



ORIGINAL ARTICLE

Outcomes of a modified Bresler procedure for the treatment of rectocele with rectal intussusception

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Abstract

Background: Obstructed defecation syndrome (ODS) is a condition that is frequently caused by rectocele and rectal intussusception. This study aimed to evaluate the effectiveness of a modified Bresler procedure for the treatment of ODS. The outcomes of this modified procedure were compared with the stapled transanal rectal resection (STARR) procedure.

Methods: We performed a retrospective analysis of the clinical data from 76 female patients who presented with ODS between June 2014 and June 2016. The patients were divided into two treatment groups, namely Modified and STARR. Patients in the Modified group ($n = 36$) underwent the modified Bresler procedure, which involved posterior rectal-wall resection using a circular tubular stapler with multilevel purse-string sutures. Patients in the STARR group ($n = 40$) underwent the standard STARR procedure. We analysed post-operative complications, Wexner constipation scores (WCS), rectocele depths, and four-point post-operative satisfaction scales.

Results: Patients in the Modified group exhibited shorter operative times and fewer post-operative complications (both $P < 0.05$). At 12 months post-operatively, both the Modified and STARR groups displayed a significant improvement in the Wexner constipation score and the depth of rectocele. The post-operative WCS for the Modified group were significantly improved compared to those for the STARR group ($P < 0.05$), while there was no significant difference in the rectocele depth between the two groups ($P > 0.05$). Post-operative interviews at post-operative 12 months showed that patients in the Modified group had a better satisfaction ($P = 0.05$).

Conclusions: Our modified procedure may be an effective treatment strategy for patients experiencing ODS caused by rectocele and rectal intussusception, with fewer complications and effective relief of symptoms.

Key words: Bresler procedure; stapled transanal rectal resection; obstructed defecation obstructive constipation; rectocele; rectal intussusception

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Introduction

Constipation is a common disorder that negatively affects the patient's quality of life. A type of constipation, known as obstructed defecation syndrome (ODS), is commonly caused by rectocele and rectal intussusception [1, 2]. Rectocele mainly refers to the anterior protrusion of the rectal wall towards the vagina, although posterior rectoceles have also been reported [3]. Rectal intussusception occurs almost exclusively in women, particularly in those with a history of vaginal delivery [4].

Conservative therapies, such as biofeedback therapy and dietary modifications, are standard first-line treatment options for patients with ODS. Prior studies indicate that biofeedback therapy and dietary changes can successfully improve the symptoms of constipation for >30% of ODS patients [5]. However, patients who fail to respond to conservative treatment strategies require surgical intervention in order to manage the condition [6, 7]. Previous studies have validated the use of surgical techniques for the treatment of symptomatic rectocele, including transanal, transabdominal, transvaginal, and combined approaches [8]. Of these, the transanal approach, which uses a circular stapler, is the most preferred method by colorectal surgeons [9, 10]. Two commonly performed transanal procedures are the Bresler procedure for rectocele [11] and stapled transanal rectal resection (STARR) for rectal intussusception [12, 13]. Specifically, an endoscopic stapler is used to remove the excess anterior mucosa and submucosa. The wound is then closed in order to repair the defect and strengthen the anterior wall of the rectum. In this study, we present the preliminary results of a modified Bresler procedure for the treatment of ODS due to rectocele and rectal intussusception. To perform our modified Bresler procedure, we resected two-thirds of the posterior wall of the rectum using a multilevel semi-purse-string suture. Overall, the modified Bresler procedure presented here provided an easy, safe, and effective method for correcting symptomatic ODS.

Patients and methods

Study subjects

A total of 76 female patients with ODS caused by rectocele and rectal intussusception who underwent surgery at the Second Affiliated Hospital of Zhejiang University School of Medicine were retrospectively enrolled in the study from June 2014 to June 2016. The inclusion criteria were as follows: (i) meeting the Rome III diagnostic criteria for ODS [14]; (ii) requirement of finger assistance or enema for defecation, after attaining a Longo ODS score ≥ 9 [15]; (iii) defecography results revealing rectocele depth >3.0 cm and obvious rectal intussusception; (iv) failure to respond to a minimum 3-month conservative treatment comprising dietary regulation, laxatives, intestinal microecological agents, and biofeedback training; (v) a strong desire to receive surgical treatment, even if the symptoms improved over time with or without treatment; and (vi) colonic transmission test before the surgery excluded colonic slow-transit constipation and colonoscopy excluded colorectal carcinoma and other colorectal diseases, including pelvic-floor dys-synergia, rectal anal stenosis, and inflammatory bowel disease.

