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ORIGINAL ARTICLE

Post-operative clinical, manometric, and defecographic findings in patients undergoing unsuccessful STARR operation for obstructed defecation

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Abstract

Aim To evaluate the reason for failure of STARR (stapled transanal rectal resection) operation for obstructed defecation.

Methods A retrospective study (June 2012–December 2017) was performed using a prospectively maintained database of patients who underwent STARR operation for ODS (obstructed defecation syndrome), complaining of persisting or de novo occurrence of pelvic floor dysfunctions. Postoperative St Mark's and ODS scores were evaluated. A VAS was used to score pelvic pain. Patients' satisfaction was estimated administering the CPGAS (clinical patient grading assessment scale) questionnaire. Objective evaluation was performed by dynamic proctography and anorectal manometry.

Results Ninety patients (83.3% females) operated for ODS using STARR technique were evaluated.

Median ODS score was 19 while 20 patients (22%) reported de novo fecal urgency and 4 patients a worsening of their preoperative fecal incontinence.

Dynamic proctography performed in 54/90 patients showed a significant (> 3.0 cm) rectocele in 19 patients, recto-rectal intussusception in 10 patients incomplete emptying in 24 patients. When compared with internal normal standards, anorectal manometry showed decreased rectal compliance and maximum tolerable volume in patients with urgency. Nine patients reported a persistent postoperative pelvic pain (median VAS score 6).

Conclusion Failure of STARR to treat ODS, documented by persisting ODS symptoms, fecal urgency, or chronic pelvic pain, is often justified by the persistence or de novo onset of alteration of the anorectal anatomy at defecation. This occurs in about half of the patients, but in 40% of the cases who complained of incomplete emptying or incontinence, anatomical abnormalities were not recognized.

Keywords Obstructed defecation · STARR · Defecography · Anal manometry · Fecal incontinence · Fecal urgency

Introduction

Obstructed defecation syndrome (ODS) is a frequent benign but disabling condition affecting mainly female patients with a relevant impact on their quality of life.

Its surgical treatment is challenging since correction of the anatomy does not always entails a restored function and because of the risk of onset of other functional disturbances including pain, urgency, fecal incontinence, or constipation due to pelvic floor dyssynergia [1, 2].

Rectal intussusception and rectocele are the most frequent defecographic findings in patients with ODS [3],

but several associated anatomical and functional abnormalities can contribute to this syndrome, including psychological disturbances [4], explaining the relatively high failure rate of any type of surgery.

ODS treatment options include open abdominal surgery, laparoscopy and lately robotic approach, or perineal/transanal approaches depending on the defecatory alterations and surgeon's preference. Actually, the correct indication for different causes of ODS has never been established.

The transanal approach by the STARR (stapled transanal rectal resection) operation, developed by Longo, gained great acceptance among coloproctologists in the last 15 years

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thanks to its minimal invasiveness and easiness of performance. However, the safety and effectiveness of this operation have frequently been questioned [5, 6], despite the reason for failure has rarely been investigated.

The aim of this paper is to identify what goes wrong in patients who report bad outcome after STARR operation, using postoperative clinical, functional, and imaging investigations.

Methods

After an IRB approval, a retrospective study on patients referred to our tertiary level colorectal unit after the failure of STARR for ODS performed in other hospitals was carried out using a prospectively maintained database in the period between June 2012 and December 2017. Failure of STARR was defined as the complain of persistence or de novo occurrence of pelvic floor disturbances (obstructed defecation with a minimum of ODS score of 10, fecal incontinence with a minimum Vaizey score of 5, or chronic pain with a minimum VAS score of 5) after STARR operation with a minimum follow-up period of 9 months. Patients treated with Transtarr technique or prolapsectomy by high-volume staplers were not included in this study. Furthermore, those submitted to other anorectal surgeries before or after STARR were excluded from the study.

After clinical and proctological examination, the patients were submitted to anoscopy, anorectal manometry, and postoperative dynamic proctography.

