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Taeniectomy pouch as neorectum after low rectal resection

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ABSTRACT

BACKGROUND AND PURPOSE The functional outcomes of incontinence and high stool frequency resulting from restorative surgery are often criticised. The aim of this study was to assess the taeniectomy pouch in comparison with other pouches described in the literature.

MATERIAL AND METHODS This was a prospective cohort study. All patients who were candidate for low rectal resection presenting to the colorectal unit at Cairo University hospitals during the period February 2013 to February 2015 were included in the study (90 patients). Safety and feasibility of the new technique were assessed, including operative time, leakage, postoperative urgency, incontinence, number of daily motions and difficulty in evacuation. These parameters were assessed clinically, by means of defecography and anorectal manometry.

RESULTS The mean age of patients was 49.6 years. Percentages of postoperative mortality and leakage were 2.2% and 3.4%, respectively. Mean operative time was 117 minutes. Mean numbers of daily motions were 3.04 and 1.52 at 3 and 12 months, respectively. Mean Wexner score for continence at 3 and 12 months were 3.21 and 1.32, respectively. Mean resting pressure was 51.63 mmHg, squeeze pressure was 130.42 mmHg and mean threshold volume was 118.68 ml.

CONCLUSIONS Taeniectomy is a novel technique for pouch formation after low rectal resection, which can be used as an alternative to other pouches, especially the widely used transverse coloplasty.

KEYWORDS

Taeniectomy – Pouch – Low rectal resection – Functional outcomes

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Introduction

Restorative surgery for rectal cancer raises concerns over the functional outcomes of incontinence and high stool frequency, especially when ultra-low colorectal anastomoses are required.[1,2] After Park and colleagues introduced the ileal J-pouch anal anastomosis in 1978,3 Lazorthes *et al.* described colonic pouch anastomosis.[4] While colonic J-pouch anastomosis can overcome some of the unfavourable functional outcomes of straight coloanal anastomosis, it comes with the additional problems of being technically difficult to achieve and difficulty with pouch evacuation.[5] Consequently, coloplasty has been described to avoid the drawbacks of the J-pouch.[6,7] More recently, a sutureless technique, 'taeniectomy', was described by Farag in 2008 to avoid the inherent complications of J-pouch and coloplasty.[8] Taeniectomy depends upon removal of 20 cm of the antimesentric tenia coli, with the intent of increasing the volume of the remaining colon. This mechanism may overcome post-anterior resection syndrome.[8] The suggested benefits of taeniectomy over other pouches are the absence of anastomosis and sutures, which may theoretically decrease the incidence of leakage, operative time and the overall cost.[8]

In this study, the taeniectomy pouch after low anterior resection of the rectum was assessed in comparison with other pouch techniques described. Functional outcomes of the new technique were assessed for frequency of bowel motions, urgency, incontinence and difficulty of evacuation.

Patients and methods

This was a prospective cohort study. All patients who were candidates for low rectal resection presenting to the colorectal unit at Cairo University hospitals during the period from February 2013 to February 2015 were included in the study. A total of 90 patients were subjected to low anterior resection followed by the newly described taeniectomy pouch; 70 resections were performed laparoscopically and 20 were open surgery. All patients consented for the operation after explanation of the potential benefits of the newly described pouch. The study was approved by the Research Ethics Committee of Cairo University.

Any patient who was candidate for low anterior resection (LAR) was included in this study, with no age or gender specifications. Inoperable patients were excluded from the study. Primary end points were assessment of the new

technique for operative time, postoperative leakage rate and postoperative mortality. Secondary end points were assessment of the new technique regarding functional outcomes including daily frequency of motions, presence of urgency and Wexner score for continence. These functional outcomes are all symptoms of low anterior resection syndrome (LARS), which often occurs after rectal resection. Data were obtained at 3 and 12 months post-restoration of bowel continuity. Intrapouch and anal pressures were obtained by manometry 6 months after restoration of bowel continuity. Defecography was performed to assess any difficulty in evacuation.

