



Transanal rectosigmoid resection for severe intractable idiopathic constipation

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Abstract

Introduction: Idiopathic constipation is a source of significant morbidity in children. A subset of patients is refractory to medical therapy and requires surgical intervention. We present a novel surgical technique for the management of these patients.

Methods: We reviewed the records of 288 patients with severe idiopathic constipation and soiling. Patients who were refractory to medical management and had a megarectosigmoid underwent a transanal full-thickness rectosigmoid resection with a primary colo-anal anastomosis.

Results: Fifteen patients underwent a transanal rectosigmoid resection. The preoperative contrast enema demonstrated an enormously dilated rectosigmoid in 14. An average of 43 cm (range, 8–98 cm) of rectosigmoid was resected. Of 14 patients with more than 3 months of follow-up, the preoperative laxative dose was 68 mg of senna/d (range, 52–95 mg), which decreased to 8.6 mg postoperatively ($P < .001$). Nine patients are clean without soiling, 1 is more prone to diarrhea, but is clean. Two patients soil occasionally, but are noncompliant, and 2 were lost to follow-up.

Conclusion: Transanal rectosigmoid resection for medically intractable idiopathic constipation resulted in a dramatic reduction or elimination in laxatives use while preserving continence. It is a useful alternative to surgical options such as other colonic resections, antegrade enemas, and stomas.

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Constipation is a common problem in the pediatric population, which can usually be treated with dietary modifications and medical therapy. A subset of patients have intractable severe constipation with soiling (encopresis) that is unresponsive to standard medical therapy. These children suffer from abdominal pain, bloating, and accidents

that often result in a poor quality of life and delayed social development [1–3]. Disimpaction followed by aggressive laxative therapy works well for the vast majority of patients [4]. However, some children have refractory symptoms, and when subjected to high-dose laxative therapy, develop abdominal distension, vomiting, cramping, and bloating. The colon becomes dilated with liquid stool and yet they have no bowel movements. Some successfully empty their colon but require enormous laxative dosing. We have found that for this small subset, operative intervention is the only option and report our experience here with a new technique.

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Fig. 1 Contrast enema in a patient with severe idiopathic constipation showing the typical finding of a megarectosigmoid with normal-caliber upper sigmoid and descending colon.

There have been many reported operative strategies for the management of severe idiopathic constipation including fecal diversion [5] and transabdominal resection of the rectum and sigmoid [6-9]. Other less invasive techniques have been described, such as antegrade continence enemas [10,11], botulinum toxin injections [12], and internal sphincter myectomy [13]. Unfortunately, these procedures have inconsistent or inadequate results. Our previous experience with sigmoid resection (preserving the rectum) in this patient population led to a significant decrease in the laxative requirements by 80% in one third of patients and by 40% in the rest [8]. Even when this experience represented an advance in the management of this difficult patient population, we thought that there must be a more effective treatment, which led us to this new technique.

We, as well as others, use the transanal surgical approach for management of Hirschsprung's disease [14,15], reoperations for Hirschsprung's disease [16], and for rectal prolapse [17,18]. We chose to apply our experience with the transanal approach to the management of patients with intractable idiopathic constipation. In the current study, we present our experience with a transanal full-thickness rectosigmoid resection and primary colo-anal anastomosis for this patient group. We believe this technique offers a less invasive and more effective alternative to managing this challenging patient population, although it is applicable only for a very specific group of patients.

1. Materials and methods

We reviewed the records of all patients who were referred to us with severe idiopathic constipation and soiling over a 20-year period. All patients were previously seen by a pediatrician or a pediatric gastroenterologist and were considered unmanageable. The vast majority were referred for surgical consultation to evaluate for Hirschsprung's disease, and no patient turned out to have Hirschsprung's. Patients first received a thorough history and physical examination and then were subjected to our medical management strategy for severe idiopathic constipation [4]. In brief, a contrast enema was done to assess the degree and extent of colonic dilatation (Fig. 1). This also helped clean the colon. If needed, the patients were disimpacted. Fecal disimpaction was accomplished by administering large enemas 3 times a day for 3 days. If unsuccessful, a balanced electrolyte solution was given via a nasogastric tube while the enema regimen was continued. If still unsuccessful, patients underwent manual disimpaction under anesthesia. Complete disimpaction was confirmed by abdominal x-ray. Once the x-ray showed a clean colon, patients were started on an amount of a senna-based laxative that we estimated by the size of the colon on contrast enema. This dose was given, and an x-ray was obtained at 24 hours. In each 24-hour period over the course of 3 to 5 days, an abdominal x-ray was checked to ensure that the bowel movements completely emptied the colon. If not, the laxative dose was increased until the colon was completely emptied. If patients' stools were loose and the x-ray remained clean the laxative dose was decreased. The purpose of this management plan was to determine the "laxative requirement" of each patient. This was defined as the amount of laxative capable of completely cleaning the colon (radiologically demonstrated).