Anal manometry

Postoperative anal manometry was performed only in patients complaining de novo fecal incontinence or urgency using a solid-state manometric catheter with 3 microsensors at 5 cm distance one from the other, connected to a Griffon manometry equipment (Albyn Medical, Ireland). The anal high-pressure zone in resting and squeezing was evaluated by a pull-through technique of the manometric catheter. Patients without anal incontinence did not agree to undergo this investigation.

Dynamic proctography

Postoperative dynamic proctography was performed only in patients with persisting ODS symptoms and without fecal incontinence, using a semisolid contrast medium composed by porridge powder, barium sulfate powder, and water. Patients were asked to perform a rectal cleaning enema at home 3 h before the exam. At the X-ray dept., they swallowed an oral solution of 100 mL of liquid barium to obtain opacification of the intestinal loops. About 90 min after the barium intake, the patients were placed on their left side and the rectum was filled through a syringe with a catheter cone using about 50 ml of liquid barium. The catheter was left inside during the exam in order to evidence the direction of the anal canal. In the static phase, radiograms were taken at resting, squeezing, and pushing.

In the dynamic phase, a thick barium paste was obtained by mixing and boiling equal proportions of chopped porridge and barium powder with water. Then, this semisolid paste was injected into the rectum using a modified silicon syringe when it was still about 37 °C. In female patients, the vagina was also filled with the same contrast medium. The dynamic phase of the dynamic proctography was recorded on a DVD disk.

Postoperative findings were compared with preoperative ones, even if these exams were performed elsewhere. Defecographic findings were defined according to Pomerri et al. [7].

Clinical evaluation

Clinical complaints were evaluated by the ODS score (range 0–31) for obstructed defecation [8] and St Marks' score (range 0–24) for anal incontinence [9]. Quality of life was assessed by SF-36 questionnaires. Clinical outcome was evaluated by the CPGAS (clinical patient grading assessment scale), values from − 7 to − 1 indicate a worsened clinical outcome, 0 indicates no variation before and after surgery, values from 1 to 7 for an improved clinical outcome [10] (Fig. 1).

All questionnaires were administered by asking patients about their clinical situation before and after the STARR procedure.

Statistical analysis

The results were reported in terms of median (range) and number of patients (percentage). A Wilcoxon rank-sum test for paired samples was used to evaluate changes in questionnaire and scores over the time. The categorical variables were analyzed using the two-sided Fisher's exact test. Data were analyzed using R Studio (Version 1.1.419 – © 2009–2018 RStudio, Inc).

Results

One hundred eight patients operated for ODS by STARR technique attended our tertiary referral colorectal unit. Five patients were excluded from the study because they were re-operated for rectocele repair or ventral rectopexy before our functional evaluation and 13 patients were excluded because they complained of hemorrhoids without functional pelvic floor disorders.

Improved	Same	Worsened
+1 almost the same, hardly any better	0	-1 almost the same, hardly any worse
+2 a little better		-2 a little worse
+3 somewhat better		-3 somewhat worse
+4 moderately better		-4 moderately worse
+5 a good deal better		-5 a good deal worse
+6 a great deal better		-6 a great deal worse
+7 a very great deal better		-7 a very great deal worse
Responders		**Non responders**

Fig. 1 The CPGAS (clinical patient grading assessment scale) score

Ninety of them (83.3% females, median age 58.5, range 28–82 years) complained of postoperative pelvic floor and bowel dysfunctions. All these patients underwent STARR operation using two PPH01/03 staplers (Ethicon Endo-Surgery, Cincinnati, OH, USA) performed by other surgeons in different hospitals more than 9 months before. The indication for surgery was obstructed defecation due to rectocele and/or rectal intussusception in all cases. Clinical evaluation was performed after a median period of follow-up of 18 months (range 9–22 months). Four of these patients (4.4%) also complained of minor anal incontinence (incontinence to flatus). Four patients (4.4%) had early postoperative complication (bleeding) and were re-operated the day after the STARR, and 6 patients (6.7%) had severe postoperative anal pain (VAS score 10). Pelvic sepsis occurred in 1 patient and was treated conservatively.

