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Idiopathic constipation: A challenging but manageable problem

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ABSTRACT

Purpose: A protocol to treat idiopathic constipation is presented.**Methods:** A contrast enema is performed in every patient and, when indicated, patients are initially submitted to a “clean out” protocol. All patients are started on a Senna-based laxative. The initial dosage is empirically determined and adjusted daily, during a one week period, based on history and abdominal radiographs, until the amount of Senna that empties the colon is reached. The management is considered successful when patients empty their colon daily and stop soiling. If the laxatives dose provokes abdominal cramping, distension, and vomiting, without producing bowel movements, patients are considered nonmanageable.**Results:** From 2005 to 2012, 215 patients were treated. 121 (56%) were males. The average age was 8.2 years (range: 1–20). 160 patients (74%) presented encopresis. 67 patients (32%) needed a clean out. After one week, 181 patients (84%) achieved successful management, with an average Senna dose of 67 mg (range: 5–175 mg). In 34 patients (16%) the treatment was unsuccessful: 19 were nonmanageable, 3 noncompliant, and 12 continued soiling. At a later follow-up (median: 329 days) the success rate for 174 patients was 81%.**Conclusion:** We designed a successful protocol to manage idiopathic constipation. The key points are clean out before starting laxatives, individual adjustments of laxative, and radiological monitoring of colonic emptying.**Treatment study:** Level IV.

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Idiopathic constipation is the incapacity or difficulty to pass enough stool regularly and efficiently. The cause of this condition is unknown [1,2]. It is by far the most common defecation and colonic motility disorder in children, and it is a common cause for surgical consultation [1–4].

Idiopathic constipation is a spectrum. Mild forms can usually be treated with dietary modifications and fiber whereas severe forms of constipation and encopresis are unresponsive to standard medical therapies. Extreme forms include cases with very severe symptoms that overlap in its manifestations with the condition known as “intestinal pseudoobstruction” [1]. These children suffer from abdominal pain, bloating, impaction and soiling that often result in a poor quality of life and delayed social development [1–3]. Some patients are also incapable of emptying their bladder, despite no recognizable spinal or neurologic abnormality, and have a higher rate of enuresis and urinary tract infections [5,6].

Patients with idiopathic constipation frequently undergo many medical consults and diagnostic exams, and they often suffer from anxiety or behavioral problems related to their constipation. Laxatives, bio-feedback, psychological treatments, electrical stimulation, Botox injection and enemas are frequently offered in attempt to improve their symptoms with variable results [7–10]. In some cases, surgical procedures are performed such as cecostomy tube placement, Malone procedure or different lengths of colonic resections, both transabdominal and transanal [11–14].

The literature describing these different treatment options for idiopathic constipation does not describe the magnitude of the patient's constipation, making it very difficult to interpret their results and apply them to our patients. Therefore, we designed a specific bowel management protocol adapted by trial and error to the magnitude of each patient's constipation. This trial and error protocol is implemented over a period of one week, taking daily abdominal radiograph films to evaluate the response to treatment, and modifying the dosage of laxatives accordingly.

The salient features of our protocol are:

- This condition is incurable but manageable.

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- Since this disorder is a spectrum with different magnitudes of constipation, every patient needs an individualized treatment regimen.
- The severity of the constipation is measured by the degree of dilation of the colon and the amount of senna laxative necessary to empty the colon on daily basis (radiologically demonstrated).
- The amount of laxative that each patient needs is different and is determined by trial and error.
- Patients with extreme constipation who failed to pass stool, became distended, and vomited after receiving laxatives 10–15 times higher than the recommended dosage are considered “resistant to medical treatment” and are therefore candidates for a surgical treatment.

The first step of our protocol consists in performing a water soluble contrast enema, without bowel preparation, to evaluate the characteristics of the colon and the degree of rectosigmoid dilation. If fecal impaction is diagnosed, he/she undergoes a clean out protocol before starting laxatives. The clean out protocol consists of the administration of three enemas per day for three days with daily radiological monitoring to objectively confirm successful emptying of the colon. The three enemas are: 1) normal saline + liquid glycerin, 2) normal saline + fleet enema, 3) normal saline + castile soap. If the patient remains impacted, he/she is admitted to the hospital and receives Golytely® (25 ml/kg/h) through a nasogastric tube for 2 days in addition to the enemas. If fecal impaction persists, as radiologically demonstrated, the patient is then taken to the operative room for manual disimpaction under anesthesia.