Surgical technique

A standard rectal dissection was performed. This included a total mesorectal excision, high ligation of the inferior mesenteric vessels, preservation of the autonomic nervous plexus and mobilisation of the splenic flexure. A double-stapled technique was used for anastomosis; GIA™ straight stapler was used for the low anterior resection, applied at or just proximal to the level of the anorectal junction. A circular gastrointestinal stapler was then used for anastomosis. The pouches were constructed with descending colon and they were fashioned starting 4 cm from the distal cut end. This was followed by a diverting loop ileostomy.

Technique of taeniectomy

The antimesenteric tenia coli was identified 4 cm proximal to the distal cut end of the colon. The submucosal plane of the chosen teniae coli was infiltrated with 20 ml of adrenaline in saline solution (1 : 100,000) for 20 cm (Fig 1). The antimesenteric tenia was dissected from the submucosal plane for 20 cm, using scissors. Careful dissection prevents breaching the submucosa and leaving it intact (Fig 2). The integrity of the mucosa was confirmed by visually inspecting the mucosa from outside, during gentle finger palpation from inside and by injecting 100 ml of methlylene blue coloured saline into the pouch (Fig 3). The pouch was then anastomosed to the distal anorectal stump end. Integrity of the anastomosis was checked using methylene blue dye. Diverting loop ileostomy was used for 85 of the 90 patients included in the study.

Three months after the operation or after completion of the postoperative chemoradiotherapy, a Gastrografin enema was given to each patient to detect any anastomotic stricture or delayed leakage before closure of the diverting loop ileostomy. None of our patients developed delayed leakage prior to closure of the diverting loop ileostomy.

Statistical analysis

Data were statistically described in terms of mean plus or minus standard deviation, median and range or frequencies (number of cases) and percentages when appropriate.

Results

All 90 patients included in this study were candidate for low anterior resection of the rectum. The mean age of the

Figure 1 Infiltration of the subserosal plane with diluted adrenaline.

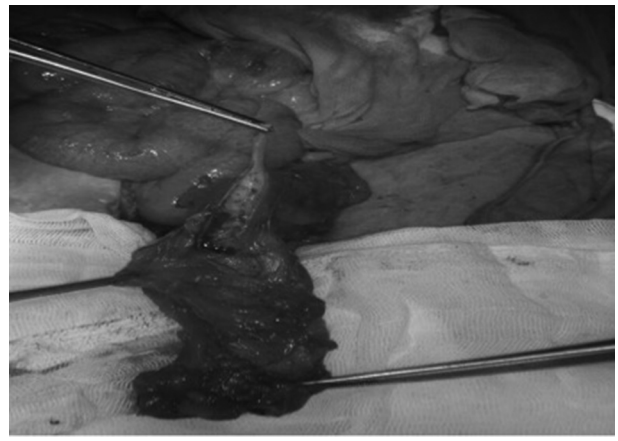

Figure 2 Dissection of the antimesenteric tenia coli for pouch creation.

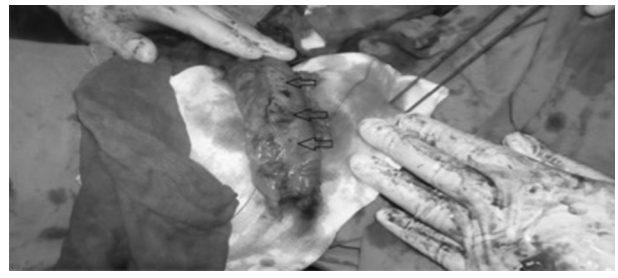

Figure 3 Checking mucosal integrity after taeniectomy with injection of diluted methylene blue. Arrows point to the taeniectomised segment of the colon.

patients was 49.6 years (standard deviation, SD, 14.48053). Operative time was 90–150 minutes (mean 117.33 minutes). Two patients died (2.22%). The first was a 67-year-old man who was known to have cardiac problems died on the third day postoperatively with extensive myocardial infarction. The second was a 72-year-old woman who died from a massive pulmonary embolism on the ninth postoperative day.

