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# Transvaginal Mesh and Transanal Resection to Treat Outlet Obstruction Constipation Caused by Rectocele

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**Background:** The aim of this study was to evaluate the curative effect of transvaginal mesh repair (TVMR) and stapled transanal rectal resection (STARR) in treating outlet obstruction constipation caused by rectocele.





**Material/Methods:** Patients who had outlet obstruction constipation caused by rectocele were retrospectively analyzed and 39 patients were enrolled the study. Patients were assigned to either the TVMR or STARR group. Postoperative factors such as complications, pain, recurrence rate, and operative time were compared between the 2 groups.

**Results:** Total effective rate was 100% in both groups. No long-term chronic pain occurred and discomfort rate of tenesmus was higher in the STARR group than in the TVMR group. Postoperative defecography showed that the rectocele depth was significantly reduced, and the prolapse of the rectal mucosa and the lower rectal capacity was also decreased. Four cases had mesh exposure in the TVMR group and 2 cases in the STARR group had anastomotic bleeding after the surgery.

**Conclusions:** For outlet obstruction constipation caused by rectocele, TVMR and STARR both obtained satisfactory results. Although TVMR is complex with longer operative time and hospitalization period, its long-term effect is better than that of STARR.

**MeSH Keywords:** Constipation • Rectocele • Surgical Staplers

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## Background

Constipation is a common cause of painful defecation. Severe constipation includes obstipation and fecal impaction, which can progress to bowel obstruction and become life-threatening [1]. Obstructed defecation has mechanical and functional causes. Functional constipation is a common disease of the digestive tract in clinic practice and rectocele is a common cause of functional constipation [2]. Due to the large pelvic outlet, narrow perineal body, and weak rectovaginal septa, the anterior wall of the rectum easily protrudes into the vagina, causing difficult defecation in females. Rectocele is more common in older women than in younger ones; estrogen, which helps to keep the pelvic tissues elastic, decreases after menopause. At present, defecography is the best method of diagnosis, which can dynamically display the shape, size, length, and depth of the rectocele and detect abnormal signs at the same time.

Treatment depends on the severity of the problem, and includes non-surgical methods such as changes in diet, pelvic floor exercises, oral drugs, and biological feedback for constipation caused by mild rectocele. However, moderate or severe cases, conservative treatment is often ineffective and surgery should be considered [3]. The main focus of this study is the surgical treatment of elderly female patients with outlet obstruction constipation caused by rectocele. By a prospective randomized controlled study, transvaginal mesh repair (TVMR) and stapled transanal rectal resection (STARR) were compared with the curative effect for treating outlet obstruction constipation caused by rectocele. We evaluated incidence of surgical post-operative complications, pain, and improvement of symptoms.

## Material and Methods

### General information

This study was a prospective, randomized, controlled clinical trial and the total number of patients enrolled in this study was 39. The study and treatment methods were approved by the Institutional Ethics Committee of our hospital. The 39 patients

were divided into 2 groups (TVMR group with 19 patients and STARR group with 20 patients). The average age in the TVMR group was  $61.74 \pm 4.58$  years, the body mass index (BMI) was  $23.69 \pm 3.13$ , and the duration of the condition was  $18.47 \pm 5.39$  months, while in the STARR group these were  $60.28 \pm 5.67$ ,  $24.25 \pm 3.20$ , and  $19.10 \pm 4.25$ , respectively. Data on rectocele are shown in Table 1. The surgery was performed on all patients under spinal anesthesia. Polytetrafluoroethylene mesh was used in the TVMR group, and prolapse and hemorrhoids stapler were used in the STARR group (Waston Medical, China).

Constipation of this study was diagnosed according to Diagnostic Criteria Rome III and anismus constipation was excluded depending on the anorectal pressure. Inclusion criteria of surgery were: 1) organic disease of intestinal tract was excluded by colonoscopy, barium enema examination; 2) age was more than 55 years; 3) patients with clinical manifestations of constipation needed to have defecation assisted with oral laxatives or hand; 4) digital rectal examination showed the anterior wall of rectum was weak and protruded into the vagina as a bag-shape, and rectal ampulla region deposited more feces; 5) defecography confirmed the presence of rectocele and the depth was more than 30 mm; 6) the symptoms did not ease with conservative treatment for 6 months, and the effect was better when a hand was put into the vagina assisting defecation; and 7) follow-up time was more than 3 months.

