

Short-term results after STARR versus internal Delorme for obstructed defecation: a non-randomized prospective study

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Abstract Obstructed defecation syndrome due to internal intussusception and rectocele is a common disease, and various transanal surgical techniques have been proposed. Aim of the present study was to compare the internal Delorme (ID) and the stapled transanal rectal resection (STARR) results in the treatment of patients with obstructed defecation syndrome. From September 2011 to May 2012, 23 patients were operated with STARR procedure and 12 patients with Delorme's procedure for obstructed defecation syndrome. All patients underwent preoperative assessment: clinical evaluation (Altomare ODS score, Wexner constipation scoring system), proctoscopy, defecography, anorectal manometry and endoanal ultrasonography. Surgery was proposed with: failure of medical therapy, incomplete defecation, and unsuccessful attempts with long periods spent in bathroom, defecation with digital assistance, use of enemas and defecography findings of rectoanal intussusception and rectocele. The average operative time was 28 min (range 15–65) for the STARR group and 56 min (range 28–96) for the ID group with a mean hospital stay of 2 days for both the procedures. The Wexner score significantly fell postoperatively from 17 to 4, 7 in STARR group and from 15.3 to 3.3 in the ID group. The Altomare score postoperatively fell from 18.2 to 5.5 for STARR group and from 16.5 to 5.3 for ID group. No statistically significant differences were observed

between the two procedures considering the outcomes parameters and the complications. Both ID and STARR procedure seem to be effective in the treatment of ODS.

Keywords Obstructed defecation · Internal delorme · STARR, transanal rectal resection · Constipation

Introduction

Constipation is a symptom and not a disease and represents a subjective interpretation of a real or imaginary disorder of the bowel function [1]. The prevalence of constipation in the western society is between 2 and 27 % [2, 3]. The real incidence of obstructed defecation syndrome in the constipated population is not completely clear and probably underestimated, due to its unspecific symptoms: incomplete evacuation, need of digital support, excessive straining during defecation and use of laxatives or enemas [4]. The disorder is complex and often multifactorial [5, 6]. Dyssynergia of the pelvic muscles may contribute to the functional form of ODS, whereas a low rectal redundancy, such as an anterior rectocele and/or intussusception of the rectal wall extending into the anal canal represents morphologic alterations causing ODS.

Many different surgical techniques to correct ODS have been described in the literature, with important limitations and different patterns of postoperative complications [7]. The stapled transanal rectal resection (STARR) procedure is a surgical technique introduced to treat ODS due to rectocele and rectal intussusceptions and it has been demonstrated to be safe and effective [8, 9]. Nevertheless, in elderly patients with weak sphincters, internal Delorme's (ID) procedure can be performed as it results in a low recurrence and a better anal continence [10].

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The purpose of our study was to compare the outcome between the two different surgical techniques using the Wexner score for constipation and incontinence, the Altomare ODS score, the Visual Analog Scale Score (VAS) for postoperative pain, the functional results and the global satisfaction index of the patients.

Materials and methods

From September 2011 to May 2012, data about 35 consecutive patients affected by ODS and treated in the Section of Coloproctology and Perineal Surgery of Cisanello Hospital in Pisa were prospectively evaluated. Preoperatively, all patients underwent clinical evaluation, proctoscopy, defecography, anorectal manometry, and endoanal ultrasonography. In all women, the obstetric and gynaecologic history was investigated as well as previous anal or abdominal surgery. A colonoscopy was performed when inflammatory or malignant diseases were suspected. Altomare ODS score [11] was preoperatively and postoperatively filled in by all patients. The Agachan–Wexner scoring system [12, 13] was used to evaluate both incontinence and constipation preoperatively and postoperatively. All the patients filled the questionnaires preoperatively and during every follow-up evaluation. The score found at the last visit was used to compare the postoperative symptoms with the preoperative disorders.

