



Transanal proximal rectosigmoidectomy. A new operation for severe chronic idiopathic constipation associated with megarectosigmoid

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ABSTRACT

Background: At the severe end of the idiopathic constipation spectrum exist patients with chronic idiopathic constipation associated with an enormous megarectosigmoid, among whom few require surgery. We performed transanal proximal rectosigmoidectomy, involving preservation of a 5 cm rectal reservoir, to ameliorate inconsistent and unpredictable outcomes and fecal incontinence occurring in some patients operated on with other techniques.

Methods: We retrospectively observed patients with chronic idiopathic constipation with megarectosigmoid who underwent transanal proximal rectosigmoidectomy during July 2017–May 2018. We analyzed sex, age, operation indication, complications, functional outcome, and time of follow-up. We statistically compared the dosage of laxative before and after the procedure.

Results: Thirteen patients were included in the study. Median age during surgery was 8 years. In 9 cases, the indication for surgery was chronic intake of a daily high dose of Senna with failed weaning trials, and 4 had persistent fecal impaction with laxative-intolerance and refusal of rectal enemas. No intra/postoperative complications occurred. Currently, all 13 patients have daily voluntary bowel movements and no fecal accidents. Laxative dosage was significantly reduced ($p = 0.007$). Follow-up ranged 6–16 months.

Conclusion: Preliminary results suggest transanal proximal rectosigmoidectomy as an adequate alternative for patients requiring surgery for chronic idiopathic constipation with megarectosigmoid.

Type of study: Clinical research.

Level of evidence: Level III.

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The seriousness of idiopathic constipation exists on a spectrum. Patients at the severe end of the spectrum suffer from chronic constipation related to an enormous megarectosigmoid (Fig. 1). These patients become a difficult medical challenge. Many of them are able to achieve successful bowel management [1]. Despite significant efforts at practicing well-protocolized bowel management, a small group of patients continues to have fecal impaction, pseudofecal incontinence, and abdominal pain which affects their quality of life.

Different surgical techniques have been described for these patients. However, outcomes after these operations are not always consistent and predictable with a complete resolution. Moreover, true fecal incontinence can result after some procedures. For the present study, we performed a new surgical technique called transanal proximal

rectosigmoidectomy. Unlike previous techniques, this procedure involves preserving a small rectal reservoir (5 cm of the distal rectum) to avoid fecal incontinence and impaction. The purpose of this article is to describe this new surgical technique and present our preliminary results.

1. Methods

We performed a retrospective cross-sectional study approved by our Institutional Review Board (PRO18040410) of patients with chronic idiopathic constipation. We reviewed the charts of patients with a diagnosis of chronic idiopathic constipation with megarectosigmoid confirmed in all by contrast enema. The length of the megarectosigmoid was measured in the AP view. This length guided the intraoperative resection. Three patients also had a computerized tomography (CT) scan in the emergency department (Fig. 2) because of concern of abdominal malignant tumor. All of the patients were referred to the Colorectal and Hirschsprung Center for Children at Children's Hospital of Pittsburgh from November 2013 to September 2018. We included all patients, who underwent transanal proximal rectosigmoidectomy. We analyzed

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Fig. 1. Contrast enema of a 17-year-old male with chronic idiopathic constipation showing an enormous megarectosigmoid.

the patients' sex, age, indication for surgery, complications, functional outcome, and time of follow-up. The patients were followed up closely according to our standardized protocol. They were seen in the clinic at 2 and 4 weeks and at 3, 6, 9, and 12 months after the operation. All patients and their caregivers were instructed to call the office immediately if they do not have daily bowel movements. The Wilcoxon test was performed for statistical analysis using SPSS Statistics, version 21.

