



# Antegrade colonic enemas and intestinal diversion are highly effective in the management of children with intractable constipation

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## Abstract

**Purpose:** Intractable constipation in children is an uncommon but debilitating condition. When medical therapy fails, surgery is warranted; but the optimal surgical approach has not been clearly defined. We reviewed our experience with operative management of intractable constipation to identify predictors of success and to compare outcomes after 3 surgical approaches: antegrade continence enema (ACE), enteral diversion, and primary resection.

**Methods:** A retrospective review of pediatric patients undergoing ACE, diversion, or resection for intractable, idiopathic constipation from 1994 to 2007 was performed. *Satisfactory outcome* was defined as minimal fecal soiling and passage of stool at least every other day (ACE, resection) or functional enterostomy without abdominal distension (diversion).

**Results:** Forty-four patients (range = 1–26 years, mean = 9 years) were included. Sixteen patients underwent ACE, 19 underwent primary diversion (5 ileostomy, 14 colostomy), and 9 had primary colonic resections. Satisfactory outcomes were achieved in 63%, 95%, and 22%, respectively. Of the 19 patients diverted, 14 had intestinal continuity reestablished at a mean of 27 months postdiversion, with all of these having a satisfactory outcome at an average follow-up of 56 months. Five patients underwent closure of the enterostomy without resection, whereas the remainder underwent resection of dysmotile colon based on preoperative colonic manometry studies. Of those undergoing ACE procedures, age younger than 12 years was a predictor of success, whereas preoperative colonic manometry was not predictive of outcome. Second manometry 1 year post-ACE showed improvement in all patients tested. On retrospective review, patient noncompliance contributed to ACE failure.

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**Conclusions:** Antegrade continence enema and enteral diversion are very effective initial procedures in the management of intractable constipation. Greater than 90% of diverted patients have an excellent outcome after the eventual restoration of intestinal continuity. Colon resection should not be offered as initial therapy, as it is associated with nearly 80% failure rate and the frequent need for additional surgery.  
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Severe constipation can present a formidable management problem. Most cases of constipation, a condition that accounts for 25% of pediatric gastroenterology evaluations, respond to diet modification or medications. In the remainder, where the child has medically refractory constipation, treatment options are limited. Fortunately, these cases are infrequent. Affected children often experience chronic abdominal pain and bloating, fecal incontinence, frequent hospitalizations, and social withdrawal. For these cases, surgical management options need to be considered. Unfortunately, the relative effectiveness of the various surgical options is currently unknown. Although many studies have examined the outcomes after various operations in the treatment of chronic idiopathic constipation in adults [1,2], few have systematically explored this issue in children. The purpose of this study is to identify the most effective surgical approaches for the management of severe constipation in young patients.

Intractable constipation in children can result from a variety of causes, including colonic dysmotility, functional disorders of the anorectum, abnormalities of the pelvic floor, and behavioral disorders. A thorough evaluation is critical to target therapy appropriately. The workup often includes imaging to rule out mechanical obstruction and to assess for dilatation of the bowel, and a variety of functional assays, including anorectal manometry, sitz marker studies, colonic motility, and defecography, tailored to the child's symptoms. However, despite complete assessment, many cases remain idiopathic. Even in cases where colonic dysmotility is identified, no specific treatment is available. In all of these cases, achieving colonic evacuation is essential to minimize the symptoms of constipation and allow the child to regain a normal life.

Several surgical options have been described for the management of intractable constipation in children. These include colonic resection [3], intestinal diversion [4], and antegrade colonic enema (ACE) [5,6]. We reviewed our experience using these different approaches and find that diversion and ACE are both very effective in achieving good functional outcomes, whereas the results after resection are highly variable and often poor.

## 1. Methods

We performed a retrospective review of all patients treated surgically for intractable constipation by the Department of Pediatric Surgery at MassGeneral Hospital for Children.

Subjects met the criteria for *functional constipation* as defined by Rome III (Table 1) and for *intractable constipation*, defined as failure to respond to conventional therapy as described by the North American Society of Pediatric Gastroenterology and Nutrition [7,8]. Children younger than 4 years ( $n = 5$ ), who cannot strictly meet Rome III criteria, had encopresis and 2 or fewer defecations per week. After obtaining Institutional Review Board approval, 44 subjects were identified as having had an operation to treat constipation in the period from 1994 to 2007. The age of subjects ranged from 1 to 26 years at the time of the initial operation. All ileostomies, colostomies, bowel resections, appendicostomies, and cecostomies performed for intractable constipation were included. Length of follow-up was a minimum of 3 months. Patients were excluded if they had Hirschsprung disease, anorectal malformation, mechanical obstruction, or inadequate follow-up.

Preoperative evaluation included anorectal manometry (ARM) to exclude anal achalasia or a hypertonic anal sphincter as the cause of constipation. Those with abnormal ARM underwent botulinum toxin injection of the internal anal sphincter, as previously described [9]. Those who did not respond to botox and underwent additional surgery for their constipation were included in this study ( $n = 9$ ). Children with normal ARM or those failing to respond to botulinum toxin injection typically underwent colonic motility studies (30 of 44, 68%) or sitz marker studies. Other imaging studies, such as barium enema, were often performed as well, depending on the preference of the referring gastroenterologist and the surgeon. Rectal biopsy was always done as part of the initial workup to exclude Hirschsprung disease.

Age at procedure, sex, type of operation, results of preoperative studies, clinical and psychiatric diagnoses, pathologic diagnoses, postoperative continence status and stool frequency, and need for subsequent procedures were

**Table 1** Diagnostic criteria for functional constipation

Must include 2 or more of the following in a child with a developmental age of at least 4 y with insufficient criteria for a diagnosis of irritable bowel syndrome:

1. Two or fewer defecations in the toilet per week
2. At least 1 episode of fecal incontinence per week
3. History of retentive posturing or excessive volitional stool retention
4. History of painful or hard bowel movements
5. Presence of a large fecal mass in the rectum
6. History of large diameter stools that may obstruct the toilet

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