In most of our patients, we reached the laxative requirements, which were much higher than what the patients received in the past (Table 1). Once that point was reached, we explained to the family that they must continue the administration of that medication for life if they wanted to keep the patient free of symptoms. If the family was reluctant to administer such a large dose of laxative, the

Table 1 Summary of outcomes

Patients	Treatment	Outcome
256	Laxative only	Improvement of symptoms, resolution of soiling
17	Sigmoid resection	Reduction of laxative requirement [4,8]
15	Transanal rectosigmoid resection	More dramatic reduction of laxative requirement with a decrease from 68 mg senna/d to 8.6 mg senna/d, 6 patients no longer needed any laxatives



Fig. 2 Transanal exposure with preservation of the anal canal and beginning of the mobilization.

alternative was an operation (transanal resection). Eleven such patients decided to have the operation.

In 4 patients we were never able to determine the laxative requirement; when we reached a larger dosage of laxatives, the patient became very distended and vomited. The abdominal film showed enormously distended loops of colon full of liquid stool, yet the patients did not pass stool through the rectum. This group was considered medically nonmanageable and therefore was offered operative intervention.

1.1. Surgical technique

Patients were admitted to the hospital 2 days before surgery for bowel preparation. At the operation, patients were positioned in a prone jack-knife position. A lone-star retractor was used to expose the anal canal, with careful attention to protecting the dentate line. Full-thickness silk sutures were placed circumferentially proximal to the dentate line to provide uniform tension. A full-thickness (Swenson-like) dissection was begun 2 cm proximal to the dentate line and the of dilated

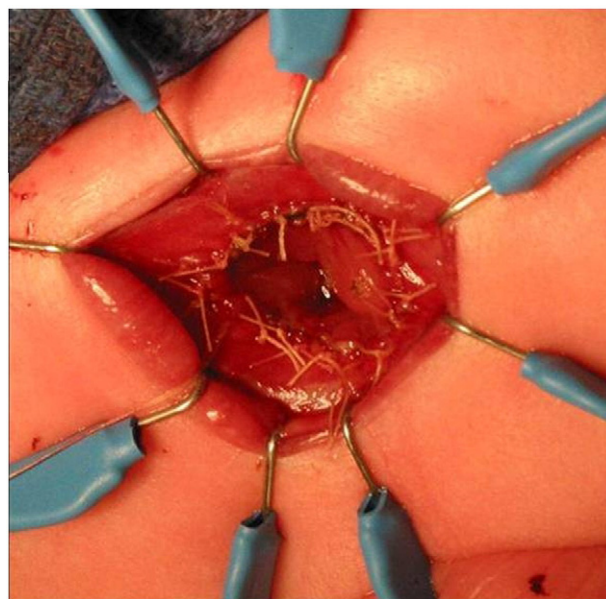


Fig. 4 Primary 2-layer colo-anal anastomosis.

rectum and colon were mobilized (Fig. 2). After opening the peritoneum, mesenteric vessels were ligated until the sigmoid colon was straightened and the normal-caliber colon reached (Fig. 3). The needed length was calculated preoperatively by measuring this on the contrast study. The bowel was transected and a primary 2-layer colo-anal anastomosis was performed (Fig. 4). Patients were maintained on total parenteral nutrition with nothing per mouth until postoperative day 7. At this time an abdominal x-ray was obtained to assess stool and gas progression. Patients were then allowed to eat and were started on a small dose of laxatives.

Changes in laxative requirements after surgery and postoperative stooling habits were assessed. Statistical analysis was performed to assess differences in these factors after operative intervention. This study was approved by our institutional review board (Cincinnati Children's Hospital Medical Center no. 06-01-03).

2. Results

Two hundred eighty-eight patients were referred to our care with severe idiopathic constipation over a 20-year



Fig. 3 The most dramatic of our cases. Ninety-eight centimeters of rectosigmoid was removed transanally.