The patients were treated with a standard protocol for pain control with intramuscular Ketorolac 30 mg after surgery and with oral Ibuprofen 600 mg for 3 days when discharged from hospital. Those patients, who were intolerant or had a higher threshold of pain, were administered Paracetamol 500 mg and Codeine Phosphate 30 mg.

The satisfaction of the patients was evaluated by asking them about their subjective feeling after surgery whether they considered themselves improved, unchanged or worsened.

The clinical outcomes were defined as excellent with a postoperative ODS score between 0 and 3, as good with a score between 4 and 6, as adequate with a score between 7 and 9 and as poor with a score between 10 and 20. We considered a procedure as clinically successful when excellent, good and adequate results were achieved comparing them with the preoperative distribution of the two groups of patients according to the obstructed defecation syndrome score.

Median follow-up was 15 (range 10–21) months and postoperative follow-up was performed at 7–15, 30 days, 3 and 6 months.

The difference between pre and post-treatment data was analyzed by a student *T* test. A statistically significant association between treatment and response was observed using Fisher's exact test. The difference was considered statistically significant for *p* values <0.05.

Indications for surgery: the patients selected for surgery were those with a failure of 6 months medical therapy (1.5 L/day of water, high-fiber diet, lactulose 10 g/day) with the persistence of at least three of the following symptoms: feeling of incomplete evacuation, painful effort, unsuccessful attempts with long periods spent in bathroom, defecation with the use of perineal support and/or odd posture, digital assistance, evacuation obtained only using enemas; and at least two of the following findings at defecography: rectoanal intussusception extending 10 mm into the anal canal, rectocele deeper than 3 cm on straining, entrapping barium contrast after defecation and an Altomare Ods score ≥ 12 .

Anorectal manometry was performed to exclude disorders concerning rectal sensitivity and alteration concerning the perineal dynamic.

Endoanal ultrasonography was performed to exclude the presence of anal sphincter injuries according to Starck classification score from 1 to 4 for sphincter defects [14].

Patients with non-relaxing puborectalis muscle at defecography, with genital prolapse or cystocele requiring associated transvaginal operations, fecal incontinence, mental disorders or general contraindications to surgery were excluded. Patients with pelvic floor dyssynergia were treated with pelvic floor training.

The ID procedure was mainly considered for patients with a supposed higher risk of postoperative incontinence related to clinical evaluation and manometrical and ultrasonographical results, without circumferential prolapse that needs to be carefully inspected before resection.

Surgical techniques

Surgery was performed by a single experienced surgeon (GN).

STARR procedure was performed according to the previously described standard technique [7].

All removed tissues were sent to histologic examination. Finally, an easy-flow-drainage is placed in the anus as an indicator of bleeding and removed after 24 h.

The Delorme's procedure was first described in 1900 as a technique to correct overt rectal prolapse [15]. It has since been used extensively for the treatment of both complete rectal prolapse and rectal outlet obstruction secondary to internal rectal prolapse.

Preoperatively, the patients were given a cleansing enema and they received a routine antibiotic prophylaxis with intravenous Metronidazole 500 mg and Cefamezin 1 g, 30 min before surgery. The patients were positioned in a prone jackknife position after receiving general anesthesia. We usually performed a mucosectomy of the prolapsed rectum with vertical plication sutures placed in the muscle using the Epo Flier kit (Sapi Med S.p.A.,

Alessandria, Italy). Briefly, the procedure starts with gentle dilatation of the anus and insertion of the circular anal dilator, which is then fixed to the perineum with four sutures. A circumferential incision in the rectal mucosa is made approximately 2 cm proximal to the dentate line. Mucosectomy is then carried out proximally for a distance of 8–15 cm according to the length of the rectal intussusceptions or rectal prolapse. Vertical plication sutures of 2–0 vicryl stitches were then placed in the muscle, starting at the proximal extent of the mucosectomy, dividing the anal circumference into 4 quadrants (3 o'clock position–6 o'clock–9 o'clock–12 o'clock). Sutures ended at the distal edge of the mucosa above the dentate line. Excess mucosa was amputated, and a mucosal anastomosis was completed with 2–0 vicryl.