Once the colon is confirmed clean on the abdominal radiograph, the trial and error protocol is started with a Senna based laxative. The initial dose is arbitrarily determined based on the magnitude of the colonic dilation as seen on contrast enema. The parents are instructed to record the number and consistency of bowel movements during the next 24 h. If there is no bowel movement in 24 h, the parents are instructed to give an enema to clean out the colon, and the laxative dose is increased by 15 mg on that same day. If the patient has multiple liquid bowel movements, the laxative dose is decreased by 7.5 mg of Senna.

This trial and error protocol is followed during the one week period until the abdominal film shows a clean colon. The goal is to reach the point where the patient adequately empties his/her colon on daily basis with radiologic confirmation. The dosage of senna laxative required to reach that point, is considered an objective measure of the magnitude of the patient's constipation. The family is then educated that the patient must receive at least that amount of laxative daily on a permanent basis to avoid fecal impaction and soiling.

1. Material and methods

We performed a single institution retrospective review of patients with idiopathic constipated patients treated with our laxative protocol, from June 2005 to October 2012 at Cincinnati Children's Hospital Colorectal Center. Data about gender, age, coexistence of other medical conditions, soiling (pre- and posttreatment), previous episodes of impaction, fecal impaction upon presentation, laxative requirement, magnitude of colonic dilation, and redundancy observed in the contrast enema, were abstracted. Patients with incomplete medical records and patients previously subjected to rectosigmoid resection, either by our surgeons or at other facilities, before participating in the laxative management week were excluded from the study. Patients affected by conditions such as anorectal malformations, Hirschsprung's disease, spina bifida, tethered cord, Down syndrome, thyroid anomalies, cerebral palsy, and mitochondrial anomalies were also excluded from the study.

A laxative trial was considered successful when the daily dosage of laxative required to empty the colon, as confirmed by a clean colon on abdominal radiograph, was reached, and the patient remained clean in his/her underwear.

Patients in whom the program was unsuccessful were divided in three different categories: nonmanageable (if they required an

enormous amount of laxative that provoked severe symptoms of abdominal distension, cramping, and vomiting, without producing bowel movements); persistent soiling (patients who still had soiling even though we found the laxative dose that produced a daily bowel movement and emptied their colon as confirmed radiologically); noncompliant (patients that did not take the prescribed amount of Senna either for social reasons, economic barriers, or cultural beliefs).

In patients that were considered nonmanageable, a colonic resection was offered in attempt to reduce the amount of Senna that they needed to empty their colon.

The water soluble enemas were also reviewed and the presence of dilation or redundancy was recorded. In order to determine if the laxatives requirement could be predicted based on the contrast enema, we measured the recto pelvic ratio (diameter of the rectal width divided by the diameter of the transverse line of the pelvis which is the greatest horizontal diameter of the pelvis) (Fig. 1) and correlated it to the dose of laxatives needed to completely empty the colon. In the literature, this index has been used to provide objective and reproducible values for the size of the rectum [15]. Patients with a recto pelvic ratio greater than 0.61 were defined as having megarectum [16].

Student's *t*-test was used to compare continuous data and Fisher's exact test and chi-squared test were used to compare categorical variables.

IRB approval was obtained for this study (# 2012–3653).

2. Results

A total of 275 patients affected by idiopathic constipation, with age from 11 months to 20 years old were identified. Sixty patients were excluded from the study because they did not meet the inclusion criteria (Table 1). Therefore, 215 patients were included in the study. Among these patients, 121 (56%) were male and 94 (44%) female. Relevant comorbidities are presented in Table 2.

The average age at presentation was 8.2 years (range 1–20), and 201 (94%) of patients were greater than 3 years old, the typical age at which children become potty trained.