### Operative method

Patients with TVMR had estrogen ointment applied into the vagina routinely to increase the thickness of the vaginal wall at 2 weeks before the surgery. A 6-cm incision along the middle line of the vaginal wall to the top of fornix uteri was cut. The space between the rectum and vagina was fully separated along with rectum and anterior fascia until the 2 sides touched the anterior sacroscliotic ligaments and the height reached the ischial spine. The rectum and anterior fascia were sutured discontinuously with Johnson 3-0 absorbable line and the protruding part of the anterior wall of the rectum was pushed back. With guidance from the anal examination, the puncture was made through the fossae ischiorectalis, muscoli levator ani,

**Table 1.** The general information of patients.

$\bar{x} \pm s$	TVMR group (n=19)	STARR group (n=20)	P value*
Age	61.74±4.58	60.28±5.67	0.525
Medical history	18.47±5.39	19.10±4.25	0.606
Rectocele depth (mm)	42.71±8.42	43.76±6.56	0.367
Score of ODS *	26.26±5.41	25.12±3.33	0.081
BMI	23.69±3.13	24.25±3.20	0.982

\* This score was got according to Longo ODS evaluation; # P was got compared TVMR group with STARR group.

**Table 2.** Detailed information of the surgery in two groups.

$\bar{x}\pm s$	TVMR group (n=19)	STARR group (n=20)	P value*
Operative time (min)	112±7.89	82.5±8.90	0.011
Bleeding volume (ml)	80.00±14.14	48.00±16.86	0.013
Complication rate	21.05% (4/19)	10.00% (2/20)	0.036
Hospitalized period (day)	10.61±1.07	7.55±1.27	0.012
ODS after 1 week	6.60±0.97	7.10±0.99	0.779
ODS after 3 months	0.43±0.21	0.32±0.35	0.055
Discomfort of tenesmus <sup>#</sup>	5.26% (1/19)	25.00% (5/20)	0.000

\* P was got compared TVMR group with STARR group; <sup>#</sup> The data was counted one month after the surgery.

1/3 outside of anterior sacrosclatic ligaments inside the sciatic spine, and then out before the rectum. The polytetrafluoroethylene mesh was placed and tape was adjusted to hold the fornix uteri and tile with the rectum and the vagina. After the fixation of the mesh, the vaginal wall was sutured continuously, a folding suture was used to increase the thickness, and gauze packing was placed for hematochezia. The gauze packing was taken out the day after the surgery and patients were given daily dressing therapy with cotton gauze permeated with Lysozyme and Lysozyme. Patients were fasted with only water during the first 3 days after the surgery, a semi-liquid diet was consumed on the 4<sup>th</sup> day, and normal diet resumed from the 5<sup>th</sup> day. Patients were discharged after they had normal defecation.

Patients with STARR underwent anal expansion with a dilator. Half-purse string suturing was performed under the muscular layer at the 6-cm level between the anterior wall of the rectum from the dentate line (9 points to 3 points, clockwise). In the same way, the 5-cm level and the 4-cm level were cut and a total of 3 half-purse string sutures were placed. A special baffle was inserted into the rectum from beneath the dilator to block the posterior wall of the rectum. A prolapse and hemorrhoids stapler was placed and the lines from 3 half-purse string sutures were tightened and tied around the stapler rod at the same time. The lines were drawn out from the side hole, gently tightened, and the stapler was closed. The stapler was used to cut off the whole layer of the rectum. The stapler was taken out and stoma was checked whether there is active bleeding or not. Absorbable sutured line was used for hemostasis. In the same way, another 3 half-purse string sutures were made and the middle one was aligned with the front stoma. After 2 ligations, the submucous eminence, which looks like “cat ears” between 2 stomas, was removed and gauze packing was placed after checking to be sure there is no bleeding. Patients were routinely given antibiotics after the surgery and Titanoreine lidocaine cream was applied externally daily. A semi-liquid diet was given within 6 h after the surgery and normal diet from the 2nd day. Patients were discharged after normal defecation.

The analysis of the specimen after the surgery confirmed that the resected depth of the anterior and posterior wall of the rectum both reached the level of the whole layer of the rectum.