2. Surgical technique

The patients were admitted for bowel preparation with enemas the day before the operation. Radiographs confirmed that the rectosigmoid was clean. In the operating room, we made rectal irrigations until the stool was cleaned out, placed a Foley catheter into the bladder, and administered intravenous metronidazole and cefazolin. The patient was in a prone position with the pelvis elevated. We symmetrically spread the buttocks using medical tape. We placed the Lone Star® Retractor System (3307) (Cooper Surgical, Trumbull, CT, USA) with eight hooks symmetrically at the limit between the anal skin and the anoderm. We performed a thorough inspection of the anal canal and rectal mucosa. Next, we relocated the hooks proximally to protect the anal canal. The next step was to apply numerous traction sutures with 5-0 silk on the

rectum at the circumference, at 5 cm proximal from the pectinate area. To confirm the length, we measured with a ruler and grasped the proximal rectum with right angle forceps (Fig. 3). This maneuver facilitated suture placement in the depth of the surgical field. Once we set the traction sutures, we applied uniform traction to evert the rectum. With a fine needle electrocautery tip (Olsen needle electrode 66107, Symmetry Surgical®, Antioch, TN, USA), we made a full-thickness incision of the rectum adjacent to the sutures and began cutting 25% of the rectal circumference (Fig. 4). During this step, we identified the adventitia as the plane of dissection. Hypertrophy of the muscular layers of the megarectum made this step challenging. We identified the longitudinal muscular fibers of the rectum, the adjacent fat tissue of the adventitia, and the white fascia of the rectum to obtain the surgical plane. Once we secured the plane of dissection, we incised the remaining 75% of the circumference. Next, we continued rectal mobilization proximally dissecting the rectal fascia until we reached the peritoneal cavity. During this step, we used right angle forceps and a 37 cm Covidien LigaSure™ instrument (Covidien, Minneapolis, MN, USA). Then, we opened the peritoneal reflection and faced the sigmoid. We made traction with Babcock forceps on the sigmoid to mobilize it. We lateralized the bowel to identify the lateral mesenteric vessels. Using the LigaSure™, we initially divided the right side of the mesentery and



Fig. 2. CT scan of a 16-year-old-male with chronic idiopathic constipation showing an enormous megarectosigmoid.

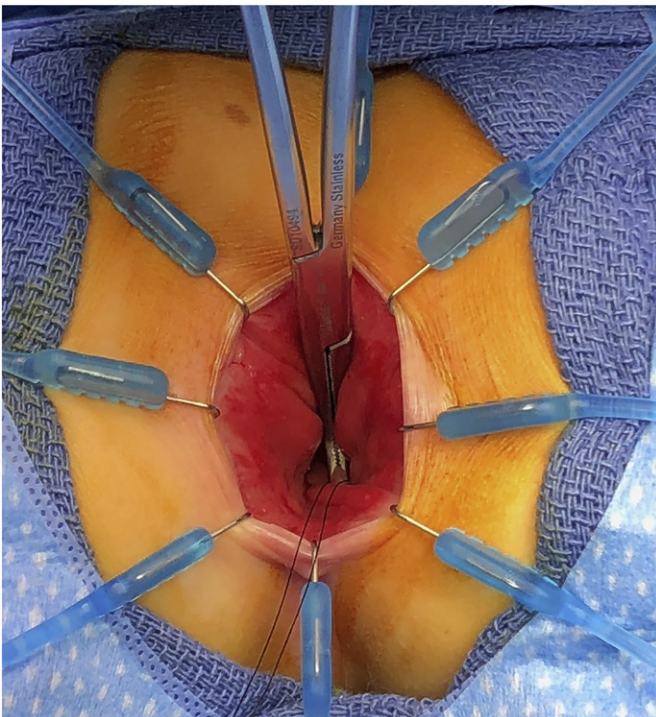


Fig. 3. Intraoperative image showing right angle forceps at 5 cm proximal to the pectinate area grasping the rectal cuff to place the traction suture.