The information about the duration of constipation symptoms was available for 148 patients: 55 (37%) of them had constipation symptoms since birth and 93 (63%) of them developed constipation after the newborn period, most commonly after the introduction of solid foods. The average duration of symptoms for patients that presented with constipation later in childhood was 54 months.

2.1. Presenting symptoms at first visit at the colorectal center

160 patients suffered from encopresis (overflow pseudoincontinence), with a similar distribution between the two sexes.

Owing to episodes of fecal impaction 109 patients (59%) were previously admitted to the emergency room, this information being available for 186 patients.

2.2. Treatment at the colorectal center

Radiographic evaluation demonstrated a normal sacrum in all patients. On water soluble contrast enema, 142 patients (66%) had a megarectosigmoid (Fig. 2) and 19 (9%) had a generalized dilation of the colon (Fig. 3) (Table 3). The recto pelvic ratio was measured in 208 patients. The average value was 0.71 and 182 (88%) patients that had a megarectum, defined as having a recto pelvic ratio greater than 0.61 [16].

67 patients (32%) needed clean out with enemas prior to starting our laxative protocol. Among these patients, 8 (4%) were admitted and received Golytely® through a nasogastric tube. No patients required manual disimpaction under anesthesia.

The average daily dose of Senna administered at the beginning of the laxative trial was 61 mg (range 15–165 mg). At the end of the week the

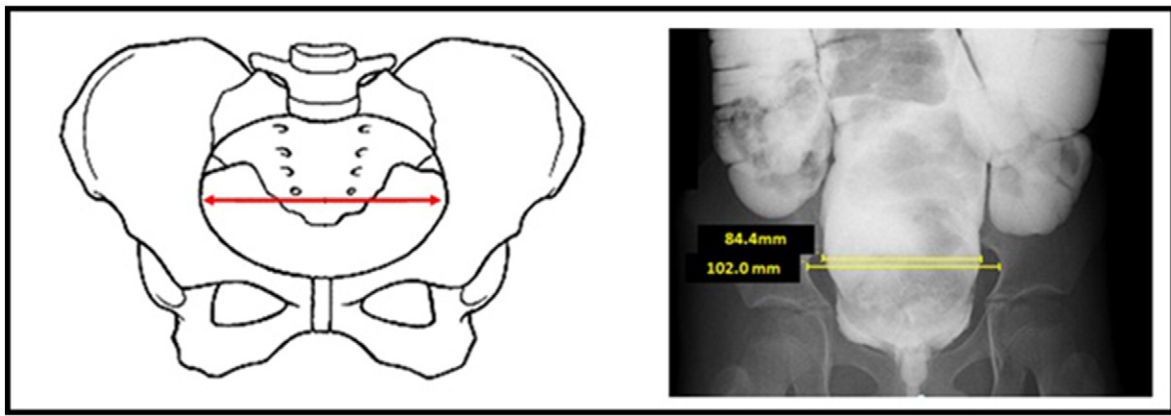


Fig. 1. The arrow in the left image shows the linea transversa which is the biggest diameter of the pelvis. In the contrast enema, the biggest diameter of the rectosigmoid and the linea transversa are marked. By dividing the biggest diameter of the rectosigmoid by the linea transversa we were able to calculate the recto pelvic ratio for every patient. In this case: $84.4/102.0 = 0.83$.

average dose was 69 mg (0–180 mg). The average dose of Senna was not significantly different between patients with megarectosigmoid or dilated colon throughout (68 mg vs 74 mg).

The laxative requirement was directly related to the patient's age but was not related to the recto pelvic ratio (Fig. 4).

175 patients received soluble fiber together with the laxative treatment. Fiber was used to improve the consistency of the stool, when they were too liquid from the laxative usage. Recommended fibers included Benefiber®, Citrucel®, and pectin and were prescribed at a dosage varying from one to three tablespoons per day.

The laxative protocol was successful (clean underwear and clean colon on abdominal radiograph) in 181 (84%) patients out of 215. Patients in whom the treatment was not successful were younger than those in whom it was successful (7.6 versus 8.3 years old). The rate of failure among developmentally delayed patients was significantly higher if compared to nondelayed patients. The average amount of Senna was not significantly different in cases in whom the treatment was successful or unsuccessful (67 vs 81 mg, respectively). Moreover, the recto pelvic ratio was not significantly different between patients that responded successfully to laxatives as compared to patients that did not respond successfully (0.70 vs 0.71, *p*-value 0.66).