The study was reviewed and approved by the Ethics Committee of Scientific Research of the Second Affiliated Hospital of Zhejiang University School of Medicine (#2019-195).

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

Surgical procedure

We performed the modified Bresler procedure on 36 patients (hereafter termed the Modified group), while the remaining 40 patients were subjected to the STARR procedure (hereafter known as the STARR group). Surgical procedures were performed by experienced clinicians who exhibited equivalent levels of operative skills.

For all of the modified Bresler patients, a combined spinal-epidural anaesthesia technique was performed. In order to determine the extent of the rectocele, patients were placed in a jackknife position, their anus was fully dilated, and the rectocele was exposed and subjected to finger palpation. The modified Bresler procedure comprised the following two steps.

Step 1: The operation on the anterior rectal wall was performed as reported by Bresler *et al.* [10]. Briefly, three tissue forceps were used to longitudinally lift the anterior rectal-wall tissue of the rectocele, primarily including the mucosa and submucosa, at a distance of 1.5–7.0 cm above the pectinate line (ranging beyond the upper and lower edges of the rectocele). A 60-mm laparoscopic anastomosis stapler (CEAA.60N, Beijing Panther Healthcare Instrument Co., Ltd) was then used to longitudinally remove the lifted anterior wall tissue of the rectum. The anterior rectal wall was then stapled using titanium staples. Excess tissue was sutured with a 4-0 silk thread and removed from the basilar part. Thereafter, a 2-0 absorbable suture was used to continuously suture the incised and stapled line of the rectum's anterior wall, so that the suture reached the submucosal muscle layer (Figure 1).

Step 2: The posterior wall of the rectum was operated, as follows. A circular anal dilator (Beijing Panther Healthcare Instrument Co., Ltd, FCSSWBE34) was used to loosen the anal canal and fully expose the lower rectum. A tongue depressor was then inserted into the anus at approximately one-third of the circumference of the bowel wall to protect the surgical site of the rectal anterior wall. Three half-purse-string sutures were performed above the dentate line on the posterior wall of the anus. The sutures included the mucosa and the submucosa muscularis, clockwise from the left anterior side (approximately 2 o'clock in the lithotomy position) to the right (approximately 10 o'clock in the lithotomy position) at multiple levels and at 2, 3, and 4 cm, respectively. A stapling instrument was placed above the half-purse-string suture and was then closed when the sutures tightened (Figure 2). The anastomotic site was examined for any active bleeding. In case of bleeding, a 3-0 absorbable suture was used to achieve haemostasis. If protrusions were present on both sides of the staple line, the protruded tissue was sutured and removed from the base (Figure 3). The details of the STARR procedure have been reported previously [16, 17].

Patients fasted on the first day after the operation. Liquid and semi-liquid food were allowed on the second and third days after surgery, respectively. The patient's urinary catheter was removed on the second post-operative day.

Assessment of outcomes

All perioperative data were recorded in detail. Post-operative follow-ups were conducted at 6, 12, and 24 months. Rectocele depth was measured using defecography tests at 6 and 12 months post-operatively. The Wexner constipation scores