### Statistical analysis

The pain at the 1st week and 3rd month after surgery was evaluated with numerical rating scale (NRS); 1–3 was considered as mild pain, 4–6 as moderate pain, and 7–10 as severe pain. Curative effect was evaluated according to the Standard for Diagnosis and Treatment of Constipation in 1999 and expressed with obstructed defecation syndrome (ODS). Score=(preoperative ODS–postoperative ODS)/preoperative ODS×100%. Score >95% and rectocele depth <5 mm was considered as cure, score >70% and rectocele depth between 12 and 15 mm as improvement, score >30% and rectocele depth between 8 and 11 mm as effect, and score <30% and no change in rectocele depth as invalid. Total effective rate=(cure+improvement+effect)/total cases×100%.

All data were analyzed using SPSS 17 software (SPSS Package, USA). The data were further analyzed by *t* test and  $\chi^2$  test. *P*<0.05 was considered as statistically significant.

### Results

Patients in the 2 groups were all given antibiotics for prevention before the surgery and there were no serious complications such as massive hemorrhage during the perioperative period, fecal incontinence, or pelvic infection. The detailed information of the surgery in patients including operative time, pain, bleeding volume, and hospitalized period are shown in Table 2. Four cases had mesh exposure in the TVMR group and they were all cured after cutting under local anesthesia 2 months after the surgery, with estrogen ointment for external use. In addition, 2 cases in the STARR group showed anastomotic bleeding after the surgery and were cured with surgical suturing. No long-term chronic pain

**Table 3.** Comparison between two groups before and after the surgery.

	TVMR group (n=19)		STARR group (n=20)		P value*
	Before	After	Before	After	
Unfinished feeling	2.37±0.49	2.11±0.45	2.40±0.68	2.10±0.64	0.203
Coloclyster	5.21±1.47	1.26±1.14	5.50±0.88	1.05±0.99	0.050
Reduced activity	0.95±1.02	0.63±0.95	0.70±1.17	0.40±0.82	0.112
Frequency	1.95±0.84	0.84±0.60	2.00±0.64	1.15±0.48	0.388
Strain	1.84±0.37	0.37±0.49	1.85±0.36	0.3±0.47	0.389
Time	1.79±0.41	1.26±0.45	1.80±0.41	1.35±0.48	0.259
Hand assisted	4.26±1.79	0.32±0.47	4.10±1.37	0.20±0.41	0.112
Laxative	5.32±1.66	1.74±0.99	5.60±1.14	1.80±1.00	0.691
Discomfort	2.53±0.51	1.07±0.48	2.35±0.58	1.97±0.52	0.012
Longo ODS	26.26±5.41	9.58±2.89	25.12±3.33	9.55±2.48	0.089
Rectocele depth (mm)	42.71±8.42	15.35±5.12	43.76±6.56	13.82±6.12	0.825

\* P was got compared TVMR group with STARR group after the surgery.

occurred in either group. However, the discomfort rate of tenesmus was higher in the STARR group than in the TVMR group, which is characterized by incomplete defecation. Symptoms disappeared gradually by 1 month after surgery (P<0.05).

Short-term curative effect was assessed at the 3rd month after the surgery. At this time, in the TVMR group 2 cases were cured, 13 cases were improved, and 4 cases were effective, yielding a total effective rate of 100%; whereas in the STARR group 1 case was cured, 17 cases were improved, and 2 cases were effective, yielding a total effective rate of 100%. There was no significant difference in the total effective rate between the 2 groups.