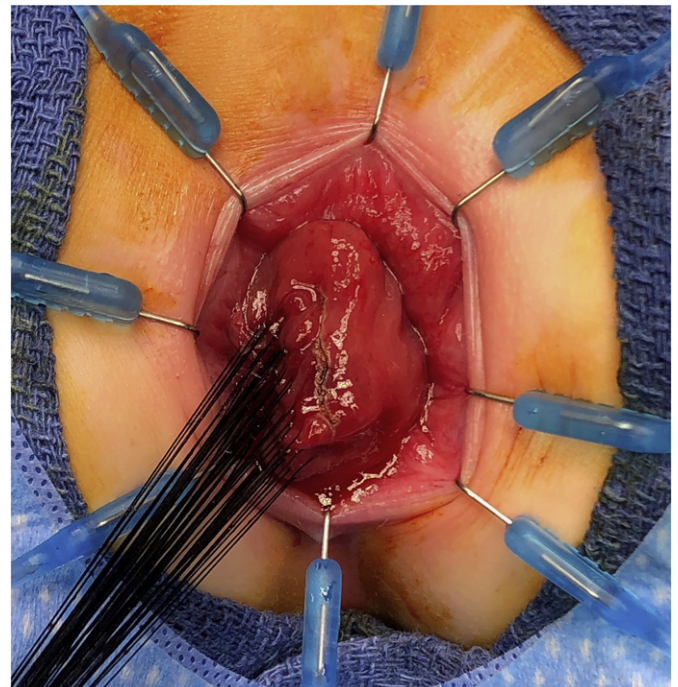


Fig. 4. The firm traction of the sutures everts the rectum to expose the line of the incision.

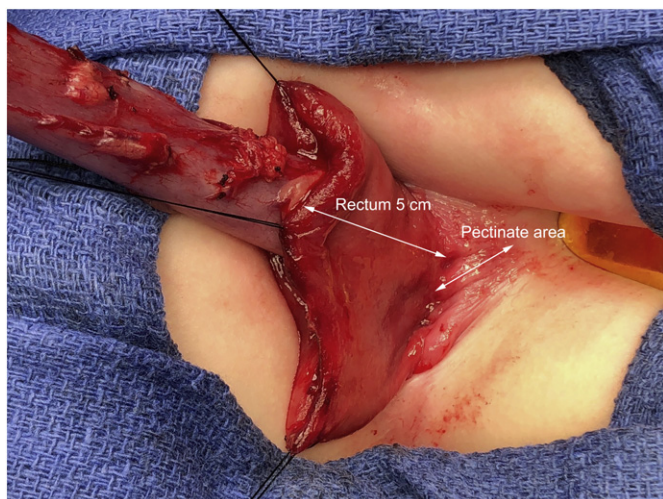


Fig. 5. Note the significant size discrepancy of the megarectum compared with the proximal colon.

then the left side. In the end, the posterior mesentery containing the main vessels was identified and divided. We continued this process of obtaining length until the proximal sigmoid was no longer dilated and hypertrophied (Fig. 5). To stop the sigmoid resection, the most critical anatomical landmark is to reach the regular diameter of the proximal sigmoid. After performing the colectomy, the specimen was sent to the pathology laboratory. Then, we fashioned the colorectal anastomosis with 3-0 Vicryl. Owing to the difference in the diameters of the intestinal segments, we initially put four equidistant stitches at 3, 6, 9, and 12

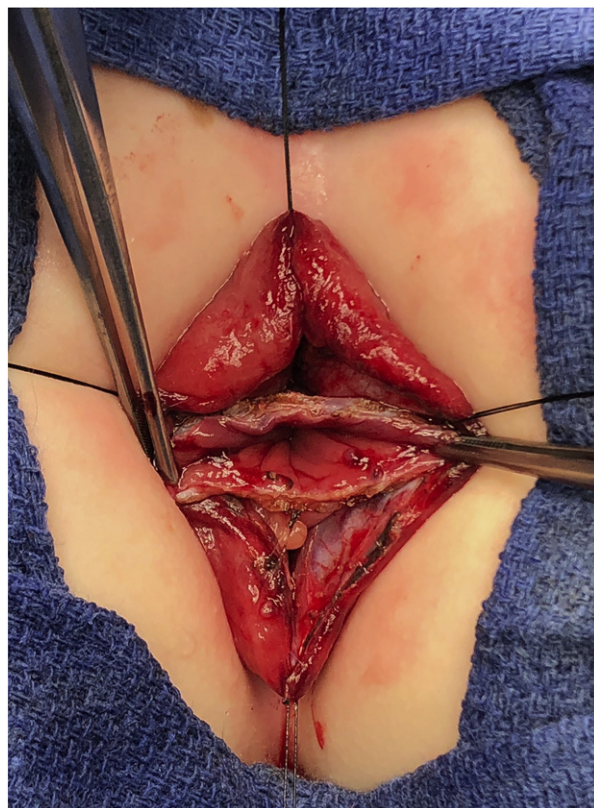
o'clock in both the proximal colon and distal rectum (Fig. 6a and b), facilitating the colorectal anastomosis in a symmetrical shape and by quadrant (Fig. 7a and b). Finally, we released the hooks gently and removed the Lone Star®. After the operation, antibiotics were continued for 5 days, and bowel function returned on day 1 in 5 patients, day 2 in 6, day 4 in 1, and on day 5 in 1. After this retrospective review, we modified the duration of antibiotics founded on evidence-based practice. Our current protocol includes the administration of 24 h of IV antibiotics with no occurrences of infection [2].