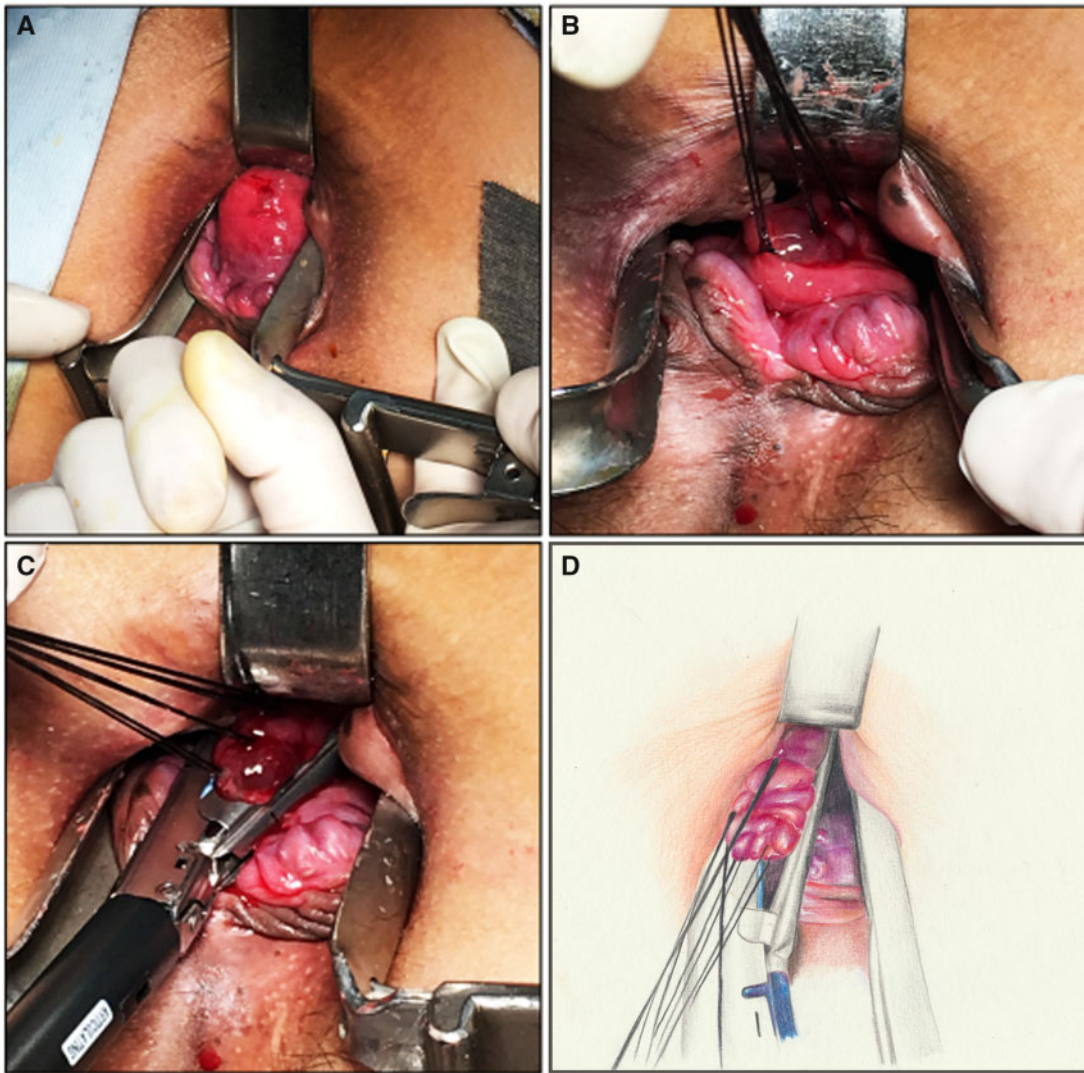


Figure 1. The operation on the anterior wall of the rectum. (A) Operative view of an exposed rectocele. (B) The anterior rectal-wall tissue lifted longitudinally. (C) and (D) Removal of the lifted tissue by anastomosis stapler.