Results

Thirty-five consecutive patients were enrolled in the present study. Twenty-three patients underwent STARR procedure using double PPH-01 stapler (4 men: median age 51 years old and 19 women: median age 53 years old; range 26–87) and 12 patients underwent internal Delorme's procedure (2 men: median age 56.5 years old and 10 women: median age 58.8 years old; range 31–91).

The mean operative time of the STARR group and ID group were 28 and 56 min, respectively ($p = 0.0001$). The mean hospital stay was 2 days for both the procedures.

The mean preoperative Wexner score (CCCS) was 17 for STARR group and 15.3 for ID group with a mean postoperative score of 4.7 and 3.3, respectively.

The mean preoperative Altomare ODS score was 18.2 for STARR group and 16.5 for ID group with a mean postoperative score of 5.5 and 5.3, respectively (Table 1). Although the ID procedure was considered for patients with a supposed higher risk of postoperative incontinence related to clinical evaluation and manometrical and ultrasonographical results, the two groups were considered homogeneous in terms of age, gender, duration of symptoms, preoperative ODS scores and preoperative incontinence score.

The preoperative distribution of the patients is reported in Table 2.

Patients selected for ID had a significant lower ODS scores compared to the STARR group ($p 0.02$).

The postoperative pain was evaluated after 1, 3 and 6 months using the Visual Analog Scale Score (VAS). No statistically significant differences were observed about pain values between the two groups.

Clinical and subjective outcomes are reported in Table 3.

Table 1 Clinical data of the two groups

	STARR	Internal Delorme	<i>p</i> value
Patients	23	12	
Females	19 (82 %)	8 (80 %)	0.4
Median age	52.6	58.4	0.07
Mean duration of symptoms (months)	23.1	24.7	0.9
Mean operative time (min)	28	56	0.0001
Mean preoperative Wexner score	17	15.3	0.45
Mean postoperative Wexner score	4.7	3.3	0.12
Mean preoperative Altomare's Ods score	18.2	16.5	0.56
Mean postoperative Altomare's Ods score	5.5	5.3	0.87

Bold value indicates statistical significance

Table 2 Preoperative distribution of 35 patients according to Altomare ODS score

	STARR (%)	Internal Delorme (%)	<i>p</i> value
Score 12–14	6 (26)	8 (66.6)	0.02
Score 15–17	5 (21.7)	1 (8.3)	0.3
Score 18–20	6 (26)	0	0.079
Score >20	6 (26)	3 (25)	0.9

Bold value indicates statistical significance

Table 3 Subjective satisfaction of the patients

	STARR (%)	Internal Delorme (%)	<i>p</i> value
Improved	20 (87)	11 (91.6)	0.88
Unchanged	1 (4.3)	0	0.73
Worsened	2 (8.7)	1 (8.3)	0.54

Complications

The early and the late complications are reported in Table 4.

In the STARR group, the early complications were an asymptomatic rectal stenosis, within a month, in one patient (4.3 %). Moreover, in one patient bleeding due to fecal impaction occurred (8.6 %), within a week; in another patient only a fecal impaction occurred (4.3 %) on the fourth postoperative day.

Regarding incontinence to flatus and stools the Wexner Incontinence score was calculated in all the patients after 1, 3 and 6 months from surgery. Some form of postoperative alteration of the continence were reported in 11 patients (47.8 %) with the following results:

Table 4 Complications

	STARR 1 month (%)	ID 1 month (%)	<i>p</i>	STARR 6 months	ID 6 months	<i>p</i>
Incontinence to flatus	2 (8.6)	2 (16.6)	0.5	0	0	1
Incontinence to liquid and flatus	2 (8.6)	2 (16.6)	0.5	0	1 (8.3 %)	0.3
Incontinence to liquid stools	1 (4.3)	0	1	0	0	1
Urge to defecate	11 (47.8)	7 (58)	0.7	3 (13 %)	1 (8.3 %)	1
Rectal stenosis	1 (4)	1 (8.3)	1	0	0	1
Bleeding	1 (4)	0	1	0	0	1
Fecaloma	2 (8)	1 (8.3)	1	0	0	1

1. Transient incontinence to flatus in two patients (8.6 %) (Score = 2) spontaneously solved in the first month.
2. Transient incontinence to liquid stools and flatus in two patients (8.6 %) (Score = 8) with a decrease of the score to 4 after 3 months and relief of the symptom after 6 months (Score = 0).
3. Transient Incontinence to liquid stools in one patient (4.3 %) (Score = 6) with a decrease of the score to 3 within 3 months and relief of the symptom after 6 months. These 5 patients complained about the urge to defecate symptom within 4 months after surgery.
4. Urge to defecate was reported in six more patients with an improvement of the symptoms after 3 months in five patients and persisting symptoms only in one patient.

Three patients (13 %), who had persisting symptoms after 6 months, underwent biofeedback therapy.

In the internal Delorme group, the early complications were an inflammatory rectal stenosis in one patient (8.3 %), within a month after surgery, who was treated with topic Beclomethasone dipropionate 3 mg and Mesalazine 400 mg and a fecaloma on the thirteenth postoperative day, in another patient (8.3 %), who was treated with enemas.

Some postoperative alteration of the continence was reported in 7 patients (58.3 %).

The transient incontinence to flatus occurred in two patients (16.6 %) within 2 months after surgery, with relief of the symptom in the further examinations.

The transient incontinence to liquid stools and flatus (16.6 %) (Score = 11) occurred in two patients within a month after surgery, with relief of the symptoms after 3 months (Score = 5) and after 6 months (Score = 2) in one patient and complete recovery in the other patient.

Three out of the above mentioned four patients complained of the urge to defecate symptom. The same symptom occurred in four other patients with an improvement within 3 months in five patients (41.6 %) and persisting symptoms after 6 months only in one patient (8.3 %) who underwent biofeedback therapy.

Discussion

The surgical treatment of ODS for rectal intussusception and rectal prolapse includes various surgical techniques such as abdominal, perineal and transanal procedures. Delorme's procedure has since been used extensively for the treatment of both complete rectal prolapse and obstruction defecation syndrome secondary to internal rectal prolapse [16]. According to some authors, this procedure seems the best choice especially for elderly and obese patients with disease in multiple systems or for young adult males in whom an abdominal rectopexy can threaten sexual potency by damaging pelvic or hypogastric nerves [17, 18]. On the other hand, internal Delorme's procedure is not recommended for patients suffering from diarrhea or incontinence associated with intussusception or prolapse, because they seem better candidates for trans-abdominal mesh fixation [16].

The literature also describes that Delorme's procedure may be indicated as emergency surgery for strangulated rectal prolapse with satisfactory results [19].

The twelve patients in our series who underwent this procedure suffered from ODS associated with rectal intussusception and internal rectal prolapse.

In our series patients selected for ID had a significant lower ODS scores compared to the STARR group, suggesting that ID was proposed to patients with less functional symptoms.

The early postoperative complications such as incontinence to flatus, incontinence to liquid stools and urge to defecate, were transient (within 2 months), with the persistence of the urge to defecate symptom in only one patient after more than 6 months (8.3 %).

The STARR procedure allows to correct rectal intussusception rectocele and hemorrhoidal prolapse providing a resection which includes mucosa, submucosa and rectal muscle wall. Nevertheless, the literature describes several complications such as rectovaginal fistula or pelvic sepsis due to this surgical technique [20]. Urge to defecate (47 % in our series) and flatus incontinence, even if generally transient, represented a significant problem for most of the

affected patients. The fecal urgency and incontinence to flatus and liquid stools, after transanal surgery or stapler use, could be caused by the anatomic readaptation of the lower rectal reservoir induced by the stapled rectal wall resection which can transiently modify anal and rectal sensitivity [7].