3. Results

From November 2013 to September 2018, 560 patients were referred to the Colorectal and Hirschsprung Center at Children's Hospital of Pittsburgh owing to intractable chronic idiopathic constipation. Thirteen patients underwent primary sigmoidectomy and appendicostomy; outcomes of the first 8 patients from this group were published previously [3]. With this procedure, half of the patients experience abdominal pain or require antegrade enemas to clean out recurrent fecal impactions, and it has not been possible to achieve the transition to treat with laxative only. Consequently, we modified our surgical strategy. From July 2017 to May 2018, 13 patients (2.3%; 4 female) underwent transanal proximal rectosigmoidectomy. None of these 13 patients had previous sigmoidectomy and appendicostomy creation. Pelvic outlet obstruction was ruled out in all these patients. Also, all the patients had a previous rectal biopsy with ganglion cells.

The patients' ages ranged from 21 months to 19 years (median, 8 years). All patients had a contrast enema, and 3 also had a CT scan, to confirm the presence of an enormous megarectosigmoid. In 9 patients, indication for surgery was chronic intake (>4 years) of a daily high dose of Senna with failed weaning trials. The parents in this group

A



B



Fig. 6. Image taken after the colectomy. Note the larger diameter of the distal rectum compared with the normal diameter of the proximal colon. The placement of equidistant stitches per quadrant facilitates anastomosis. (A) Initially, we placed four equidistant stitches at 3, 6, 9, and 12 o'clock on the megarectum. (B) Next, we placed and tied four equidistant stitches at 3, 6, 9, and 12 o'clock on the proximal colon and the megarectum.