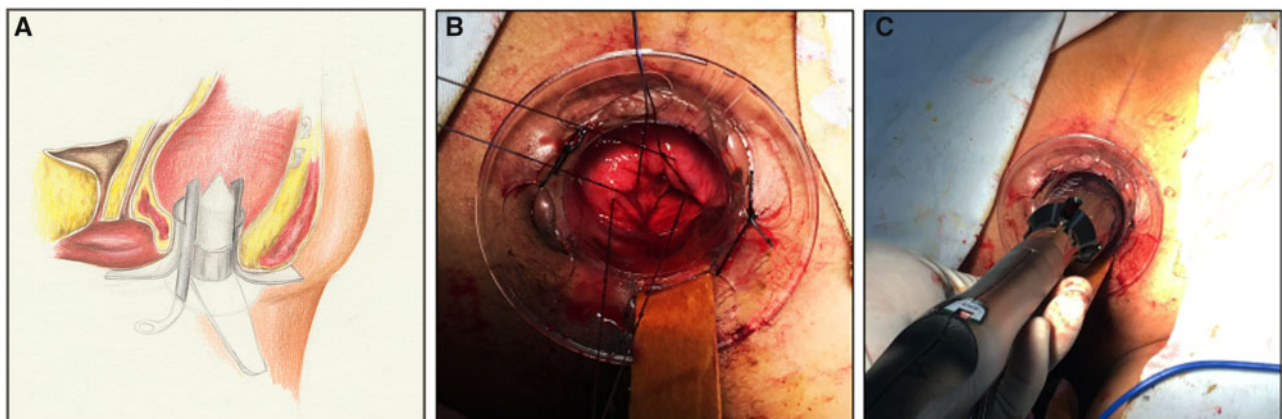


Figure 2. The operation on the posterior wall of the rectum. (A) Hand-drawing. Circular anal dilator exposing the posterior rectal wall. (B) Three half-purse-string sutures were inserted, which included the mucosa and the submucosa-muscularis, clockwise from the left anterior side to the right at 2, 3, and 4 cm above the dentate line. (C) Closure and firing of the stapler when the sutures are tightened.

(WCS) [18] were obtained through analysis of the medical history or via telephone interviews. To minimize bias, patient satisfaction was evaluated in a blinded fashion using a four-point satisfaction scale as follows: grade 1, excellent or very good with practically no defecatory problems; grade 2, good with occasional, insignificant defecatory problems; grade 3, sufficient with several defecatory problems somehow affecting the quality of life; and grade 4, poor with severe defecatory problems significantly affecting quality of life [19].

Statistical analysis

The data were analysed using SPSS 22.0 software (SPSS Inc., Chicago, IL, USA). Quantitative data were recorded as mean \pm standard deviation (SD) or median (range). The preoperative and post-operative results were analysed using a paired t-test. A Mann-Whitney U test was also used to compare the differences among the post-operative satisfaction indices. A chi-square test was used for qualitative variables, where indicated. Values were considered statistically significant when the *P*-value was less than 0.05.

Results

Baseline characteristics

Analyses of baseline data from 76 female patients, who were enrolled in the study from June 2014 to June 2016, revealed no significant differences between the Modified and STARR groups (Table 1).

Perioperative outcomes

Transanal operations (modified Bresler or STARR) were successfully performed for all patients enrolled in the study. The Modified group had a shorter operative time compared to the STARR group (30.2 ± 4.8 vs 35.1 ± 4.2 minutes, $P < 0.001$; Table 2). There was no significant difference in intraoperative blood loss between the two groups ($P = 0.816$). The incidence of post-operative analgesia was 16.7% in the Modified group and 27.5% in the STARR group ($P = 0.258$). No post-operative complications were observed in the Modified group, while six patients in the STARR group developed post-operative complications, including rectal stenosis ($n = 3$), dyspareunia ($n = 2$), and staple granu-
loma formation ($n = 1$). In addition, comparison of the two