Among the patients in which the laxative protocol was considered not successful (*n* = 34), 19 were considered nonmanageable, 12 were still soiling despite having daily bowel movements and a clean colon on abdominal radiographs, and 3 were not compliant.

The most common side effect experienced by patients was cramping (*n* = 47). This group of patients required a significantly higher amount of senna as compared with those that did not complain of cramping (96 mg compared to 62 mg). Besides cramping, no other side effects were observed related to the use of Senna.

2.3. Surgical procedures

Out of the 215 patients who underwent the laxative protocol, 41 (19%) ultimately underwent colonic resection. This group deserves a separate, special discussion in a future publication.

2.3.1. Follow-up

Fifty-two patients (24%) had follow-up for less than 30 days, therefore we considered them lost to follow-up. The patients that were lost to follow up were evenly distributed among the ones that responded to laxatives and those who did not respond. The mean follow-up for the remaining 163 patients was 329 days (range 31–2612 days). After the end of the week-long laxative trial, the patient's response to the laxatives was monitored remotely with telephone and e-mail contact and occasional abdominal films. Among patients with follow-up, 99 patients (81%) maintained successful response to laxatives. In 40 patients, it was necessary to increase the daily laxative dose from the prescribed dose at the end of the laxative trial week (the increase varied from 5 mg to 93 mg of Senna). In 24 patients, the Senna dose was decreased at follow-up (the decreased varied from 2.5 mg to 74 mg of Senna). 30 patients continued to receive the same amount of Senna they received at the end of the laxative trial. For 5 patients, the information regarding the amount of Senna received at follow up was not available.

2.4. Previous therapies and procedures

All of our patients were taking or had taken other laxatives prior to our laxative trial. The most common laxative patients had taken previously was Polyethylene Glycol (Miralax®) (97%), followed by Senna

Table 1

Exclusion criteria and number of patients excluded for each criteria.

Reason for exclusion	No. of patients excluded
Incomplete medical record	29
Colonic resection before laxative protocol	17
Down syndrome	5
Mitochondrial disease	3
Hypothyroidism	2
Cerebral palsy	2
Spinal intervention before laxative protocol	2

Table 2

Characteristics of our series of patients and prevalence of behavioral problems and developmental delay among the patients.

Total number of patients	215
Males	121 (56%)
Females	94 (44%)
Age	8.2 y.o. (1–20 y.o.)
Developmental delay	29/215 (15%)
Behavioral problem	55/215 (27%)
Autism	12/55 (22%)
ADHD	23/55 (42%)
Anxiety/depression	16/55 (29%)
Other	11/55 (20%)
Idiopathic rectal prolapse	11/223 (5%)