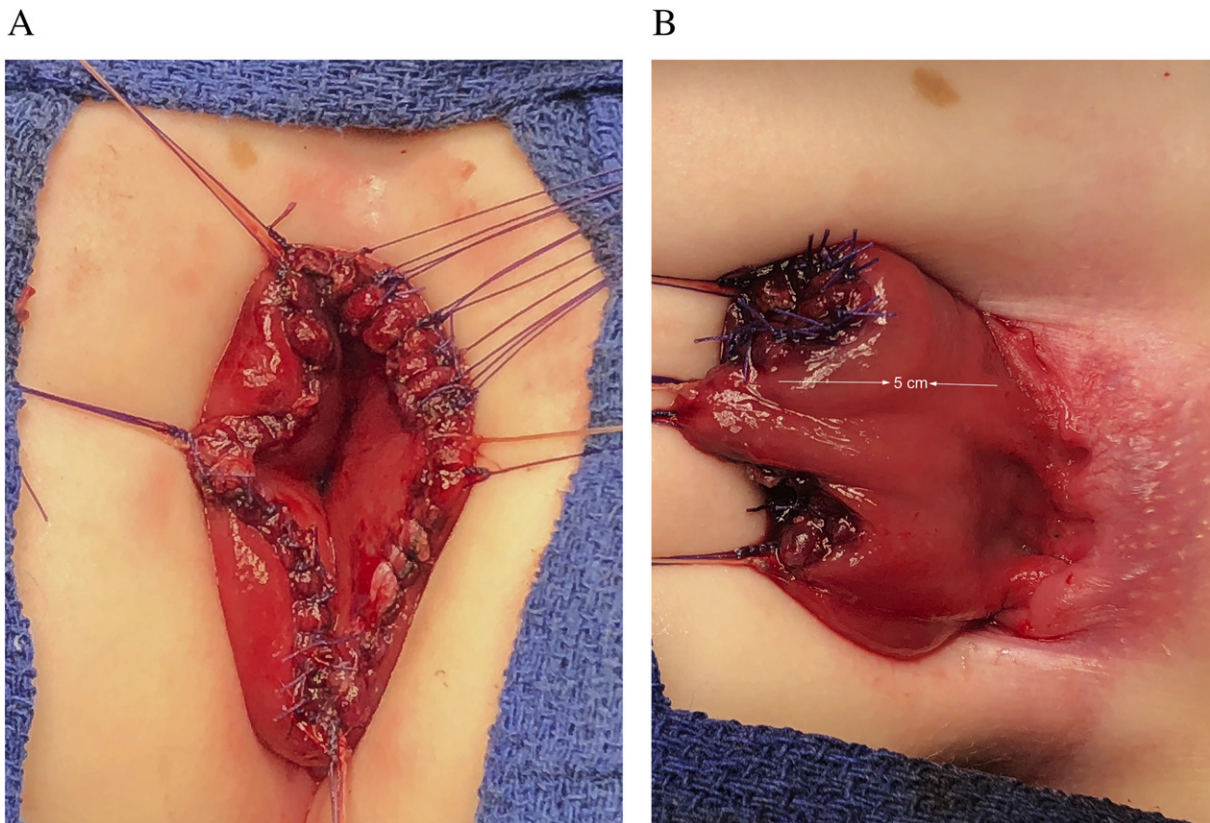


Fig. 7. The anastomosis is complete. (A) Frontal view and (B) lateral view.

refused to continue giving their children the laxative. The indication in the other 4 patients was because they could not tolerate the stimulant laxative and rejected the rectal enemas. Thus, these patients continued to have fecal impactions and pseudofecal incontinence. In this group, 2 teenagers with long-standing severe pseudofecal incontinence suffered depression and anxiety and 1 of them attempted suicide.

No intraoperative or postoperative complications occurred in the present study. A regular diet and laxative were started once the patient's bowel function returned, except we started enemas via appendicostomy in only 1 patient on postoperative day 5. The follow-up time ranged from 6 to 16 months (median, 8 months). The postoperative dose of Senna was significantly less compared with the preoperative treatment in 9 patients (Wilcoxon test, $p = 0.007$) (Fig. 8). Four patients were excluded from the analysis because they were not on

Senna preoperatively. None of the patients had abdominal pain. We created an appendicostomy in the first 3 consecutive patients that we operated, in 2 because they dreaded rectal enemas, and we wanted to ensure access to give enemas in the event of fecal impaction. These 2 patients did not require the use of their appendicostomy. The third patient (patient #12 in Table 2) was a 19-year-old male who suffered pseudofecal incontinence for the last 18 years wearing diapers, pads, and pull-ups all his life. We were not confident of his capacity of being toilet trained while being treated with laxatives after the resection. Therefore, we started treating him with antegrade enemas for four months. Then, he was socially clean and wearing regular underwear for the first time in his life. After this successful experience with enemas, he demonstrated complete fecal control and had voluntary bowel movements without a laxative. In consequence, his mother stopped the enemas on her own, and the patient began to have regular voluntary bowel movements without laxative or enema.

No episodes of fecal impaction occurred. Currently, all 13 patients have daily voluntary bowel movements, 11 take Senna, 1 takes Bisacodyl, and 1 does not take any laxative (Tables 1 and 2).

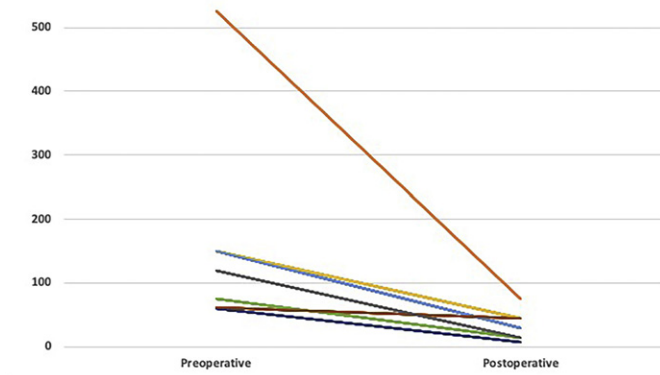


Fig. 8. Preoperative and postoperative milligrams of Senna dosage in 9 patients. The difference was statistically significant by the Wilcoxon test with a p value of 0.007.