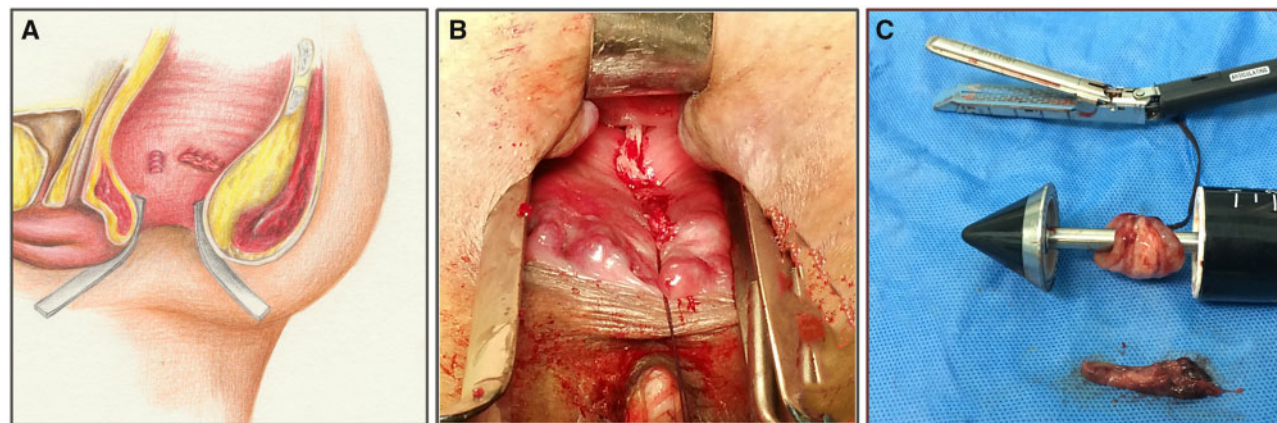


Figure 3. Post-operative incision of the modified Bresler procedure. (A) Hand-drawing. The longitudinal incision of the anterior rectal wall and the lateral incision of the posterior rectal wall. (B) The incision of the rectal wall. (C) The resected specimen.

Table 1. Comparisons of baseline characteristics between the Modified and STARR groups

Variable	Modified group (n = 36)	STARR group (n = 40)	P-value
Age, years	52 (35–75)	51 (32–74)	0.739
Sex	All female	All female	–
Disease duration, years	10 (7–35)	10 (4–32)	0.977
Reproductive history/vaginal delivery	24 (66.7)	30 (75.0)	0.424
Perineal descent	19 (52.8)	24 (60.0)	0.526
Defecation pain index	4 (2–6)	4 (3–6)	0.930

Values are presented as median (range) or n (%).

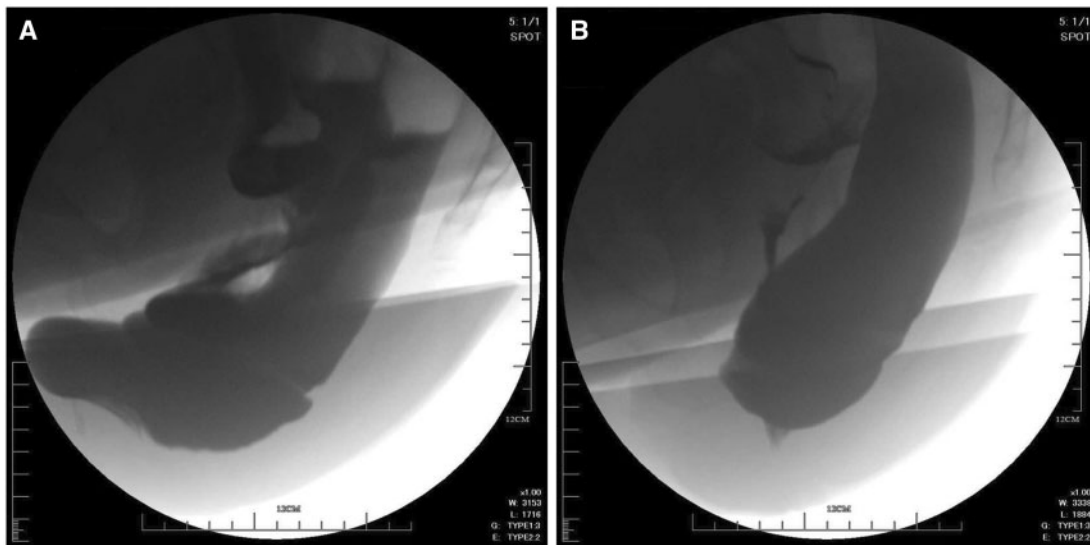
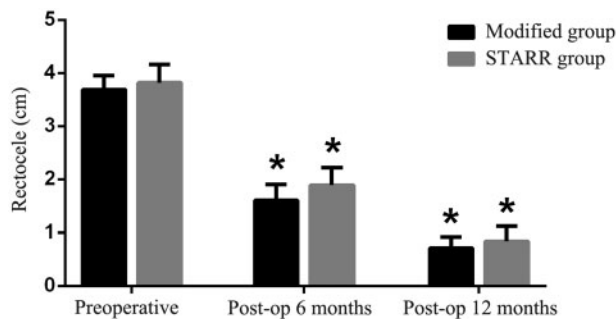
Table 2. Comparisons of perioperative outcomes between the Modified and STARR groups

Variable	Modified group (n = 36)	STARR group (n = 40)	P-value
Operative time, min	30.2 ± 4.8	35.1 ± 4.2	<0.001
Blood loss in operation, ml	18.3 ± 3.0	18.0 ± 7.2	0.816
Post-operative analgesia	6 (16.7)	11 (36.7)	0.258
Post-operative complication	0 (0.0)	6 (27.5)	0.046
Post-operative hospital stay	7.4 ± 1.5	7.1 ± 1.3	0.353

Values are presented as mean \pm standard deviation or n (%).