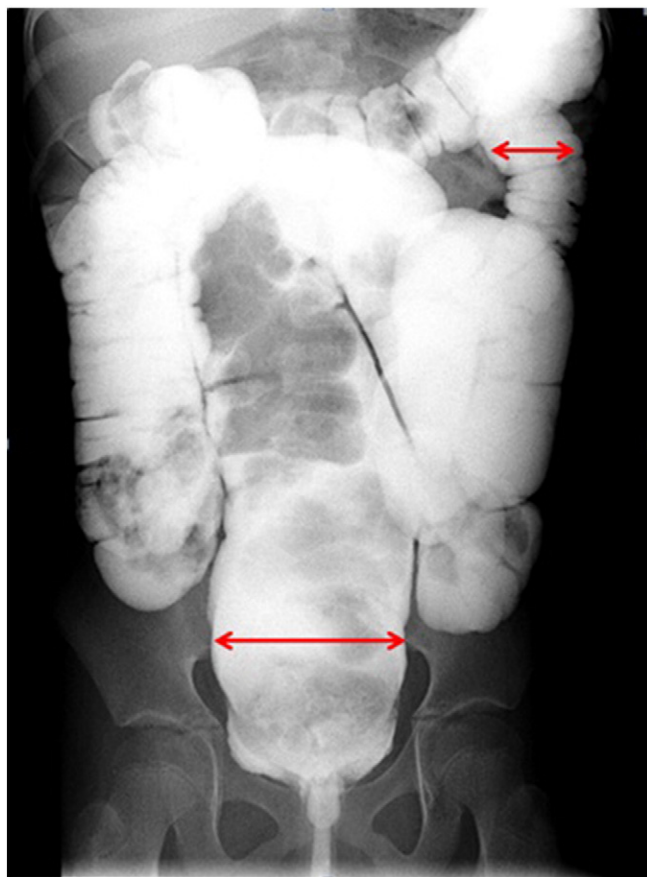


Fig. 2. The contrast enema of a patient with a dilated rectosigmoid. The two arrows show how the size of the sigmoid colon is bigger than the size of the rest of the colon.

(41%), Milk of Magnesia® (14%), Bysacodyl® (11%), Amitza® and Colace® (6%). The average daily dose of Miralax taken by the patients was 25 mg a day while the average daily dose of Senna taken by the patients was 33 mg per day. In all cases the laxative dose previously given was inadequate and constipation symptoms persisted. Additionally, 36 patients (19%) were regularly receiving enemas for the treatment of constipation.

Before referral to our center, 29 children (13%) underwent some procedure. The most common procedure used for treatment of constipation was botox injections ($n = 16$). Additional procedures patients underwent for treatment of their constipation included anal sphincter myectomy ($n = 5$), cecostomy $n = (5)$, and appendicostomy/MACE procedure ($n = 4$). One child underwent myectomy, botox injection and MACE procedures while another child underwent 7 botox injections. While some of these patients had temporary improvement after the procedure, eventually the constipation worsened in all patients.

3. Discussion

We believe that the vast majority of patients with severe constipation can be managed medically, with an appropriate evaluation and an individually designed laxative protocol as demonstrated in our series.

We believe that the diagnosis of idiopathic constipation is a clinical one. We also found the contrast enema performed with a hydrosoluble material to be a valuable diagnostic tool to confirm the diagnosis [1].

Rectal dilation in the contrast enema did not predict the amount of laxatives needed to completely empty the colon. This finding reinforces the importance of a trial and error approach over a one week period with radiologic evaluation.

Clean out with enemas was needed in 30% of our patients prior to initiation of the laxative protocol (Fig. 5). This represents a key step in

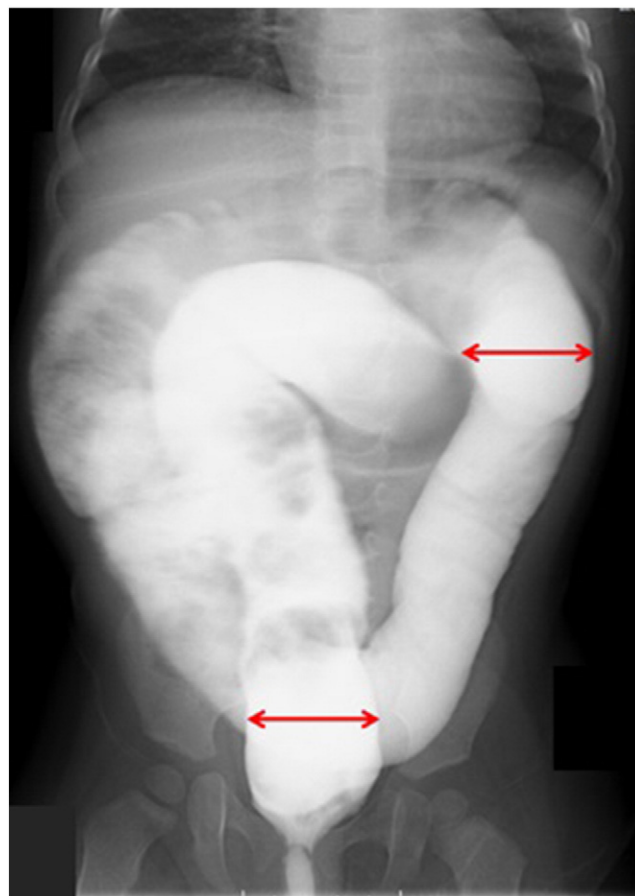


Fig. 3. The contrast enema of a patient with a dilated colon throughout. The two arrows show how the size of the sigmoid colon and of the rest of the colon is similar.