Clinical findings

The median postoperative ODS score was 19 (IQR, 14–22) (Fig. 2). Twenty patients (22.2%) presented a de novo fecal incontinence (median postoperative St Marks' score, 13.5; IQR 12–18) and 4 patients (4.4%) reported a worsening of the preoperative fecal incontinence. The type of incontinence was urge fecal incontinence in all the cases. Nine patients (10%) reported postoperative chronic anal pain (median VAS score 6). Two other patients had a diverting colostomy (2 and 5 months after surgery) because of the severity of the rectal pain but with limited benefit.

Rectal tenesmus was complained by 18 patients (20%) before STARR and persisted in 14 of them, while further 10 patients complained of a new onset of tenesmus with a total of 24 patients (25.5%) presenting tenesmus after STARR. One female patient had an enterocele diagnosed after the procedure. (Table 1).

CPGAS score had a median value of − 4, that means "moderately worse."

All eight domains of SF36 questionnaires, except body pain and physical function, showed a statistically significant deterioration. In particular physical and emotional role domains, decreased from a median value of 75 (IQR 50–75) and 66 (IQR 66–66) to 25 (IQR 0–50) and 0 (IQR 0–33), respectively (Fig. 3).

Manometry findings

Postoperative anorectal manometry was performed only on 18/24 patients complaining anal urge incontinence, showing a median resting anal pressure of 45 mmHg (IQR 32–76) (normal values 40–60 mmHg), a maximum resting pressure

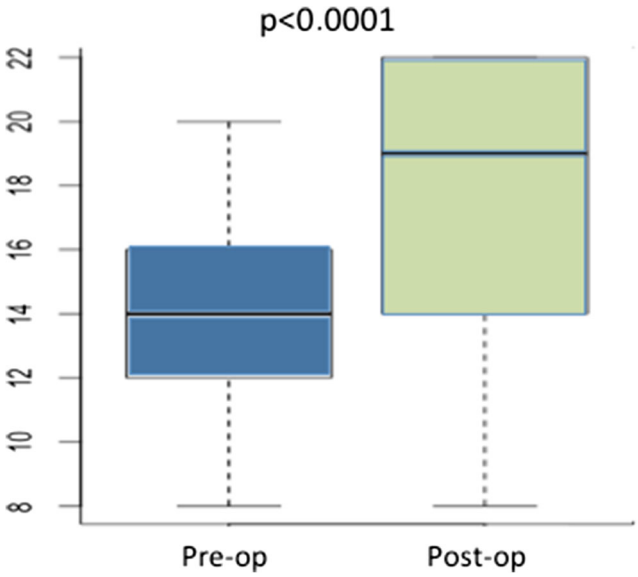

Fig. 2 Box and whiskers plot showing pre and postoperative ODS score

Table 1 Preoperative and postoperative clinical and defecographic findings

	Before STARR	After STARR	*p* value
Rectocele	27 (16 > 3 cm–11 < 3 cm)	19 (12 > 3 cm–7 < 3 cm)	0.23
Cystocele	4	5	1
Incontinence	4	24	0
Chronic pain	1	9	0.003
Diverting colostomy	0	2	0.4
Rectal tenesmus	18	24	0.37
Recto-rectal intussusception	18	10	0.06

of 66 mmHg (IQR 43–78) (normal values 60–80 mmHg), a median squeezing anal pressure of 58 mmHg (IQR 45–90) (normal values 90–140 mmHg), and a maximum anal squeezing pressure of 108 mmHg (IQR 77.5–138.25) (normal values 110–160 mmHg). All the patients had a normal rectoanal inhibitory reflex.

The rectal sensitivity test revealed a median rectal sensory threshold volume of 47 ml (IQR 27.2-57.7) (normal values 40–80 ml), a median volume to induce defecation of 78 ml (IQR 69.7-95.2) (normal values 100–150 ml), and a maximum tolerable volume of 100 ml (IQR, 85.5–141.25) (normal values 150–200 ml). The median compliance was 4 (IQR 3–5), (normal values 5–10) (Table 2). No one of these patients had undergone preoperative manometric evaluation while the patients without anal incontinence did not agree to undergo this postoperative investigation.