Of the 3 patients (13 %) who complained about fecal urgency, 6 months after STARR procedure, two were recommended to undergo biofeedback therapy and one to practice perineal contractions.

The biofeedback therapy after anorectal surgery has not been studied on a larger scale but only reported as isolated experience. Several rehabilitative treatments have been combined to address the persisting symptoms of obstructed defecation syndrome after STARR procedure [21, 22], or transanal surgery for hemorrhoids and rectal prolapse [23].

Many studies confirm that STARR is effective especially in a shorter time period (<20 months), with a high satisfaction of the patients [24].

In a recent study, Regenet et al. [25] reported an incidence of 93 % of excellent and good results in 30 patients, with only one urge to defecate symptom incidence of 20 %, two bleeding symptoms and one rectal stenosis. Patel et al. [26] reported on 37 patients who underwent STARR procedure for ODS, with an important improvement of symptoms, a high satisfaction and an acceptable complication rate.

In a recent series, Ommer et al. [27] claimed a 90 % improvement of the symptoms in all the patients, with only an urge to defecate incidence of 21 % and one case of postoperative chronic pain.

Renzi et al. [28] reported a success of 89 %, 6 months after STARR procedure, with only an urge to defecate incidence of 4.4 and 2.9 % of bleeding.

Chronic pain after STARR has been described in literature [29] and the hypothesized mechanisms are a too-low staple line, perianastomotic fibrosis, and high levels of anxiety. Pain after STARR may respond to oral nifedipine, which was not used in this study [30].

As STARR procedure, in contrast to internal Delorme's procedure, requires a total rectal resection, it may cause several complications. Pescatori et al. [31] reported one case of rectovaginal fistula after STARR. In another study, Binda et al. [32] reported a bleeding incidence of 15 %, incontinence to flatus of 11 % and a recurrence of the symptoms of 33 % out of 37 patients who underwent STARR procedure within 4 years.

Some concerns still remain about long-term result of STARR procedure mostly considering recurrences [33], however, only few studies have indicated the value of ID in the treatment of obstructive diseases and in general study

quality and evidence level are low, and no data about long-term result are provided [34].

Moreover, the recurrence rate of internal rectal prolapse seems to be unaffected by the type of operation, being 53 % after manual techniques and 48 % after stapled or combined (manual + stapled) procedures [35].

A careful reading of the articles which criticize STARR may indicate that the patients were not carefully selected because they were affected by anismus, sphincter injuries, pudendal neuropathy or slow transit constipation syndrome, and also psychological assessment should not be underestimated [21]. In fact, the negative prognostic factor of psychological illness is well documented for both the procedures [21, 35, 36].

The longer operative time for ID could be explained with the longer time spent for manual anastomosis.

Despite the lack of evidences about the Internal Delorme's procedure, we believe that it could be a viable option for the treatment of ODS caused by internal rectal prolapse in patients, especially elderly, who may encounter a lower sphincter compliance if operated with STARR procedure. Moreover, the ID procedure is cheaper than STARR because the cost of the device was eliminated (300–700 Euros in Italy), suggesting its potential role in the financial planning of the surgical activity of many institutions.

However, the lack of statistically significant differences between the two surgical approaches does not allow to identify clear benefits or contraindications of a technique over the other and suggesting that the surgeon experience should play an essential role in the surgical outcome.

Conclusions

In our experience, the surgical treatment of obstructed defecation syndrome by transanal approach with internal Delorme or STARR procedure seem to be satisfactory, with comparable short-term result. Moreover, also the subjective satisfaction rate of the two groups of patients was high. Internal Delorme should be considered for patients with high risk of postoperative continence alteration.