our program since our goal is to determine how much laxative the patients need to daily empty their colon adequately (Fig. 5). We are very proud that with our clean out protocol, we have been able to avoid manual disimpaction under anesthesia. We also believe that the active participation of the patient during the process of clean out helps them understand the importance of following our recommendations for long-term management of his/her constipation.

With this protocol, we achieved a success rate of 84% immediately after the one week laxative protocol and 81% at follow-up. All of the patients in whom our management was successful had previously been prescribed laxatives and failed. This emphasizes the importance adjusting laxative dosage on an individual basis and by trial and error with radiologic demonstration.

An unnecessary surgical procedure was performed in 13% of our patients prior to the referral to our Colorectal Center. Botox injections may give a temporary improvement of symptoms but eventually the symptoms persist. Therefore, we do not recommend Botox injections for the management of idiopathic constipation. Myectomies are controversial procedures, frequently performed without scientific basis. We do not perform them. Cecostomies or operations to administer antegrade

Table 3

Features of the colon at the water soluble enema according to the presence of dilation.

Colonic dilation at contrast enema	
Dilated rectum and or sigmoid	142
No or minimal dilation	42
Dilated colon throughout	19
Dilated right colon	6
Total	209

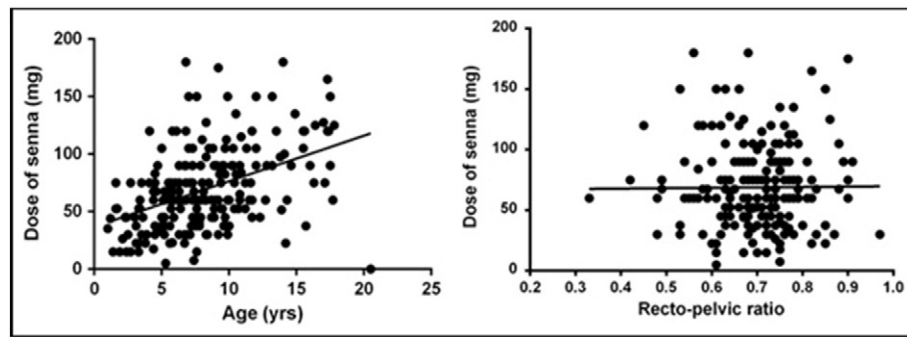


Fig. 4. Chart on the left shows the relation between the age of the patient at the beginning of the laxative protocol and the dose of senna required to empty the colon at the end of the laxative protocol. Chart on the right shows the relation between the rectopelvic ratio and the dose of senna that the patient required to empty the colon.

enemas represent an alternate route of administration of enemas. We believe that most patients do not need enemas to treat constipation. We highly recommend this protocolized medical management of constipation prior to any invasive procedure. Enemas could be considered in the group that did not respond to our protocol, as an alternative to an operation.

In the literature, we could not find any publication that describes the magnitude of the constipation with objective criteria other than the number of bowel movements per day. We believe that this is not an objective method because we sometimes see patients with severe forms of stool accumulation that have many “bowel movements” per day. We think that the laxative dosage is individual, not weight dependent, and that the dosage required to achieve a clean colon radiologically measures the magnitude of the problem.

An abdominal radiograph is the only way to prove that the colon is empty. In our series, the dose of laxatives that the patients needed to empty their colon was, as expected, directly related to their age. However many exceptions were present and we should not consider age as a predictor of laxative requirement.

The recto pelvic index was not related to the laxatives requirement. This is probably because of the fact that it is based on a two-dimensional measure and that it only takes into consideration the size of the most distal part of the rectosigmoid and not the entire colon.

An older age and normal mental development seemed to correlate, although not significantly, with the rate of success of our management. This is expected because younger children and children with developmental problems are more likely to be more affected by the cramping that the laxatives can cause.