Postoperative leakage

There were three cases of postoperative leakage (n = 88, 3.4%). The first case of leakage was diagnosed on the fourth postoperative day with tachycardia, fever and leukocytosis. Reoperation revealed a small opening in the anterior wall of the anastomotic line, not the taeniectomy pouch. Peritoneal lavage and diverting loop ileostomy were performed, as they were not done in the first operation, with wide pored drains inserted. The patient had a smooth postoperative recovery, bowel continuity was restored 6 weeks later and the patient completed the follow-up.

The other two cases of leakage were diagnosed on the fifth and seventh postoperative day, respectively, when the patients developed pain, fever and tachycardia. A gastrografin enema revealed a minor leak in both cases. Computed tomography (CT) showed mild to moderate pelvic collections in both patients near the anastomotic site that was drained via CT-guided aspiration and insertion of a pigtail drain for 5 days. Conservative management was successful in both patients and both completed follow-up.

Functional outcomes

Three patients missed the follow-up appointment and the remaining 84 patients continued. At 3 months, the minimum number of motions per day was 2 and the maximum 6 (mean 3.04) and at 12 months this had reduced to a minimum of 1 motion per day and a maximum of 3 (mean 1.52). Twenty-eight patients were assessed for continence at 3 and 12 months using Wexner scoring system, where 0 is perfect continence and 20 is complete incontinence. At 3 months, grades were 0–9 (mean 3.21) and at 12 months0–5 (mean 1.32). There was no difficulty in evacuation. No patients reported the need for enemas or laxatives for pouch evacuation. This was confirmed clinically and by complete evacuation on defecography. Three of the 84 (3.57%) patients showed urge incontinence and inability to defer defecation for 15 minutes. Resting and squeeze pressures, together with threshold volume, were recorded at 6 months post-restoration of continuity using manometry (Table 1).

Table 1 Manometric findings for 84 patients

Taeniectomy	Resting pressure (mmHg)	Squeeze pressure (mmHg)	Threshold volume (ml)
Normal values	59–75	90–160	90–150
Minimum	38.2	85.4	82
Maximum	67.2	165.1	160
Mean	51.63	130.42	118.68
Standard deviation	7.81	19.67	17.06

Discussion

Straight coloanal anastomosis has a major drawback, which is the loss of the reservoir function of the rectum. Incontinence, urge incontinence and diarrhoea affect quality of life, although some studies showed long-term improvement of these symptoms.[2] Lazorthes *et al*. introduced the concept of incorporating a colonic pouch anal anastomosis following the success of the idea of the ileoanal anastomosis pouch.[4] The addition of a colonic pouch reduced frequency, urgency and incontinence in the early postoperative period. When compared with straight coloanal anastomosis, the J-pouch showed fewer bowel movements per 24 hours at 3 months (2.5 vs. 5.3), 1 year (2.5 vs. 4.5) and 2 years (2.0 vs. 3.6), respectively).[9] Although the colonic J-pouch improves the functional outcomes for patients with low anterior resection, it comes with the drawback of difficulty in evacuation.[10]

A coloplasty is designed to interrupt antegrade colonic peristalsis and as an option when the pelvis is too narrow to permit a bulky colonic J-pouch anal anastomosis. It is similar to a pyloroplasty or stricturoplasty.[11] In a study by Pimentel and colleagues, there were no statistically significant differences between coloplasty and colonic J-pouch regarding bowel function.[12] Anastomotic leaks in coloplasty patients were higher than corresponding rates in the colonic J-pouch, although statistical difference was not significant. Leakage was 13.2% in coloplasty and 6.6% in colonic J-pouch.[12] However, more recent studies have shown that the incidence of anastomotic leaks is comparable between transverse coloplasty and colonic J-pouch.[13]

Taeniectomy of the antimesentric teniae coli was described by Farag *et al*. in 2008 is a simple alternative to the colonic J-pouch and transverse coloplasty.[8] The results of this study show that taeniectomy is comparable to findings in the literature on other pouch techniques, specifically the widely accepted transverse coloplasty, regarding operative time, postoperative leakage and functional outcome.