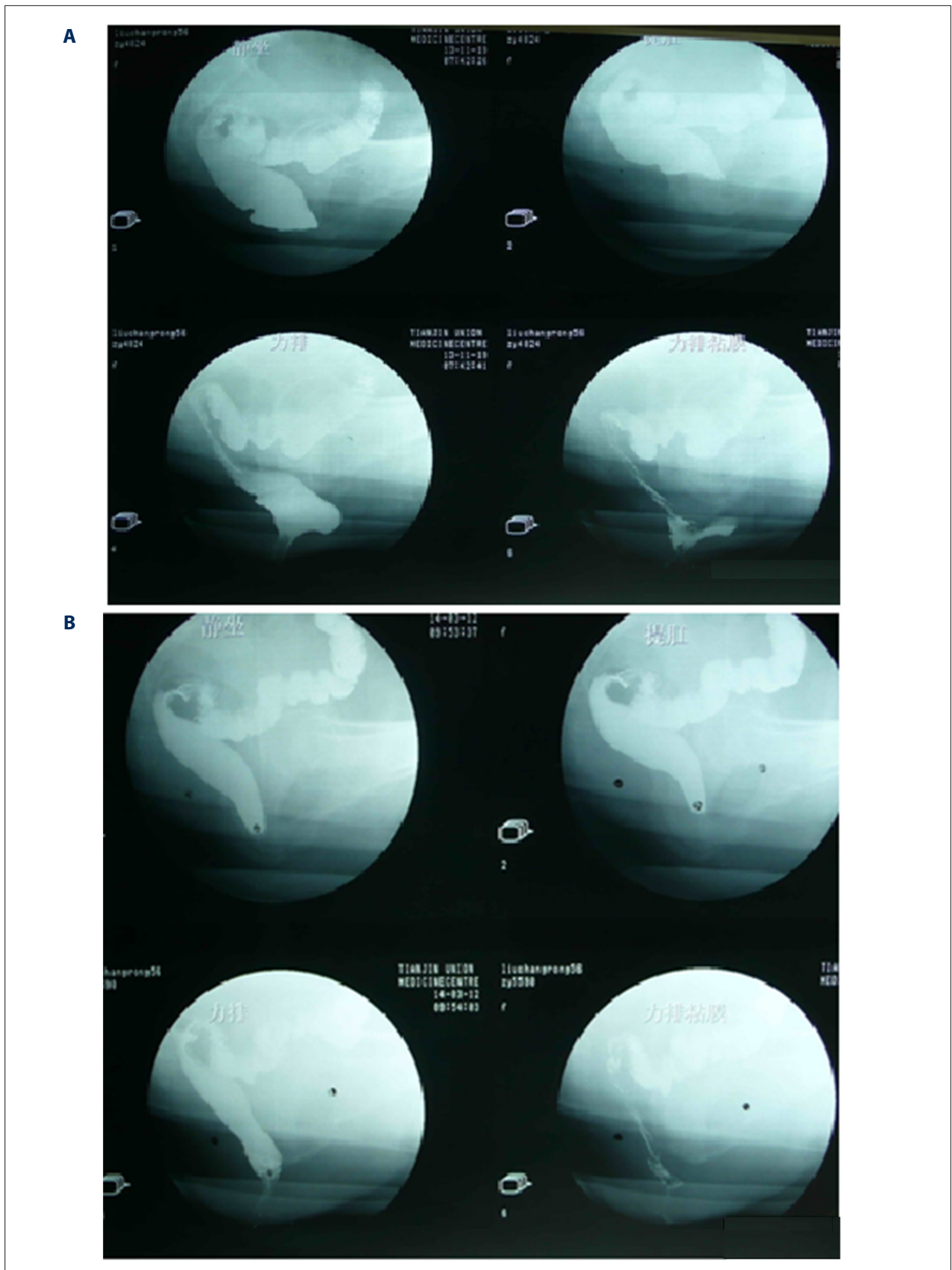
Three months after the surgery, rectocele depth in both groups was significantly reduced, especially defecation strain and defecation assisted with hand (Table 3, P<0.05). Partial outlet obstruction symptoms were effectively alleviated. The improvement of perineum discomfort between the anus and rectum was more obvious in the STARR group. Postoperative defecography showed that the rectocele depth was significantly reduced, and the prolapse of the rectal mucosa and the lower rectal capacity was also decreased (Figures 1, 2). Long-term curative effect was assessed at 1 year after the surgery, at which time the TVMR group had 1 case of recurrent defecation dysfunction and a recurrence rate of 5.26%, whereas the STARR group had 6 cases and a recurrence rate of 30.00% (P<0.05)

## Discussion

A rectocele results from a tear in the rectovaginal septum. Rectal tissue bulges through this tear and into the vagina as a hernia,

