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Effectiveness of an organized bowel management program in the management of severe chronic constipation in children

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ABSTRACT

Background: Chronic constipation is a common problem in children. The cause of constipation is often idiopathic, when no anatomic or physiologic etiology can be identified. In severe cases, low dose laxatives, stool softeners and small volume enemas are ineffective. The purpose of this study was to assess the effectiveness of a structured bowel management program in these children.

Methods: We retrospectively reviewed children with chronic constipation without a history of anorectal malformation, Hirschsprung's disease or other anatomical lesions seen in our pediatric colorectal center. Our bowel management program consists of an intensive week where treatment is assessed and tailored based on clinical response and daily radiographs. Once a successful treatment plan is established, children are followed longitudinally. The number of patients requiring hospital admission during the year prior to and year after initiation of bowel management was compared using Fisher's exact test.

Results: Forty-four children with refractory constipation have been followed in our colorectal center for greater than a year. Fifty percent had at least one hospitalization the year prior to treatment for obstructive symptoms. Children were treated with either high-dose laxatives starting at 2 mg/kg of senna or enemas starting at 20 ml/kg of normal saline. Treatment regimens were adjusted based on response to therapy. The admission rate one-year after enrollment was 9% including both adherent and nonadherent patients. This represents an 82% reduction in hospital admissions ($p < 0.001$).

Conclusions: Implementation of a structured bowel management program similar to that used for children with anorectal malformations, is effective and reduces hospital admissions in children with severe chronic constipation.

Childhood constipation has an estimated prevalence of at least 3% and is among the most common gastrointestinal complaints in children [1,2]. Constipation accounts for 10% to 25% of referrals to pediatric gastroenterologists [2], with less than 5% of these children having an underlying cause identified [3]. Idiopathic or functional constipation is a diagnosis of exclusion when no anatomic, physiologic or histologic reason for constipation can be identified. The Rome III criteria have been created to help standardize the definition of functional constipation. By this definition, children must have at least 2 of the following symptoms per week: a maximum of 2 stools, an episode of incontinence, volitional stool retention, painful stools, large diameter stools, or a large fecal mass in the rectum [4].

The spectrum of constipation is broad, ranging from mild constipation that can be addressed with diet modification to severe, intractable disease requiring hospitalization for management. The condition can be debilitating and the consequences of constipation on a child's quality of life and social function are striking [5]. In the most severe cases, children with constipation have often failed dietary and medical management from primary care providers and gastroenterologists. We hypothesized that a structured approach to bowel management, similar to our program used for patients with anorectal malformations, would improve symptoms and decrease hospital admissions for obstructive symptoms in these children.

1. Methods

After obtaining approval from the Institutional Review Board, we conducted a retrospective review of all children seen in our pediatric colorectal center with the diagnosis of idiopathic constipation from January 2011 through July 2014. Our colorectal center has a dedicated, full-time nurse practitioner with oversight by a single pediatric surgeon. Typically these patients are referred to us by either their gastroenterologist or pediatrician after failing dietary and medical management. Patients were identified using our colorectal center database. Children were excluded if they had a history of anorectal malformation, Hirschsprung's disease, spina bifida, spinal cord injury, appendicostomy prior to referral or sacrococcygeal teratoma. They were diagnosed with idiopathic constipation based on the Rome III criteria and the absence of anatomic, physiologic or pathologic reason for their constipation [4].

Patient information including demographics, diagnostic studies, bowel regimen, success of bowel management, surgical interventions and hospitalizations before and after bowel management were

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collected from inpatient records and outpatient charts. Our review was primarily descriptive in nature. Fisher's exact test was used to compare hospital admissions the year prior to and year after initiation of bowel management.

1.1. Bowel management protocol

Children with severe chronic refractory constipation seen in our colorectal center initially go through an intensive week of tailored bowel management. This begins with a contrast enema the day before and an abdominal x-ray the day of clinic evaluation. These studies provide information regarding the diameter and length of the colon, stool burden and also provide catharsis. Motility is assessed based on contrast retention on the x-ray obtained the following day. Treatment plans are determined based on patient history in combination with the findings of these studies as described below. The goal of treatment is for patients to empty their colon daily and to be free of soiling.

Management plans consist of either high-dose senna-based laxatives or a daily large volume enema. Protocols to guide these treatments have been previously reported [6–8]. In older patients who have been toilet trained in the past but have soiling from pseudoincontinence or severe constipation without soiling, high-dose laxatives are initiated once the patient has been disimpacted. In patients who have never been toilet trained and have a history of soiling or in those patients with a megarectum we start with daily large volume enemas. We feel that it is important for a child to have been previously toilet trained prior to initiating a laxative program. This may be more easily accomplished with the initial use of enemas. Infrequently, children who do not tolerate retrograde enemas or laxatives, such as children with severe autism, undergo appendicostomy as initial therapy.