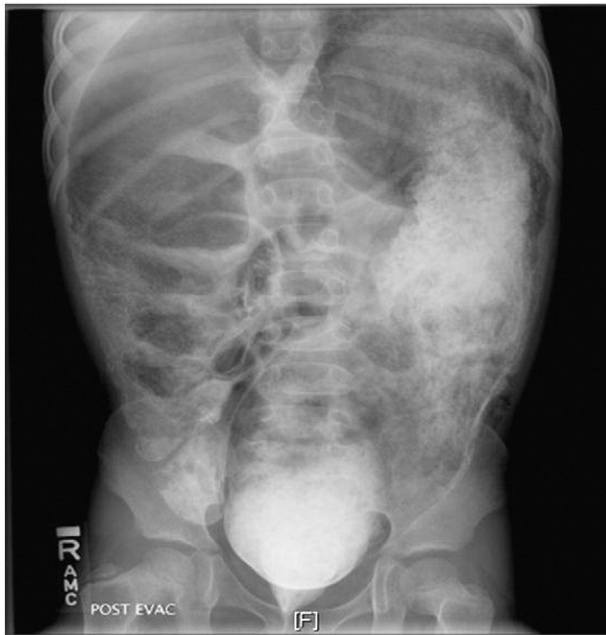


Fig. 5 The patient with diffuse colonic dilatation who required a second colonic resection.

period. Two hundred fifty-six (89%) patients were medically managed and did not require operative intervention. No referred patient in this group had Hirschsprung's disease. In all patients, soiling was eliminated after the laxative regimen was implemented. The intractable patients (32 patients, 11%) were offered surgery (Table 1). Seventeen received a sigmoid resection only (previously reported) [4,8]. In the current series, 15 patients underwent a transanal rectosigmoid resection with a primary colo-anal anastomosis. Age range at the time of surgery was 5 to 17 years. The preoperative contrast enemas in 14 patients demonstrated an enormously dilated rectosigmoid with a normal-caliber descending colon (Fig. 1). One patient had a diffusely dilated colon (Fig. 5) and needed a second resection because of persistent symptoms. Six patients had had colonic manometric studies with varying results including "diffuse hypermotility," "hypomotility," and "normal." An average of 43 cm (range, 8-98 cm) of rectosigmoid was resected. Of 14 patients with more than 3 months of follow-up, the preoperative laxative dose was 68 mg of senna/d (range, 52-95 mg), which decreased to 8.6 mg postoperatively ($P < .001$). Six patients no longer required any laxatives. Nine patients are clean without soiling, 1 is more prone to diarrhea, but is clean. Two patients soil occasionally, but are noncompliant, and 2 were lost to follow-up. One patient had a stricture at the colo-anal anastomosis that responded to dilation.

3. Discussion

A subset of patients with severe idiopathic constipation, refractory to medical therapy, will benefit from surgical

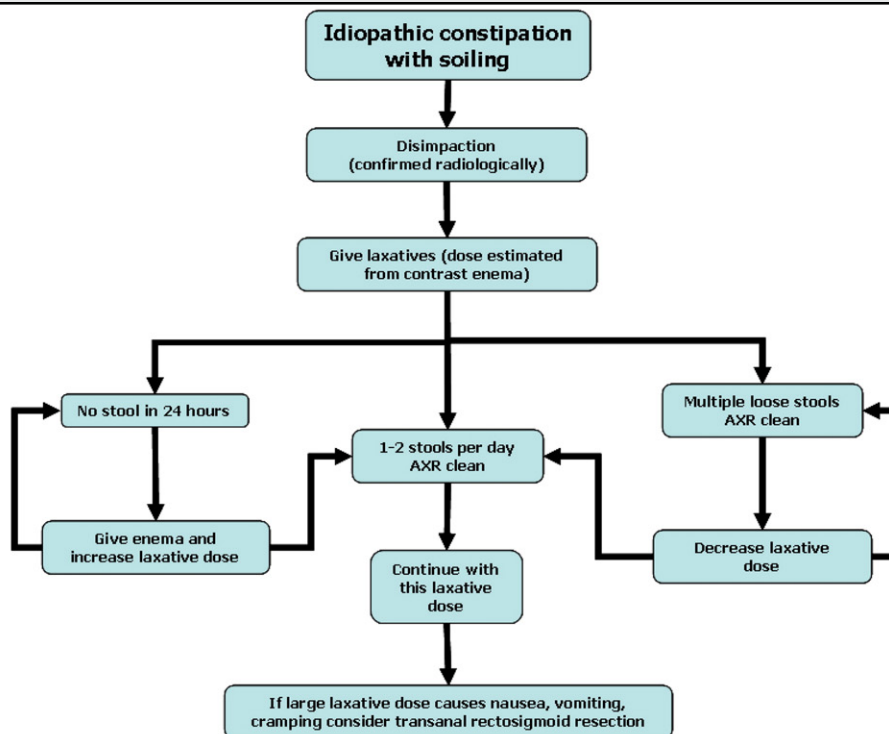
intervention. In this study we present our experience with a transanal full-thickness rectosigmoid resection and a primary colo-anal anastomosis. Patients had a significant reduction or elimination in laxative requirement, were continent post-operatively, and had an improved quality of life. We believe this approach is a novel minimally invasive alternative to treat this patient population.