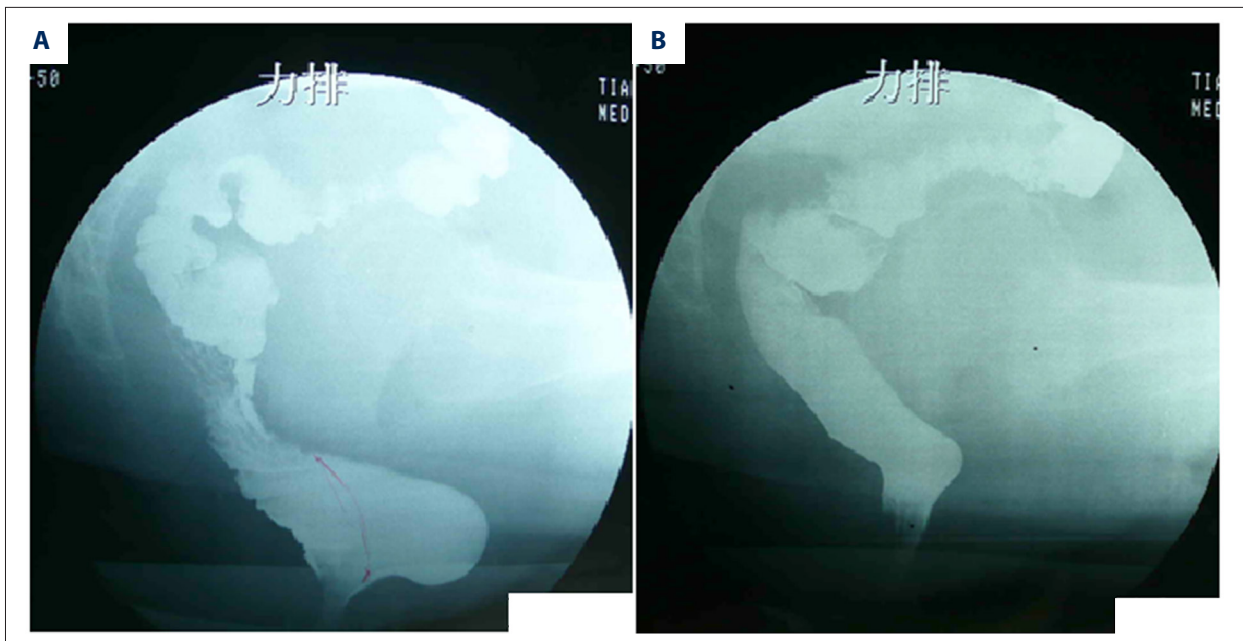
which is most common in middle-aged and elderly women [4]. Normal defecation is the movement of stool mass under the combined effect of rectal force, abdominal pressure, and the surrounding muscle structures. Often, when stool mass moves forward, pressure will act on the anterior wall of the rectum. In women there are rectovaginal septa between the anterior wall of the rectum and the posterior wall of the vagina, which can resist this pressure. Rectovaginal septa can be thin, broken, and less supportive in situations such as terminal nerve injury caused by repeated vaginal delivery, decreased estrogen levels in elderly women, and long-term increased abdominal pressure [5]. When rectovaginal septa cannot resist the pressure of stool mass, part of the mass will sink into the rectal hernial sac and not be discharged. When defecation stops, the stool mass will return to the rectum, producing an unfinished feeling, rectal sensation, and abdominal bulge. If patients try to force defecation, the rectocele will become deeper and the rectovaginal septa will become thinner, which form a vicious cycle. The fascia of the trigona urogenitale in females may not be not strong enough to resist formation of a rectocele. Studies have shown that vaginal delivery is a major risk factor causing rectocele [6].

Zhang found that some rectoceles occur without disease [7]. Rectocele without symptoms or mild, moderate rectocele is actually an anatomic variation, or transient morphological changes in defecation, which cannot be considered as a pathological phenomenon. Rectocele with symptoms or severe rectocele is not an independent disease, and may be a manifestation of systemic disease. Treatment and clinical research showed that in addition to the anatomical abnormalities, mental and neuromuscular abnormalities in the defecation process play



**Figure 1.** Comparison of defecography before (A) and after (B) the surgery in TVMR group.





**Figure 2.** Comparison of defecography before (A) and after (B) the surgery in STARR group.

an important role [8]; therefore, results of surgical treatment can be affected by some non-anatomic factors. Conservative treatment effect is not ideal for outlet obstruction constipation caused by moderate or severe rectocele, and surgical treatment may be needed. Before the surgery, the patients were required to put the hand into the vagina to assist defecation; if this is effective, surgical treatment can be considered to reinforce the rectovaginal septa.