Table 1

Preoperative and current dosage in milligrams of Senna in 9 patients after transanal proximal rectosigmoidectomy.

Patient	Preoperative (mg)	Current (mg)	Follow-up (months)
1	150	30	16
2	150	45	11
3	525	75	10
4	150	30	9
5	75	15	7
6	60	7	7
7	61.6	45	7
8	120	15	6
9	150	45	6

Table 2

Preoperative and current treatment in 4 patients after transanal proximal rectosigmoidectomy.

Patient	Preoperative	Current	Follow-up (months)
10	Enema	26.4 mg Senna	13
11	17 g MiraLAX®	51.6 mg Senna	13
12	Enema	None	8
13	35 mg Bisacodyl	10 mg Bisacodyl	6

We operated on a 21-month-old girl (patient # 6, Table 1). At the time of the operation, she had an extraordinary megarectosigmoid. Although she was treated according to our protocol, she suffered from recurrent fecal impaction with severe side effects from the laxative dosage. The side effects were abdominal pain, loss of appetite, nausea, and vomiting every time she had the laxative. Having to regularly administer enemas created significant familial and social problems for the mother.

4. Discussion

Chronic idiopathic constipation associated with an enormous megarectosigmoid is a challenging lifelong disease. The megarectosigmoid possesses ineffective peristalsis, preventing regular bowel movements and facilitating feces accumulation. Most patients with this condition achieve success under a supervised and protocolized bowel management program [1] in which the patient undergoes a proper cleaning out of the megarectosigmoid using enemas followed by a stimulant laxative trial. A minority of patients cannot tolerate the quantity of laxative required for a daily bowel movement, or an effective dose cannot be reached. Consequently, these patients need daily enemas to clean out the megarectosigmoid and control fecal accidents.

Not all patients with megarectosigmoid have a smooth bowel management program. Some patients are prone to fecal impaction requiring frequent clean outs with enemas to reset the bowel management. Other patients are unable to continue taking the laxative because they suffer side effects, the most frequent of which are nausea, abdominal pain, and vomiting. Other patients get tired of taking the medication for so long and are worried about the uncertainty of how long the treatment will last. Those patients on daily rectal enemas seek and request other options. Unfortunately, the presence of a megarectosigmoid is a lifelong condition in many patients. For these patients, the dosage of stimulant laxatives is usually very high and can rarely be reduced over time. In our experience, the most frequently asked questions from patients with megarectosigmoid are, “How long do I need to take the medication?” and “What other treatment options exist?” We consider a well-judged surgical treatment in all of these situations [4–6], but the gold standard procedure for this problem has not been established.

The main operations for this problem are focused to administer antegrade enemas, or to resect the megarectosigmoid (Fig. 9). Sigmoid resection entails the removal of the sigmoid with a colorectal

anastomosis at the level of the low peritoneal reflection [7]. This procedure allows reduction of the laxative dosage. However, because the problematic megarectum is left untouched, the risk of fecal impaction with pseudofecal incontinence and the necessity of rectal enemas are always present. Moreover, some patients undergoing sigmoidectomy suffer pain localized on the left side or lower abdomen after resection.

Primary sigmoidectomy and appendicostomy are other procedures [3,8]. They involve a sigmoidectomy with the creation of an antegrade continent enema procedure in the same operation. In our experience, approximately half of the patients have adequate bowel function while taking a lower dose of the laxative, and when they are impacted, appendicostomy is used to clean out the megarectum, allowing the patient to continue using the laxative. However, the other half requires daily antegrade enemas because they cannot tolerate the laxative, usually owing to abdominal pain and vomiting. Also, fecal impaction presents erratically, even with the use of daily antegrade enemas. Our hypothesis regarding patients with inconsistent and unpredictable outcomes is that these are because of the remaining “problematic” megarectum, which affects some patients who undergo sigmoidectomy.