Defecographic findings

Fifty-four patients (60%) agreed to have a postoperative defecography while the remaining patients refused to undergo this investigation. In this subgroup, the postoperative findings were compared with the preoperative ones, which was available in all the cases, revealing the presence of a significant rectocele (non-emptying and > 3 cm) in 16 cases before surgery and in 12 of them after surgery. A non-significant rectocele was detected in other 11 cases preoperatively and in 7 cases in the postoperative defecography.

A persistent recto-anal intussusception was found in 10 patients out of 18 who had this abnormality preoperatively, while a de novo recto-rectal intussusception was demonstrated in further 8 patients (5 females) who had rectocele before surgery. Incomplete postoperative rectal emptying was demonstrated in 23 patients. All the patients with postoperative rectocele also had incomplete rectal emptying. A cystocele was reported in 4 patients before the operation and in 5 patients in the postoperative defecography.

A de novo pelvic floor dyssynergia was demonstrated in 4 patients who received the STARR operation for rectoanal intussusception.

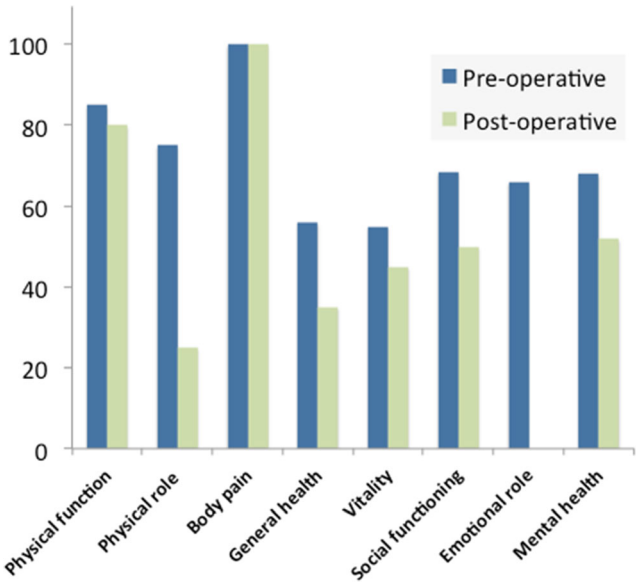

Fig. 3 Pre and postoperative SF 36 questionnaires. Data expressed as median

Discussion

ODS was identified as a distinct disease quite recently [11] and has attracted the attention of coloproctologists because of the severe impact on the patients' quality of life and the significant proportion (15–20%) of adult female population affected [12].

When medical treatment fails, surgical approach should be taken into consideration in order to correct rectocele and/or rectal intussusception which are the most frequent associated conditions.

Stapled transanal rectal resection (STARR) was proposed as a minimal invasive procedure for the surgical management of ODS associated with rectal intussusception, with or without rectocele in the early 2000s [13]. It had a rapid and wide acceptance among colorectal surgeons in the last decade [14], although its safeness has been debated because of occurrence of postoperative complications in up to 36% of the patients [15–18].

Although reassuring short-term outcome has been reported by Jayne D.G [19] in a review on data collected by some pioneers of this operation using the European STARR registry,

Table 2 Anorectal manometry findings (data expressed as median)

	Median value	IQ range	Normal value range
Resting anal pressure (mmHg)	45	32–76	40–60
Max resting pressure (mmHg)	66	43–78	60–80
Squeezing anal pressure (mmHg)	58	45–90	90–140
Max squeezing pressure (mmHg)	108	77–138	110–160
Onset of feeling (ml)	47	27–58	40–80
Volume to induce defecation (ml)	78	70–95	100–150
Max tolerable volume (ml)	100	85–141	150–200
Compliance	4	3–5	5–10

the long-term efficacy of STARR for ODS treatment has been scaled down by recent studies [20, 21] and a failure rate up to 40% has been demonstrated at the defecography [22].

These data from the literature have cooled the enthusiasm related to this surgical option to treat ODS. In fact, a recent survey carried out on 32 European centers demonstrated that STARR operation has already been abandoned by 1/3 of them [23]. In our personal experience too, STARR operation was abandoned since 2006 after an internal audit showed unsatisfactory results.

However, the literature concerning the cause of failure of the STARR operation is poor.