Table 3. Wexner constipation scores (mean \pm SD) before and 12 months after surgery

Sign/symptom	Modified group		STARR group	
	Preoperative	Post-operative	Preoperative	Post-operative
Frequency	0.97 \pm 0.62	0.08 \pm 0.28	1.13 \pm 0.41	0.16 \pm 0.35
Difficulty	3.78 \pm 0.43	1.05 \pm 0.33	3.90 \pm 0.34	1.40 \pm 0.27
Completeness	3.47 \pm 0.50	1.46 \pm 0.55	3.01 \pm 0.62	2.32 \pm 0.31
Pain	2.58 \pm 0.55	2.05 \pm 0.41	2.79 \pm 0.73	1.68 \pm 0.74
Time	3.56 \pm 0.49	0.88 \pm 0.53	3.30 \pm 0.58	1.33 \pm 0.36
Assistance	1.56 \pm 0.52	0.17 \pm 0.37	2.06 \pm 0.70	0.38 \pm 0.41
Failure	1.64 \pm 0.48	0.36 \pm 0.48	2.13 \pm 0.36	0.47 \pm 0.52
History	1.67 \pm 0.71	1.67 \pm 0.71	1.29 \pm 0.44	1.29 \pm 0.46
Total score	18.27 \pm 1.58	6.42 \pm 1.27	18.82 \pm 1.32	8.32 \pm 1.53

**Figure 4.** The results of defecography. (A) Preoperative defecography showing a large anterior rectocele. (B) The large rectocele was resolved after the modified Bresler procedure.**Figure 5.** Rectocele depth before and after surgery. * $P < 0.05$ vs preoperative measurement.

groups indicated no significant difference in the length of post-operative hospitalization ($P = 0.353$).

Follow-up outcomes

For both groups, the WCS at 12 months post-operatively were significantly improved compared to the preoperative scores. Furthermore, we observed a significant improvement in post-operative WCS in the Modified group compared to the STARR group (6.42 ± 1.27 vs 8.32 ± 1.53 , $P < 0.01$; Table 3).

Post-operative defecography tests were performed for all patients. For 13 patients in the Modified group, the rectocele disappeared completely (Figure 4). A significant decrease in rectocele depth after surgery in both the Modified group (3.68 ± 0.26 cm before surgery vs 1.60 ± 0.30 cm at 6 months post-operatively vs 0.71 ± 0.21 cm at 12 months post-operatively) and the STARR group (3.73 ± 0.24 cm before surgery vs 1.89 ± 0.33 cm at 6 months vs 0.84 ± 0.28 cm at 12 months). No differences were observed with respect to the depth of rectocele at 6 and 12 months post-operatively between the two groups ($P > 0.05$; Figure 5).

Patient satisfaction increased in both the Modified and STARR groups at 12 months post-operatively compared to that noted at 6 months post-operatively. Similarly, increased satisfaction in both groups was noted at 24 months post-operatively compared to that noted at 12 months post-operatively. Notably, at 12 months post-operatively, the patients who underwent the modified Bresler procedure reported better satisfaction than those who underwent the STARR procedure (Figure 6).

Discussion

Constipation is frequently diagnosed in anorectal clinical practice, with ODS representing a common type of constipation.