In the literature we were able to find only one publication about systematic use of Senna for childhood idiopathic constipation in a series of 21 patients [17,18]. Most of the studies published about idiopathic

constipation are trials to compare the effectiveness of Polyethylene Glycol® with other osmotic and stimulant laxatives; no systematic use of Senna had been reported in the literature [18]. In our experience Senna (used with much higher doses than the ones recommended in the literature), has revealed to be an effective and safe stimulant laxative. Other than abdominal cramping, no other side effects were reported in our series. In the literature a few cases of senna-induced dermatitis have been reported in the past and the carcinogenic potential of chronic use of senna has been extensively excluded by both retrospective and prospective studies [19,20].

We believe that a long-term follow-up with continued adjustment of the laxative dose is crucial for a long-term success. Unfortunately, 24% of the patients in our series had a follow-up shorter than 1 month. We do not know what the reasons for lost to follow-up were.

Some physicians prescribe laxatives for a short period of time and then decrease the dose gradually until stopping the laxative based on the idea that idiopathic constipation is curable [21]. We do not recommend tapering/decreasing the dose since we believe that idiopathic constipation is a chronic, not curable, disease. However, we believe that idiopathic constipation is a manageable condition that requires long term treatment and follow-up.

It is clear that the overwhelming majority of patients with severe idiopathic constipation do not need surgery. Rather, they only need an appropriate evaluation and correct medical management [4].

4. Conclusions

Idiopathic constipation is a spectrum, and in its extreme forms, represents a therapeutic challenge. Using a protocol based on the idea that every patient is different and that each one requires a different quantity of laxative, it is possible to improve the results of treatment. A contrast

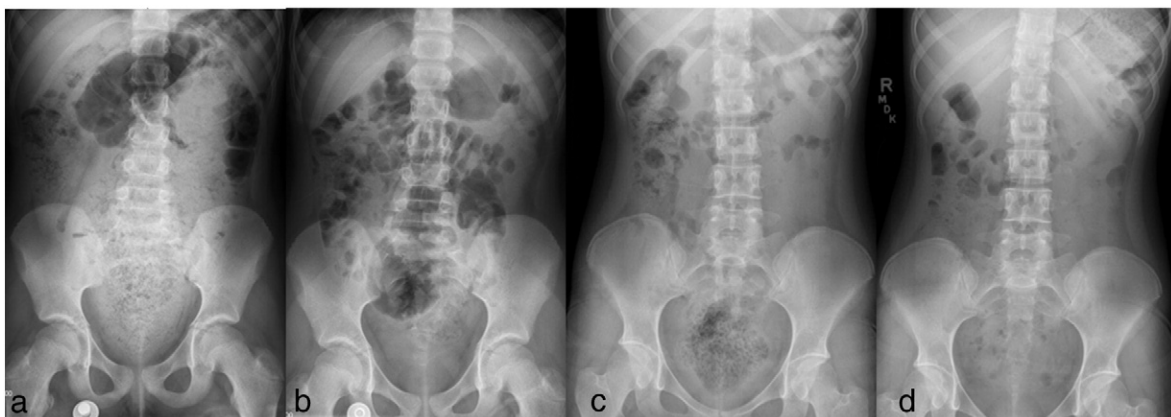


Fig. 5. Abdominal radiographs during a bowel management week showing: a) fecal impaction, b) successful clean out with enemas, c) abdominal radiograph on beginning of the week showing stool in the rectum, d) abdominal radiograph in the end of the week on 60 mg of senna.

enema is a useful diagnostic tool to confirm the diagnosis of constipation and to assess the degree of colonic and sigmoid dilation. The dose of laxatives initially administered is arbitrary and has to be adjusted during the following days accordingly to the patient's reports and amount of stool in the colon as seen in the abdominal films. Regular long term radiologic monitoring is vital, as it is the only objective way to determine the effect of the laxative. The laxative requirement in these patients seems to be much higher than what is normally prescribed. Surgery should be reserved for nonmanageable cases, if not to cure them, then to attempt to make laxatives more effective in these patients.

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