Our hypothesis regarding patients with inconsistent and unpredictable outcomes who undergo sigmoidectomy is that the megarectum remains as source for recurrent fecal impaction. Also, the cause of the left abdominal pain is that a nondilated colon is anastomosed to the megarectum. This anastomosis creates a sudden change between two intestinal segments with different peristalsis.

Complete rectal and sigmoid resection with coloanal anastomosis [9] resolved constipation and the risk of fecal impaction. However, these patients suffered true fecal incontinence after the surgery [10,11] (personal communication with authors from reference [8]). We believe the cause of this problem with this operation is the lack of a fecal reservoir, plus a more active bowel, compared with peristalsis of the megarectosigmoid, anastomosed with the anal canal.

We suggest that preserving a small rectal pouch would avoid the risk of fecal incontinence and impaction. Consequently, we performed a transanal full-thickness rectosigmoid resection but saved the distal 5 cm of the rectum. The decision to preserve 5 cm of the rectum was a guesstimate. We know that 2 cm resulted in a too small reservoir [9]. Therefore, we decided to perform our incision at 5 cm. All 13 patients had fecal control and daily bowel movements and had not presented with fecal impaction or abdominal pain. Their laxative dose was significantly reduced postoperatively. The patients and parents were delighted because of the reduced amount of laxative without the need for enemas.

There are no current guidelines regarding when or how to operate on patients with complicated chronic constipation. Moreover, there is no definition of the meaning of untreatable constipation. This paper focuses on the introduction of the technique, and not on the demanding and challenging question regarding when to operate. In this group, nine patients had > 4 years of daily high doses of laxatives, and they all failed weaning trials; the other four patients did not tolerate the dosage of stimulant laxative, refusing the rectal enemas and continuing

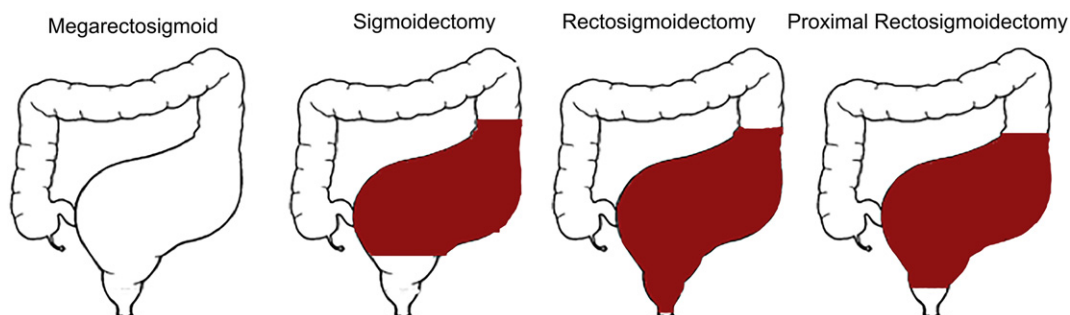


Fig. 9. Diagrams comparing proposed surgical resection for the treatments of megarectosigmoid. Sigmoidectomy with colorectal anastomosis at the peritoneal reflection. Rectosigmoidectomy with coloanal anastomosis. Proximal rectosigmoidectomy with colorectal anastomosis at 5 cm above the dentate line.

with chronic and recurrent fecal impactions with the consequent pseudofecal incontinence.

When all the medical resources have been exhausted after proper bowel management, then the surgeon needs to consider surgical treatment. Every surgeon needs to decide what operation will be performed based on his/her skills, knowledge, experience and own circumstances. This operation requires an experienced and knowledgeable surgeon. Not every pediatric surgeon should do this operation. A pediatric surgeon interested in performing this operation needs additional training in colorectal surgery to successfully realize this novel technique.

5. Conclusions

Transanal proximal resection of the megarectosigmoid preserving 5 cm of the distal rectal reservoir appears to be an adequate surgical alternative for patients needing surgical treatment for chronic idiopathic constipation associated with megarectosigmoid. Our preliminary results are promising since all of the patients achieved fecal control, had daily bowel movements with a significant reduction of laxative dose, and no fecal impaction or abdominal pain.

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