The overall efficacy of surgical methods varies in different reports. The principles of the surgery are repairing the weak defect between the rectum and vagina, reconstructing the anterior wall of the rectum, and restoring normal anatomy of the rectum in defecation. Surgical methods include transanal surgery, transvaginal surgery, transperineal surgery, and resection of the untreatable rectum or sigmoid colon [9,10]. There are many reports on the procedure for prolapse and hemorrhoids (PPH) used in treating rectocele, and some authors add the injection of a curative agent or traditional Chinese medicine [11]. However, the long-term efficacy of PPH needs to be observed to determine the limit of the resection range in the rectal wall, including depth and height. Stapled transanal rectal resection (STARR) and trans-STARR are new operations developed within the last 10 years [12], which have achieved satisfactory curative effect.

STARR was first proposed by Longo for the treatment of rectocele [13]. STARR is a transrectal operation, using 2 PPH staplers resecting long, prolapsed mucosin in the anterior wall and posterior wall of the lower rectum submucosa and partial muscle tissue in order to reduce the width and depth of

the rectocele. STARR can increase the tension of the anterior wall of the rectum and the thickness of the rectovaginal septa, removing the rectocele. STARR can also prevent the recurrence of rectocele and reduce rectal volume, which can improve symptoms such as internal hemorrhoids and rectal mucosal prolapse. In addition, this operation retains the side wall of the rectum, causes little trauma, is a simple operation, and results in only mild postoperative pain [14,15].

In this study, we also used TVMR to treat outlet obstruction constipation caused by rectocele. TVMR is a combination of Prolift pelvic organ prolapse repair and transperineal operation. Bilateral anterior sacrosacral ligaments were used to fix mesh, which can strengthen the bearing capacity of the mesh resisting the pressure. The uterus and the posterior fornix upward through the tape stretch, decreasing downward traction of pelvic endometriosis. TVMR can effectively reduce the recurrence rate and is a new treatment.

Clinical observation found that patients in the STARR group were with highly satisfied. Similar to all anal surgery, complications such as pain, bleeding, temporary changes in bowel habits, and retention of urine also exist in STARR [16], but the incidence is much lower than in traditional surgery [17]. In this study, the recurrence rate of defecation disorders in the STARR group was 30.00% at 1 year after the surgery, which was higher than that of the TVMR group. Long-term follow-up outside China showed that the immediate effective rate of STARR was 65–83.4% [18,19], but there was no definite conclusion on the long-term effect. In the TVMR group, the most common complication was mesh exposure. According to reports,

the rate of mesh erosion or exposure of the pelvic organ prolapse repair was about 6%, which can directly affect quality of life [19]. The rate of mesh erosion in this study was 21.05%, with less than 3 cm<sup>2</sup> occurring in the anterior wall of the vagina close to the lower part of the incision, which may be associated with poor wound healing in the elderly. Although we used estrogen ointment before the surgery, the incidence of mesh exposure was still higher. For the mesh exposure, estrogen therapy was more useful. If the wound does not quickly heal, surgery to remove part of the mesh will be needed by around 2 months after the surgery.

In recent years, tissue engineering technology has been applied in the clinical repair of missed or damaged tissue. Some researchers have introduced the concept of tissue engineering into pelvic floor reconstruction in females [20]. Although the construction of the mesh used in pelvic floor reconstruction is still in the stage of laboratory research, the results of the present study has shown a good prospect in clinical application. Biologically produced meshes include autologous tissue mesh, allogeneic tissue mesh, and xenogeneic tissue mesh. In theory, biological mesh has higher biocompatibility, but there are no consistent *in vivo* results about its biodegradation and poor mechanical tolerance [21]. Moreover, many literature reviews showed that the biological mesh in pelvic floor reconstruction had no significant advantage over synthetic mesh, and the long-term follow-up did not find significant differences in the quality of life between these 2 kinds of mesh [21]. Further research is needed to determine whether biological mesh can be used for treatment to improve the quality of life for relatively young patients.