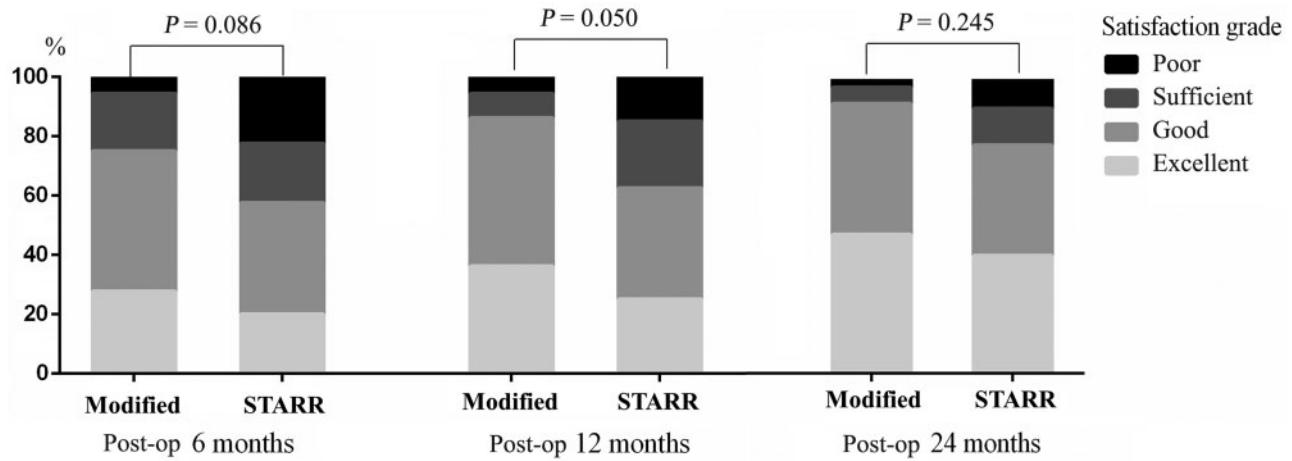


Figure 6. The grade of patient satisfaction with the two procedures at post-operative interviews.

Various causes of ODS, including spastic pelvic floor syndrome, rectal anal stenosis, rectal anal inflammation, anxiety, and depression have been described. Apart from these, anatomical abnormalities, such as rectocele and rectal intussusception, are also important pathological factors during the progression of ODS in female patients [20].

In the past, treatment of rectocele and rectal intussusception involved application of the STARR procedure [21], which utilizes two PPH staplers to remove the whole layers of the anterior and posterior walls of the rectum lesion via two steps. The STARR procedure has been shown to effectively rebuild rectal volume by resection of the prolapsed tissue [12]. Particularly, it eliminates the mechanical obstruction of defecation, reduces the volume of the rectum, improves the compliance of the rectum, and provides a reasonable and effective treatment standard for ODS patients. Furthermore, results from randomized, controlled trials indicate that the therapeutic efficacy of STARR is significantly better than that of biofeedback training [12]. However, this approach is associated with fatal complications, such as anal incontinence, rectal perforation, extra-rectal haemorrhaging or formation of a large hematoma, and rectal vaginal fistula [22, 23]. Another limitation with STARR is that the procedure was designed for transverse resection, which limits the extent of longitudinal resection to the anterior wall [24]. Some long-term follow-up studies revealed a gradual increase in the ODS scores of patients who underwent the STARR procedure after operation, indicating that recurrence may occur [25]. Consequently, STARR is not the gold-standard operation for severe or large longitudinal rectoceles.

The Bresler procedure—a transrectal anterior wall repair and rectal mucosal fixation surgery developed in 1993—has proven effective for the treatment of rectocele [12]. This procedure strengthens the anterior rectal wall through the use of an anastomosis stapler. Although the Bresler procedure is simple, it is limited by issues, such as insufficient tissue removal, inability to manage the prolapsed rectal mucosa, and rectal prolapse [23]. Various viewpoints suggest that this procedure should be used for treating rectocele or ODS caused by rectocele with rectal prolapse, whereas STARR should be performed for rectal prolapse or ODS caused by rectal prolapse with rectocele [26, 27]. Therefore, it is possible that a combination of the STARR and Bresler procedures may achieve better outcomes for patients with rectocele accompanied by rectal mucosal prolapse.

In our previous study, we developed a relatively simple procedure for treating rectocele accompanied by rectal mucosal prolapse [28]. Although both the Bresler and STARR procedures show good efficacy, most of the hospitalized patients in our hospital choose the modified Bresler procedure due to its lower medical costs. During the operation, we designed this surgical procedure to remove prolapsed rectal mucosa from the rectal posterior wall (approximately two-thirds of the circumference of the bowel wall) via transverse resection and closure using STARR. This process was then followed by removal of the longitudinal prolapsed rectal mucosa of the anterior wall (two-thirds of the circumference of the bowel wall) using the Bresler procedure. The rectum was narrowed and fixed in both longitudinal and transverse directions, while the surgical incision was shaped like a ‘railway-crossing sign’.