Laxatives are senna-based and started at a dose of 2 mg/kg. If the child does not have a bowel movement within 24 h a Fleets enema is administered to evacuate the distal stool and the laxative dose is increased. This process is repeated until the child has one to two soft bowel movements per day. Pectin is administered to patients receiving laxatives if the stool is loose in order to add bulk and increase the efficiency of the laxative. If a child is laxative intolerant, usually due to abdominal cramping, they are switched to enemas.

In patients who are placed on enemas, initially they are started on 20 ml/kg of normal saline. If normal saline alone is ineffective the following irritants are added in succession: glycerin (10–30 mL), Castile soap (1–3 packets, 9–27 mL) and phosphate (Fleet Enema) (30–120 mL). The patients are taught to hold the enema for 10 min, and then sit on the toilet for 30–45 min.

During the initial week of bowel management, a daily outpatient abdominal x-ray is obtained and the patients/parents are contacted by phone to evaluate treatment. Treatment regimens are adjusted based on the child's clinical and radiographic response. The treatment plan is considered successful when the abdominal radiograph is clear of stool in the rectum and left colon and the child has had no soiling.

An important difference between our bowel management program and those that have previously been published is that we do not require patients to return to clinic on a daily basis during the initial week of management. Specifically, following the initial evaluation we allow patients who do not live locally to return home and complete the program remotely. Our healthcare system is unique in that a single provider is responsible for a large percentage of patients within the region and has a central electronic medical record that allows us to review the daily radiographs. Radiographs from unaffiliated facilities are transmitted electronically. This allows us to minimize the disruption to daily activities of both the patient and their family and reduces the cost incurred. We believe that this distinction is important for 2 reasons. Firstly, it indicates that bowel management can be done successfully with less disruption to the family and while using fewer resources. Secondly, it is likely that our type of program includes patients who would not be able to stay in residence for several days. Residential programs likely have a group of patients who are highly self-selected. Our experience suggests that bowel management may therefore be more broadly applicable with expectations for success. Finally we hypothesize that the results may be more durable as the family is carrying out the regimen in their home setting rather than a clinical setting.

1.2. Follow-up

After a successful regimen has been initiated, children are followed closely for symptomatic changes with monthly telephone follow-up and office visits at 6-month intervals. After a child has been successful on enemas for 3–6 months we attempt a laxative trial. The weeklong laxative trial is performed as described above. Patients who are repeatedly unsuccessful with laxatives are given the option to continue retrograde enemas and try laxatives again in a 6–12 months or undergo an antegrade continence enema (ACE) procedure (Malone appendicostomy) [9]. Patients are also encouraged to undergo laxative trials periodically following appendicostomy. While segmental colon resection is not our preferred management practice, occasionally children with high laxative requirements or substantial enema needs are offered sigmoidectomy in an attempt to reduce the laxative dose or enema volume.

2. Results

Forty-four children with medically refractive constipation referred to our center have been followed for at least one year (55% male). These children represent the most severely constipated patients in our institution that evaluates an average of 500 children in the emergency department and 1080 children in the gastroenterology clinic yearly for constipation. On average, 102 children require admission for management of their constipation each year.

The median age at referral to our pediatric colorectal center was 8.6 years (range 2.6–16.8). Seventeen (39%) of these children have neurologic impairment or psychiatric diagnosis including autism, cerebral palsy, intrauterine drug exposure, chromosomal abnormalities and depression. Twenty-two (50%) children required a total of 30 hospitalizations for treatment of constipation the year prior to our evaluation, and 2 (5%) of these children required manual disimpaction under anesthesia (Table 1). Ten of these children had neurologic or psychiatric diagnoses. An additional 20 children have been enrolled in our bowel management program but do not yet have one year follow-up.

At one year after initiation of therapy, 28 (64%) patients were adherent with their prescribed bowel management program. Sixteen (36%) patients were either non-adherent (8) or have been lost to

Table 1
Characteristics of patients with chronic constipation followed more than 1 year.

Total = 44	Number (%)
Male	24 (55%)
Neurological diagnosis	17 (39%)
Cerebral Palsy	5 (11%)
Autism	4 (9%)
Depression/bipolar	3 (7%)
Intrauterine drug exposure	3 (7%)
Chromosomal abnormality	2 (5%)
Prior hospitalization for bowel cleanout	22 (58%)
Prior disimpaction under anesthesia	2 (5%)
On laxative therapy at time of referral	34 (77%)
Previously treatment by gastroenterologist	28 (64%)
Contrast enema findings	
Non-dilated, redundant	16 (36%)
Non-dilated	15 (34%)
Dilated rectosigmoid	11 (25%)
Global dilation	2 (5%)