## References:

1. Varma M, Gurland B: Constipation and functional bowel disorders. Springer New York, 2014: 535–48
2. Rajindrajith S, Devanarayana N: Constipation in children: novel insight into epidemiology, pathophysiology and management. *J Neurogastroenterol Motil*, 2011; 17(1): 35–47
3. Wadhawan H, Shorthouse AJ, Brown SR: Surgery for obstructed defaecation: Does the use of the Contour device (Trans-STARR) improve results? *Colorectal Dis*, 2010; 12: 885–90
4. Tang H, Wang Z: [30 cases of PPH combined with acupoint injection for the treatment of rectocele constipation.] *Journal of External Therapy of Traditional Chinese Medicine*, 2013; 22: 6–7 [in Chinese]
5. Christodoulou M, Papalois A, Mouzakis D et al: Dynamic mechanical properties of tissue after long-term implantation of collagen and polypropylene meshes in animal models. *Open Journal of Urology*, 2013; 30029: 155–59
6. Philippa S, Roland M: Biomaterials in urinary incontinence and treatment of their complications. *Indian J Urol*, 2010; 26: 221–29
7. Zhang Z, Yang G, Pan D: [Clinical study of laparoscopic stapler transanal rectal resection in the treatment of rectocele.] *Chinese Journal of Gastrointestinal Surgery*, 2012; 15: 523–24
8. Wang Y, Zhao S, Zhai F et al: [Clinical observation of transperineal patch repair in the treatment of rectocele.] *Chinese Journal of Difficult and Complicated Cases*, 2014; 2014-02
9. Arda I, Kemal P, Mehmet S et al: Diagnostic evaluation and treatment of patients with rectus abdominis hematoma. *Cir Esp*, 2015; 93: 580–88
10. Isik A, Peker K, Firat D et al: Importance of metastatic lymph node ratio in non-metastatic, lymph node-invaded colon cancer: A clinical trial. *Med Sci Monit*, 2014; 20: 1369–75
11. Ellis C: Stapled Transanal Rectal Resection (STARR). *J Gastrointest Surg*, 2007; 11: 198–208
12. Hasan H, Hasan H: Stapled transanal rectal resection for the surgical treatment of obstructed defecation syndrome associated with rectocele and rectal intussusception. *Isrn Surgery*, 2012; 2012: 652345
13. Gagliardi G, Pescatori M, Altomare et al: Results, outcome predictors, and complications after stapled transanal rectal resection for obstructed defecation. *Dis Colon Rectum*, 2008; 51: 186–95
14. Feiner B, Gietelink L, Maher C: Anterior vaginal mesh sacrospinous hysteropexy and posterior fascial plication for anterior compartment dominated uterovaginal prolapse. *Int Urogynecol J*, 2010; 21: 203–8
15. Lo TS: One-year outcome of concurrent anterior and posterior transvaginal mesh surgery for treatment of advanced urogenital prolapse: Case series. *J Minim Invasive Gynecol*, 2010; 17: 473–79
16. Hinoul P, Ombelet WU, Burger MP, Roovers JP: A prospective study to evaluate the anatomic and functional outcome of a transobturator mesh kit (prolifix anterior) for symptomatic cystocele repair. *J Minim Invasive Gynecol*, 2008; 15: 615–20
17. Ildikó S, Gábor J, Gergely V et al: [Dilemmas of the reconstruction of the major pelvic artery due to infectious aortic graft complication.] *Magy Seb*, 2015; 68: 12–17 [in Hungarian]

## Conclusions

Our study found that surgical methods for outlet obstruction caused by rectocele were safe, without adverse events. A detailed examination and strict screening of the operative indications before the surgery can prevent the poor efficacy and ensure the curative effect. When conservative treatment is invalid for outlet obstruction constipation caused by rectocele, surgical treatment is needed; for this, TVMR and STARR both obtained almost the same results in improving constipation symptoms and short-term efficacy, as well as decreasing post-operative complications and pain. Compared with STARR, TVMR causes no more surgical trauma, but does lead to complications such as mesh exposure. Although TVMR is more complex with longer operative time and hospitalization, its long-term effect is better than STARR.

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## Conflicts of interest

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18. Shepherd J, Higdon H, Stanford E, Mattox T: Effect of suture selection on the rate of suture or mesh erosion and surgery failure in abdominal sacrocolpopexy. *Female Pelvic Med Reconstr Surg*, 2010; 16: 229–33
19. Siegmann K, Reisenauer C, Speck S et al: Dynamic magnetic resonance imaging for assessment of minimally invasive pelvic floor reconstruction with polypropylene implant. *Eur J Radiol*, 2011; 80: 182–87
20. Christl R, Andreas K, Andreas K et al: Anatomical conditions for pelvic floor reconstruction with polypropylene implant and its application for the treatment of vaginal prolapse. *Eur J Obstet Gynecol Reprod Biol*, 2007; 131(2): 214–25
21. Ulrich D, Edwards S, Alexander D et al: Changes in pelvic organ prolapse mesh mechanical properties following implantation in rats. *Am J Obstet Gynecol*, 2015; 214: 260–61