In the current study, we found no significant difference in blood loss or length of hospital stay between the two groups, indicating that the two procedures (STARR and modified Bresler) have similar levels of surgical trauma and impacts on patient recovery. However, the operative time was shorter in the Modified group than that in the STARR group. During surgery, we used a 30-mm endoscopic linear stapler, contrary to what has been used before in which three cartridges are usually required for the Bresler procedure [29]. Qian *et al.* modified this procedure by using a 45-mm linear cutting stapler with two staple cartridges [19]. The shorter operative time in our study may be due to the use of a 60-mm laparoscopic cutting stapler with six rows of staples. This device saves time because there is no need to change the staple cartridge, which can cut more rectal anterior wall tissue, and also reduce the risk of local bleeding. The most common post-operative complaint after the two procedures was anal pain, which could be relieved by intramuscular injection of tramadol. We found no post-operative complications in the Modified group. However, in the STARR group, six patients developed post-operative complications including rectal stenosis, dyspareunia, and staple granuloma formation. Therefore, the modified Bresler procedure may pose a safer alternative to STARR alone. STARR was designed for transverse resection, which carries the risk of rectal stenosis and might cause a sequela of anal pain in some patients. In the clinic, rectocele is often accompanied by rectal mucosal prolapse [16] and, when both conditions are severe, a single method might not achieve good remission.

Based on surgical principles, the canonical Bresler procedure removes the excess anterior rectal wall longitudinally, although part of the posterior rectal wall cannot be removed. On the other hand, the STARR procedure only excises redundant tissue without reinforcing the defect. Therefore, STARR is an ineffective method for rectifying large rectoceles [30]. Our modified Bresler procedure, which is a combination of both the canonical Bresler and STARR procedures, achieved better outcomes for rectocele accompanied by rectal mucosal prolapse. Our analysis indicated no significant differences in the rectocele depth between the two groups after operation. However, the post-operative WCS of the Modified group were significantly improved compared to the STARR group. The modified procedure simultaneously treated rectal intussusception and rectocele, as well as narrowing the rectal mucosa in addition to reducing the laterally enlarged rectal ampulla. In addition, it led to a reduction in rectal volume and improved rectal compliance. The Modified group seemed to have better patient satisfaction compared to the STARR group. At 24 months after the operation, 91.6% of patients from the Modified group felt satisfied with the procedure.

Despite the success attained in correcting the rectocele for our ODS patients, the following precautions should be taken during surgery. First, the lower edge of the resected mucosa should be located approximately 1.5 cm above the dentate line in the anorectal ring. If the resected edge is too low, it is easy to damage the anal internal sphincter, thereby compromising the function of the anus and causing obvious post-operative pain. In addition, the upper edge of the resected mucosa should be beyond the folded or prolapsed rectal anterior wall mucosa. The second precaution that should be taken is that, before firing the laparoscopic cutting stapler, the stapler head and sides must not be in contact with any part of the rectal wall that does not require removal. Additionally, care should be taken to protect the posterior wall of the vagina. A routine examination of the posterior wall of the vagina should be performed to prevent it from being embedded in the cutting stapler. Finally, using a continuous locked suture, we employed the 'pagoda-shaped' suture pattern (starting at the distal end) to close the rectal cutting line. The width of this suture pattern gradually increased. Attention should be given to the depth of the suturing, which should reach the submucosal muscle layer but not perforate the posterior vaginal walls. Overall, this procedure further improves the repair of the rectal surgical site and avoids post-operative rectal vaginal fistula.

Optimal surgical treatment for ODS caused by rectocele and rectal intussusception remains controversial. In this study, we demonstrate a simplified transanal technique by modifying the Bresler procedure. This surgical procedure is minimally invasive and safe, with fewer complications and effective relief of symptoms in patients with rectocele and rectal intussusception. In the future, randomized controlled trials with long-term follow-up are required to confirm the advantages of this procedure.

Authors' contributions

Design of the study: Q.D., Z.Y.L., and J.W.W. Acquisition of data: K.L.Y., Y.H.W., Z.S., and Y.M.S. Analysis and interpretation of data: Q.D., X.P.X., and K.L.Y. Drafting of the article: K.L.Y., C.J.W., and J.W.W. All authors read and approved the final submitted version.

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None.

Conflicts of interest

None declared.

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