rectorectal intussusception
Rectal bleeding <sup>a</sup>	36 (42.8 %)	Median perineal descent (cm)
Rectal or vaginal digitation	54 (64.3 %)	
Rectoperineal discomfort	33 (39.3 %)	
Abdominal distension	49 (58.3 %)	
Feeling of rectal obstruction	28 (33.3 %)	
Anal pain	57 (67.8 %)	
Laxatives <sup>b</sup>	78 (92.8 %)	
Enemas	19 (22.6 %)	
Abdominal pain	25 (29.8 %)	

*SD* standard deviation

<sup>a</sup> >1 episode/week

<sup>b</sup> >2 episodes/month

**Table 2** Postoperative complications

Early complications (week 1)	Incidence [number patients (%)]	Late complications (after 12 months)	Incidence [number patients (%)]
Defecatory urgency	7 (8.3 %)	Defecatory urgency	0
Bleeding	0	Fecal incontinence	0
Incontinence to flatus	0	Chronic pain	0
Acute urinary retention	0	Dyspareunia	2 (2.4 %)
Severe pain	0	Constipation	5 (6.0 %)
Rectovaginal fistula	1 (1.2 %)	Rectal stenosis	0
Perianal sepsis	0	Rectal diverticulum	0
Anal fissure	0		
Staple line dehiscence	0		
Mortality	0		
Total	7 (8.4 %)		

defecation due to rectocele. The mean Pescatori score was  $2.2 \pm 1.2$  (0–3) preoperatively and  $1.5 \pm 2.3$  (0–2) postoperatively, and the patients were graded as A1 with no significant difference between pre- and postoperative status ( $p < 0.001$ ).

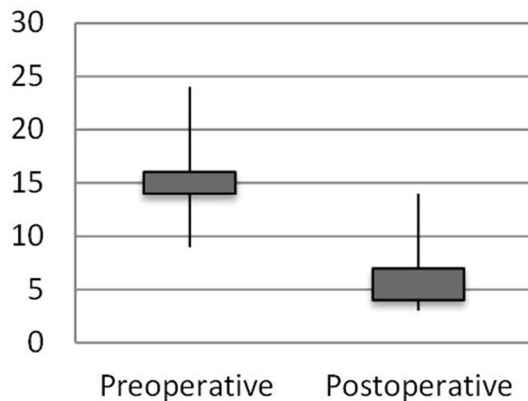
The symptoms of constipation improved in 79 patients; therefore, the success rate of TVSR for rectocele with ODS was 94 %. Symptoms persisted in five patients (6 %), and in four cases, it could be explained by the iceberg syndrome [15], i.e., the presence of occult ODS-related disorders: two of the patients had anxiety/depression and two with rectal hyposensitivity. The remaining patient had recurrent rectocele. They all had been treated with a high residue diet, bulk laxatives, pelvic floor rehabilitation, and transanal rectal stimulation. The patient with recurrent rectocele was managed by rectal block suture. Psychological counselling was advised for the two patients with anxiety/depression (Figs. 6, 7).

Meanwhile, the VAS score at 12 months had markedly increased over [VAS score at baseline vs. 12 months:  $4.20$  (95 % CI 3.62–4.46) vs.  $7.65$  (95 % CI 6.78–8.67);  $p < 0.0001$ ] (Fig. 8). The higher VAS score was consistent with the improvement in ODS score and suggested that there was an increase in patient satisfaction. The data collected showed that the PAC-QOL score at 12 months had significantly dropped below that at baseline. PAC-QOL (dissatisfaction index) at baseline versus 12 months was  $42.43$  (95 % CI 43.21–48.33) versus  $8.81$  (95 % CI 6.26–10.33) ( $p < 0.0001$ ) (Fig. 9). In addition, the self-reported definitive outcome was excellent in 46 patients (54.7 %), good in 29 (34.5 %), fairly good in 20 (23.8 %), and poor in five (6.0 %). This means that in 94 % of patients, ODS symptoms improved resulting in increased satisfaction and quality of life. The rectal and vaginal pressures at rest and on coughing or straining are given in Table 3. They increased significantly compared to

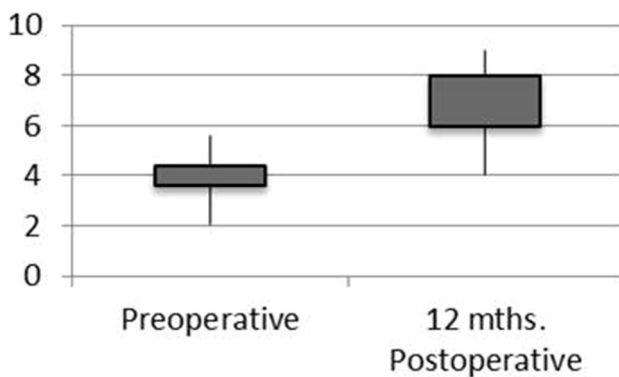
$t$  preoperative values ( $p < 0.001$ ,  $p < 0.001$ , respectively) and were equal at rest (Fig. 9).

## Discussion

The anatomical and physiological disturbances underlying ODS are complex and only partly understood, but rectocele and rectoanal intussusception have been identified as the two most important organic causes of ODS [16].