Despite the short follow-up period, both the results and the complications rate seem to be good if the patients are well selected and operated on by experienced colorectal surgeons.

Further studies are required with larger number of patients and longer follow-up to evaluate the recurrence rate.

Conflict of interest No conflict of interest to be disclosed.

References

1. Arce DA, Ermocilla CA, Costa H (2002) Evaluation of constipation. *Am Fam Phys* 65:2283–2290
2. Stewart WF, Libermann JN, Sandler RS (1999) Epidemiology of constipation (EPOC) study in the United States: relation of clinical subtypes to sociodemographic features. *Am J Gastroenterol* 94:3530–3540
3. Pare P, Ferrazzi S, Thompson WG, Irvine EJ, Rance L (2001) An epidemiological survey of constipation in Canada: definitions, rates, demographics, and predictors of health care seeking. *Am J Gastroenterol* 96:3130–3137
4. Dindo D, Weishaupt D, Lehmann K, Hetzer FH, Clavien PA, Hahnloser D (2008) Clinical and morphologic correlation after stapled transanal rectal resection for obstructed defecation syndrome. *Dis Colon Rectum* 51:1768–1774
5. D'Hoore A, Penninckx F (2003) Obstructed defecation. *Colorectal Dis* 5:280–287
6. Lembo A, Camilleri M (2003) Chronic constipation. *N Engl J Med* 349:1360–1368
7. Boccasanta P, Venturi M, Stuto A, Bottini C, Caviglia A, Carriero A, Mascagnin D, Mauri R, Sofo L, Landolfi V (2004) Stapled transanal rectal resection for outlet obstruction: a prospective multicenter trial. *Dis Colon Rectum* 47:1285–1296
8. Longo A (2003) Obstructed defecation because of rectal pathologies. Novel surgical treatment: stapled transanal rectal resection (STARR). In: *Acts of 14th international colorectal disease symposium*. Fort Lauderdale, FL, 2003
9. Lehur PA, Stuto A, Fantoli M, Villani RD, Queralto M, Lazorthes F, Hershman M, Carriero A, Pigot F, Meurette G, Narisetty P, Villet R (2008) Outcomes of stapled transanal rectal resection vs. biofeedback for the treatment of outlet obstruction associated with rectal intussusception and rectocele: a multicenter, randomized, control trial. *Dis Colon Rectum* 51:1611–1618
10. Lechaux JP, Lechaux D, Perez M (1995) Results of Delorme's procedure for rectal prolapse. Advantages of a modified technique. *Dis Colon Rectum* 38:301–307
11. Altomare DF, Spazzafumo L, Rinaldi M, Dodi G, Ghiselli R, Piloni V (2007) Set-up and statistical validation of a new scoring system for obstructed defaecation syndrome. *Colorectal Dis* 10:84–88
12. Jorge JM, Wexner SD (1993) Etiology and management of fecal incontinence. *Dis Colon Rectum* 36:77–97
13. Agachan F, Chen T, Pfeifer J, Reissman P, Wexner SD (1996) A constipation scoring system to simplify evaluation and management of constipated patients. *Dis Colon Rectum* 39:681–685
14. Starck M, Bohe M, Valentin L (2003) Results of endosonographic imaging of the anal sphincter 2–7 days after primary repair of third- or fourth-degree obstetric sphincter tears. *Ultrasound Obstet Gynecol* 22:609–615
15. *Classic articles in colonic and rectal surgery* (1985) Edmond Delorme 1847–1929. On the treatment of the rectal mucous membranes or recto-colic. *Dis Colon Rectum* 28:544–553
16. Berman JR, Harris MS, Rabeler MB (1990) Delorme's transrectal excision for internal rectal prolapse: patient selection, technique, and three-year follow-up. *Dis Colon Rectum* 33:573–580