Operative time

Ho *et al*. in 2002 described a mean operative time of 110 minutes for construction of a transverse coloplasty.[11] In a study by Yik Hong, the mean operative time of 110 minutes.[14] The taeniectomy pouch described in this paper had a mean operative time of 117 minutes This is comparable with transverse coloplasty in these two studies.

Mortality

A 2003 study by Pimentel *et al*. had no mortalities with transverse coloplasty[12] but in the Yik Hong study there was 7% mortality with transverse coloplasty.[14] In the Ho et al. study, the mortality rate was 2.27%.[11] Mortality in the taeniectomy group in our study was 2.22%, which is comparable to these studies.

Leakage

The study by Pimentel *et al*. reported a leakage rate of 6%.[12] Z'graggen *et al*. reported an anastomotic leakage rate of 7.3% (n = 3) in a study of 41 patients with transverse coloplasty after low anterior resection.[15] In our study, in the taeniectomy group leakage was 3.4%. This rate is comparable to or lower than the overall leakage rates in the earlier studies.

Functional outcomes

Pimentel et al. showed a mean number of motions of 3.12 at 3 months and 2.12 after 12 months.[12] The number of bowel motions recorded in the study by Ho *et al*. was higher, with 4.6 at 6 months and 3.4 at 12 months.[11] In our study, with the taeniectomy pouch the mean number of motions was 3.04 after 3 months and 1.52 after 12 months. These results are comparable to the overall number of motions in the results of previous studies.

The grade of continence in our study was evaluated by Wexner scoring system, in which 0 is perfect continence and 20 is complete loss of continence Pimentel *et al*. also used Wexner scoring system in their 2003 study, where the continence grades were 3.2, 2.9 and 2.7 at 3, 6 and 12 months postoperatively.[12] In Ho et al.'s 2002 study, continence grade was 3.2 in both early (4 months) and late (12 months) follow up.[11] With the taeniectomy pouch, in our study the mean continence was 3.21 at 3 months and 1.32 after 12 months, which is favourable when compared with previous studies.

In the current study, three patients (3.57%) had urgency that improved markedly by 1 year. This is comparable to Pimentel *et al*. who found 10% urgency in their study,[12] similar to Z'graggen *et al*., who reported urgency of 16% after 6 months, dropping to 6% after 12 months.[15] Conversely, Fazio *et al*. in 2007 reported persistence of urgency in 23.3% of patients with coloplasty.[16]

Manometric results

In the study by Z'graggen et al, the median resting pressure after transverse coloplasty was 49 mmHg, with a mean tolerable volume of 123 ml.[15] Pimentel *et al*. reported a resting pressure after transverse coloplasty of 43.6 mmHg, squeeze pressure of 116.3 mmHg and threshold volume of 126.1 ml.[12] A study by Köninger *et al*. in 2004 also showed similar results, with a resting pressure of 52 mmHg, a threshold volume of 110 ml.[17] Squeeze pressure was not measured in that study. Comparatively for taeniectomy, the mean resting pressure was 51.63 mmHg, squeeze pressure 130.42 mmHg and threshold volume 118.68 ml (Table 1).

Outcomes and limitations of this study

The taeniectomy pouch produces comparable results to the widely accepted transverse coloplasty, which is theoretically safer and easier to perform. However, a larger study is needed to compare the newly described pouch to the widely accepted transverse coloplasty. The grade of continence should also be assessed preoperatively for both clinical assessments using any of available scores of continence and manometrically for all patients who are candidates for colonic pouches. This may help to establish a baseline of continence and to avoid misinterpreting the symptoms of a patient with already decreased continence as a postoperative complication. We are therefore working on a cohort comparison study comparing our new technique with the widely accepted transverse coloplasty pouch.

Conclusion

Taeniectomy is a novel technique in the field of colorectal surgery. It is used with the aim of decreasing number of anastomoses and hence decreasing leakage, and is technically less demanding. Taeniectomy can be used as an alternative to the transverse coloplasty pouch, although further larger studies are needed for more detailed assessment.

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