**Fig. 8** Comparison of constipation scoring system (CSS) at baseline and 12 months



**Fig. 9** Comparison of visual analogue scale (VAS) at baseline and at 12 months

Vaginal delivery may overstretch or tear the pelvic floor, altering the functional and anatomical position of the muscles, nerves, and connective tissues. Rectocele is usually caused by obstetric trauma that disrupts the attachments of the levator ani fascia and bulbocavernosus muscles. An eversion of the introitus is noted on physical examination. This eversion aggravates constipation and results in inefficient bowel movements and the need for stronger Valsalva maneuvers [17]. There is a difference in the rectovaginal pressure gradient with a significant increase in the rectal over the vaginal pressure, particularly on coughing or straining, which affects the support of the vaginal introitus and lower third of the vagina [18]. Therefore, it can be assumed that ODS is caused by high rectal and low vaginal pressure. In the current study, the vaginal and rectal pressures at rest and on straining were closer to the normal level in the postoperative manometric study than that in preoperative one. The linear rectal stapler resection reshaped the redundant rectum and stabilized the rectal and vaginal pressures, with the result that on straining or coughing. The pressure increased equally on both sides of rectovaginal septum, apparently keeping it in place.

The advantage of TVSR is that it avoids circumferential suture lines, fibrotic dehiscence, and stenosis. Moreover, the staple line reinforces the rectovaginal septum and normalizes the rectal and vaginal pressures, besides resecting the rectocele, removing the redundant part of the posterior vaginal wall and diminishing the size of the vaginal introitus. The results of our present study thus demonstrate that TVSR significantly improved the patients' defecatory difficulties.

Early postoperative complications in the shape of defecatory urgency appeared in seven patients (8.2 %) and resolved by month 5. One case (1.2 %) of rectovaginal fistula, probably due to damage of the suture line by passage of retained hard stools in the rectum, or to postoperative late ischemia followed by tissue necrosis, was diagnosed on day 5 and corrected with a mucosal advancement flap. A total of seven patients (8.3 %) had late postoperative complications: two patients complained

**Table 3** Rectal and vaginal pressures at rest and on coughing or straining preoperatively and postoperatively

Pressure (cm H <sub>2</sub> O)	Preoperative				Postoperative			
	Rectal		Vaginal		Rectal		Vaginal	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
At rest (basal)	7.8 ± 2.3	6–8	1.4 ± 0.5	0–2	7.4 ± 1.3 <sup>o</sup>	6–8	7.5 ± 2.1**	6–8
On coughing or straining	104.3 ± 8.4	89–119	31.3 ± 4.1	25–36	169.2 ± 11.2*	148–184	157.3 ± 12.7**	152–174

<sup>+</sup> Values given as the mean ± SD

Preoperative and postoperative  $p$  values compared

<sup>o</sup>  $p > 0.05$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$

of dyspareunia and five got ODS symptoms. The constipation recurrence rate of 6 % might be due to technical error when trying to dissect a good segment of the rectal wall or large size rectocele and to occult disorders in ODS (anxiety/depression and rectal hyposensitivity). According to the Pescatori incontinence score [12], there was no significant change in patients' continence after TVSRR as this technique carries no risk of fecal incontinence.

Common complications with stapled transanal rectal resection (STARR) are rectal bleeding and fecal incontinence, which are also reported after traditional surgery. Uncommon complications are rectal perforation, recto-vaginal fistula, and retroperitoneum, which are increasingly reported after STARR and may well be the effect of a learning curve. Reinforcement of the rectovaginal septum was achieved in this maneuver, as the weakness of the septum is one of the main causes of rectocele.

STARR is associated with the expected morbidity following anorectal surgery, such as bleeding. Nevertheless, worrisome complications and unsatisfactory functional results have been described as well [19]. There are also reports of high reintervention rates for symptomatic recurrence and procedure-related complications after surgery [19, 20]. The success of STARR was associated with fecal incontinence, which worsened in 10.7 % of patients after surgery. The outcome of the Italian multicenter study showed worse results in non-selected patients, and improvement after STARR was noted in only 65 % of the patients [20, 24]. The literature gives the incidence of midterm recurrence as 4.3–17.1 % [7, 20–22]. Also, transanal rectocele resection using a linear stapler was described earlier [23].

Therefore, in our study, we used the validated Altomare scoring system (CDR), VAS, and the validated PAC-QOL for clinical assessment. The clinical and functional outcome scores (CDR, VAS, and PAC-QOL) after TVSRR demonstrated significant improvement compared to pre-operative scores. An evident reduction in the ODS scores was observed at 12 months. Furthermore, the significant differences between the pre- and postoperative VAS and PAC-QOL mean total scores indicated an improvement in both patient satisfaction and the quality of life. The satisfaction index reflected the patient's self-reported definitive score of satisfaction: It was excellent in 46 patients (54.7 %), good in 29 (34.5 %), fairly good 20 (23.8 %), and poor in five (6.0 %). Hence, our one-year follow-up study suggests that the postoperative benefits of TVSRR were maintained, with a success rate of 94 %.

Rectocele with ODS mostly had internal mucosal prolapse. In TVSRR, the linear stapler performs full thickness excision of the rectal wall including the mucosa and muscle layer, and the procedure deals with the redundancy of the rectal mucosa quite well. The symptomatic recurrence

seems to be related to either technical defects or large rectocele.

## Conclusions

TVSRR is beneficial for the treatment for ODS resulting from rectocele without rectal intussusception in females. Postoperative complications are negligible because a one-line stapler suture is used. The procedure also minimizes the size of both rectocele and vaginal introitus which is cosmetic for females. However, the procedure has no impact on fecal incontinence. TVSRR is a simple, easy and, cost-effective, and is associated with high patient satisfaction and quality of life.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** The study was approved by the Ethics Committee of the Cairo University Coloproctology Department.

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

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