17. Tsunoda A, Yasuda N, Yokoyama N, Kamiyama G, Kusano M (2003) Delorme's procedure for rectal prolapse: clinical and physiological analysis. *Dis Colon Rectum* 46:1260–1265
18. Watts AM, Thompson MR (2000) Evaluation of Delorme's procedure as a treatment for full-thickness rectal prolapse. *Br J Surg* 87:218–222
19. Jordan JC, Fernandez C, Diaz F, Alos R, Buch E, Roig JV (1999) Delorme's procedure in a case of strangulated rectal prolapse. *Cir Esp* 66:339–340
20. Naldini G (2011) Serious unconventional complications of surgery with stapler for haemorrhoidal prolapse and obstructed defaecation because of rectocele and rectal intussusception. *Colorectal Dis* 13:323–327
21. Pescatori M, Zbar AP (2009) Reinterventions after complicated or failed STARR procedure. *Int J Colorectal Dis* 23:87–95
22. Pucciani F, Ringressi MN, Giani I (2007) Persistent dyschezia after double stapled transanal rectal resection for outlet obstruction: four case reports. *Pelvipерineology* 26:132–135
23. Corno F, Volpato S, Borasi A, Barberis A, Mistrangelo M (2009) Treatment of functional diseases after rectum anal surgery: effectiveness of rehabilitation of the pelvic pavement. *Minerva Chir* 64:197–203
24. Naldini G, Cerullo G, Menconi C, Martellucci J, Orlandi S, Romano N, Rossi M (2011) Resected specimen evaluation, anorectal manometry, endoanal ultrasonography and clinical follow-up after STARR procedures. *World J Gastroenterol* 17:2411–2416
25. Meurette G, Wong M, Frampas E, Regenet N, Lehur PA (2004) Obstruction defecation syndrome: prospective open study of 30 patients operated by stapled transanal rectal resection. *Dis Colon Rectum* 47:615–616
26. Patel CB, Ragupathi M, Bhoor NH, Pickron TB, Haas EM (2011) Patient satisfaction and symptomatic outcomes following stapled transanal rectal resection for obstructed defecation syndrome. *J Surg Res* 165:e15–e21
27. Ommer A, Albrecht K, Wegner F, Walz MK (2006) Stapled transanal rectal resection (STARR): a new option in the treatment of obstructive defecation syndrome. *Langebecks Arch Surg* 391:32–37
28. Renzi A, Izzo D, Di Sarno G et al (2006) Stapled transanal rectal resection to treat obstructed defecation caused by rectal intussusception and rectocele. *Int J Colorectal Dis* 21:661–667
29. Dodi G, Pietroletti R, Milito G, Binda G, Pescatori M (2003) Bleeding, incontinence, pain and constipation after STARR transanal double stapling rectotomy for obstructed defecation. *Tech Coloproctol* 7:148–153
30. Thaha MA, Irvine LA, Steele RJ, Campbell KL (2005) Postdefaecation pain syndrome after circular stapled anopexy is abolished by oral nifedipine. *Br J Surg* 92:208–210
31. Pescatori M, Dodi G, Salafia C, Zbar AP (2005) Rectovaginal fistula after double-stapled transanal rectotomy (STARR) for obstructed defecation. *Int J Colorectal Dis* 20:83–85
32. Binda GA, Pescatori M, Romano G (2005) The dark side of double-stapled transanal rectal resection. *Dis Colon Rectum* 48:1830–1831
33. Madbouly KM, Abbas KS, Hussein AM (2010) Disappointing long-term outcomes after stapled transanal rectal resection for obstructed defecation. *World J Surg* 34:2191–2196
34. Isbert C, Germer CT (2013) Transanal procedure for functional bowel diseases. *Chirurg* 84(30–4):36–38
35. Pescatori M, Boffi F, Russo A, Zbar AP (2006) Complications and recurrence after excision of rectal internal mucosal prolapse for obstructed defaecation. *Int J Colorectal Dis* 21:160–165
36. Tobin SA, Scott IH (1994) Delorme operation for rectal prolapse. *Br J Surg* 81:1681–1684