The vast majority of patients with severe constipation can be managed medically (Table 2). In our series, only 11% of patients who were referred to our care ultimately underwent operative intervention. Clearly, appropriate preoperative evaluation and optimization of medical therapy are necessary to improve outcomes in these patients. Given that we are a referral center for these complex patients, and all were first seen by a pediatrician or a pediatric gastroenterologist, it is clear that the overwhelming majority of patients with severe idiopathic constipation do not need surgery; they just need the correct medical management.

The key components of our preoperative management were a contrast enema to guide therapy, fecal disimpaction proven radiographically, adequate laxative therapy, and close radiographic monitoring. This proved successful in the vast majority of patients and demonstrated that patients with soiling (encopresis) in fact had pseudoincontinence, and once their constipation was adequately managed, they stopped soiling [4]. With adequate laxative dosing, all patients demonstrated the capacity for voluntary bowel movements and clearly were only incontinent because of overflow.

From the contrast enemas, we were able to determine the degree and length of the dilated colon and rectum and also get a relative sense of the patient's dysmotility. Colonic manometry is used by many practitioners to evaluate idiopathic constipation [19,20]. Our experience with this modality demonstrated inconsistent results [4]. We find the contrast enema is more anatomically predictive of a dysmotile colon and use it for medical treatment and surgical planning. The patients in this study, who presented with preoperative manometric studies, had widely variable results. The colonic manometry did not affect our management and had no correlation with outcome. We believe a contrast enema is adequate to indirectly assess motility in the management of these patients but look forward to advances in manometric technology that may more objectively guide therapy in the future.

It is vital that fecal disimpaction be performed and confirmed by abdominal x-ray before laxative therapy begins because laxatives given to a child with an impacted colon will cause severe cramping. We routinely increase laxative requirements higher than conventional doses for patients. Many families are concerned about long-term laxative use. We do not know of any negative effect of this treatment other than the development of melanosis coli, which has no clinical importance, and the likelihood of needing increasing dosage over time. We consider the use of laxatives as a necessary medicine to treat a physiologic condition. For patients on significant doses and given this parental concern, surgery

Table 2 Idiopathic constipation with soiling algorithm

was offered, as we do not know for certain that there are not long-term negative effects of laxatives, despite the fact that none so far have been demonstrated. This tailored program successfully manages more children who otherwise have surgery as their only option. In fact, many of our medically managed patients had been told by other clinicians that they needed cecostomies, colectomies, and/or colostomies, but in fact needed laxatives alone.

From the laxative regimen, we can determine that the children have the intact components for continence, which include appropriate anal sensation and an intact sphincter mechanism. We found that all patients were capable of having voluntary bowel movements with elimination of soiling once they received adequate laxative treatment.

The goal of surgical management is to resect the dilated and hypomotile segment of rectum and colon identified on contrast enema, and to bring down the normal-caliber bowel, which begins somewhere in the sigmoid. A previously described approach to solving this problem was a transabdominal resection of the dilated sigmoid colon [6,21-23]. We have previously reported our experience with this technique [7] and have found a dramatic decrease in the laxative requirement. Patients had overall improvement in their quality of life but were subjected to a transabdominal operation, and over time, we began to realize they had limited improvement because of their residual rectum. The transanal rectosigmoid approach we believe is less invasive than our previous technique, and we believe that it will prove to be more effective in the long term.

Others have reported this same concern, that of needing to do a resection of dilated sigmoid and rectum in patients with idiopathic constipation. A proctocolectomy with a restorative J pouch for patients with severe constipation has been used [24]. Others have reported rectal resections including a low anterior resection with an ileo-anal anastomosis [25], Swenson endorectal (transabdominal) pull-through [26], and the Duhamel procedure [27]. Many of these studies were performed in both children and adults, with reported good results, but used a transabdominal procedure.