Grassi et al. [24] studied clinical and defecographic finding in 54 patients before and after STARR procedure, highlighting the safety and the efficacy of this procedure since significant reduction of the rectocele and intussusception was noted in all patients. On the other hand, they reported urgency in defecation in 22.2% of patients in the immediate post-operative period, postoperative bleeding, and a substenosis in 3.7% of the sample.

In 2008, Dindo et al. [25] described promising results of STARR with a rate success of 79% using the MR defecography study to evaluate the correction of the ODS; however, the reliability of the findings is limited by the small sample size (only 24 patients) and the too short-term evaluation after the surgical procedure.

A paper by Schwandner [26] showed that STARR procedure significantly repairs some abnormalities in pelvic anatomy in a group of 30 patients. However, no significant improvement was found in continence score.

A recent study from Piloni et al. [27] using postoperative magnetic resonance defecography demonstrated an incomplete rectal evacuation in 82% of the cases, persistent pelvic organ prolapses in 39.8%, rectal stricture in 28.5%, and persistent rectocele greater than 2 cm in 26.8% of the cases. Nevertheless, MR defecography can overestimate the incomplete rectal evacuation due to the position of the patients during the exam, and it can underestimate the persistence of rectal intussusception which is often discovered by pushing at the end of defecation [28].

In the study, we have reviewed only patients with an adequate length of the follow-up complaining of pelvic floor disturbances (such as obstructed defecation, fecal incontinence, and pelvic pain) after STARR, trying to understand the reasons behind the failure of this treatment.

In these patients, the main clinical symptoms were persistence or worsening of ODS de novo urge incontinence (in 22.2% of the patients) and pelvic pain (10% of patients).

Defecographic finding showed that only in 62.7% of the patients the persistence of ODS symptoms was justified by abnormalities of the defecation process (rectocele, intussusception, pelvic floor dyssynergia), while in the remaining 37.3% of the patients who complained of incomplete emptying, fragmented defecation, or urge incontinence, no abnormal defecographic findings were recognized. In most of this, subgroup of patients, however, an abnormal rectal sensitivity was detected during the rectal sensitivity testing. In particular, these patients had a significant reduction of the maximal tolerable volume to induce defecation compared with internal normal standards, while rectal compliance was within normal ranges in most (12 patients) but not in all the patients.

According to post-operative defecography, this study shows that STARR operation is often ineffective to correct rectocele and high recto-rectal intussusception. Furthermore, the restriction of the rectal ampulla might cause an alteration of rectal compliance leading to fecal urgency. Therefore, failure of STARR to treat ODS documented by persisting ODS symptoms, urge fecal incontinence, or chronic pelvic pain, is often justified by the persistence or de novo onset of alteration of the anorectal anatomy at defecation. However, this was demonstrated in about 60% of the patients who agreed to perform postoperative defecography, but in about 40% of the cases who complained of incomplete emptying or incontinence, anatomical abnormalities were not recognized, even if an altered rectal sensitivity and sometime decreased rectal compliance was detected by anorectal manometry.

In conclusion, despite the limitations due to the retrospective nature of this study and the lack of some preoperative evaluation of these patients, analysis of our data demonstrate that STARR operation for ODS may fail to relieve symptoms

for several reasons, including wrong indications and inaccurate surgical technique, but also because the proctographic findings behind the ODS are not always corrected by this operation. Moreover, functional abnormalities of rectal sensation and motility should obviously be expected from the removal of the part of the rectum.

Authors contribution Arcangelo Picciariello, MD: conception and design of the study, acquisition analysis and interpretation of data, writing the paper, and final approval of the version to be published

Vincenzo Papagni, MD: acquisition analysis and interpretation of the data,and final approval of the version to be published

Gennaro Martines, MD: acquisition analysis and interpretation of the data, and final approval of the version to be published

Michele De Fazio, MD: acquisition analysis and interpretation of the data, and final approval of the version to be published

Rosa Digennaro, MD: acquisition analysis and interpretation of the data, and final approval of the version to be published

Prof Donato F. Altomare, MD: aonception and design of the study, interpretation of the results, writing the paper, and final approval of the version to be published

Compliance with ethical standards

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

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