A major concern when performing a transanal rectosigmoid resection is the potential for postoperative fecal incontinence with the loss of the rectal reservoir. We postulate that because patients in this cohort had an intact sphincter mechanism preoperatively, they could handle any increase in motility created by the loss of the rectum. This is similar to the patient with ulcerative colitis who can maintain bowel control after colonic resection despite the hypermotility of the small bowel. The postoperative hypermotility with loose stool needs to be anticipated and can easily be managed. We discuss this possibility with families before surgery. We believe all patients with idiopathic constipation inherently have the components needed for continence. Patients are born with an intact anal canal and sphincter mechanism, and by preserving the dentate line, we preserve their ability to differentiate between solid, liquid, and gas. We also take special attention to avoid excessive stretching and retraction of the sphincters

during surgery, or by starting the dissection too close to the dentate line.

In our series we had 3 complications. One patient developed a stricture at the colon-anal anastomosis which required dilation. We believe this complication was because of excessive tension at the anastomosis. We learned that patients who present with a generalized dilatation of the colon (Fig. 5) may benefit from a more extensive colon resection at the initial procedure. These patients behave like they have colonic pseudoobstruction. Luckily, these patients are much less common. We learned this lesson in retrospect from this one patient who should have had a more extensive resection initially. Another patient had postoperative soiling and was more prone to diarrhea. They required medical (loperamide and pectin) and dietary management of these symptoms. Once the stool was brought to the right consistency, the soiling stopped.

Transanal rectosigmoid resection offers a less invasive alternative to the surgical management of patients with severe, medically intractable idiopathic constipation and a dilated rectosigmoid. Patients undergoing this procedure had improved quality of life, maintained continence, and had dramatically decreased laxative requirements.

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Discussion

Male voice: How do you decide where to stop when you're going transanally? What's the marker? Is it the bowel diameter? How do you decide where your proximal margin is?

Dr Martin: One way we decide is that on the preoperative contrast we're able to measure the extent of the dilatation. And so we have that as a target for the length that we're going to need to resect based on the length of dilation. So, as we're dissecting and we're getting close to that mark, we know that once we've reached that mark of the length that we need, that's probably enough. Also the splenic flexure limits the amount that we can take out, so there is a limit to how much we can take out transanally.

Dr Richard Ricketts (Atlanta, Ga): Is this a change from the former recommendation of a rectosigmoidectomy for what Dr Pena called megarectosigmoid? Is this a change in management?

Dr Martin: It is. This is Dr Pena's experience of the past 4 or 5 years. Previously he reported that his experience was to do a transabdominal sigmoid resection. Those patients initially had improved outcome. However, after a time they developed recurrent constipation. This was likely due to the retained rectum that developed dilation and caused constipation. The transanal approach is now his approach for patients with refractory symptoms.

Dr Marc Levitt (Cincinnati, Ohio): I want to elaborate on both those questions, which I think you answered beautifully. In response to the first question, we look at the contrast study and where the normal-caliber begins, that's as far as we need to go. The nice thing about the majority of these patients is they have an enormous rectosigmoid and the upper sigmoid is normal caliber. Now that's the surgeon's approach to the motility change, we don't yet have a great way of knowing physiologically where the good bowel begins. The clinical results show that it seems to be fairly accurate. In response to Dr Ricketts' question, yes, formally, again these are idiopathic constipation cases; this is not a rectal malformation and not Hirschsprung's idiopathic constipation. There is a large group on whom we did sigmoid resections. They did better, but they didn't get much better

and that was because of the residual rectum. And then we said why don't we apply a full resection of the bad bowel transanally. The major difference though in a rectal malformation patient is that I believe they need their rectum for the proprioception to help with continence. The idiopathic constipation patients have a normal anal canal and a normal sphincter so they can handle the hypermotility that you're inducing by bringing the upper sigmoid to the anus. And they do quite well; they've maintained their continence.

Male Voice: Do you ever do anal manometry to assess the anal sphincter pressure before and after the procedure? For instance when we did hemorrhoidectomies, the old tradition was an anal dilation. Whenever we do a transanal pull-through there's a fair bit of a stretching of the area.

Dr Martin: We have not done that. Almost every one of these patients came to us with anal and colonic manometry. The results were variable, some said hypomotility, some said hypermotility, and some said normal. Some said normal anal canal and some said abnormal anal canal. We basically stopped checking them and the clinical results speak for themselves, that the patients can handle and maintain their continence. We do not have great methods to objectively assess this, and these are clinical results, which seem to be working well. But you are correct; we are in great need of not only physiologic but also pathologic assessment of what is actually wrong with these patients.