A SPECIAL ARTICLE

Functional Fecal Retention in Childhood

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A careful history and physical examination will help to differentiate between functional fecal retention and fecal retention due to neurological, anatomical or organic disease. Most children with functional fecal retention require no or minimal laboratory work-up. Successful treatment of functional fecal retention requires a combination of parent and child education, behavioral intervention including toilet sitting, laxative therapy, and long-term compliance with the treatment regimen. Almost every patient will experience dramatic improvement, but significantly more children receiving behavioral intervention plus laxative therapy improved and recovered compared with those receiving behavioral intervention alone. Recovery rates are 50% after one year and 48%–75% after 5 years. There is no evidence that biofeedback training adds any benefit to the behavioral plus laxative treatment in the management of functional fecal retention with encopresis.

Constipation in children has been defined as a delay or difficulty in defecation, present for two or more weeks, and sufficient to cause significant distress to the patient (1). Functional constipation is defined as constipation not associated with abnormalities or intake of medication. British parents reported that 34% of school-aged children suffered from constipation. In 5% of these otherwise healthy children, the constipation was chronic, lasting for >6 months (2). A complication of longstanding functional constipation is functional fecal retention. Fecal retention can be diagnosed when a hard mass is palpated in the lower abdomen, or when the rectal examination reveals a dilated rectum filled with a large amount of stool, or when the abdominal radiograph demonstrates excessive stool throughout the colon.

Others have defined functional fecal retention by a history of at least 12 weeks of passage of large diame-

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Table 1
Causes of Fecal Retention

(A) Functional constipation is the most frequent cause (90-95%)

(B) Drugs
- Methylphenidate
- Phenobarbital
- Antidepressants
- Opiates

(C) Anorectal malformations
- Imperforate anus
- Anal stenosis

(D) Neurologic causes
- Meningomyelocele
- Tethered cord
- Spinal trauma
- Neurofibromatosis
- Hirschsprung's disease
- Hypotonia
- Cerebral palsy
- Neuromuscular disorders

(E) Endocrine, metabolic and gastrointestinal disorders
- Hypothyroidism
- Diabetes mellitus
- Hypercalcemia
- Hypokalemia
- Renal tubular acidosis
- Cystic fibrosis
- Gluten disease

ter stools at intervals <2 times per week and retentive posturing (3). Retentive posturing is done to avoid defecation by purposefully contracting the pelvic floor. As the pelvic floor muscles fatigue, the child uses the gluteal muscles, squeezing the buttocks together. Retentive posturing is often done by extending the body and contracting the anal canal and the gluteal muscles in infants. The toddler often rises on the toes, holds the legs and buttocks stiffly, and rocks back and forth holding on to a piece of furniture when the urge to defecate is perceived while other young children will sit on their buttocks with the heel pressed against the perineum or sit on the ground. In this way the defecation is avoided for several days, causing fecal accumulation in the rectum and colon. Older children with functional fecal retention often have no retentive posturing, but may have done so in the past. Functional fecal retention in infants often starts with a painful bowel movement, in toddlers it may coincide with toilet training, and in older children may coincide with the beginning of going to school a full day.

Functional fecal retention is the most common cause of encopresis in children. Encopresis is a term that refers to the repeated involuntary but occasionally intentional passage of feces into inappropriate places after the mental age of 4 years without any underlying organic cause (4). Encopresis is most often due to underlying functional fecal retention, but occasionally can occur without fecal retention often referred to as non-retentive fecal soiling (3,4). Encopresis is reported to affect 2.8% of 4-year-olds, 1.9% of 6-year-olds, and 1.6% of 10- to 11-year-olds. Boys are more commonly affected than girls.

Encopresis and/or chronic abdominal pain are the most common symptoms of fecal retention. When the child finally passes the large painful stool it reinforces the child's conviction that defecation is an unpleasant or painful experience. In the days following the passage of this large stool, the child will feel well, eats well, has no abdominal pain, and encopretic episodes are absent or greatly reduced. In some children the large fecal mass is never passed and their parents are not aware of the underlying fecal retention. These children leak frequently small amounts of stool or often have continuous fecal soiling.

Rare organic conditions should be considered and ruled out in every child with fecal retention. The list of diseases causing fecal retention is long, but organic conditions are rare and can be due to anorectal malformations, due to neurogenic causes such as spinal disorders or Hirschsprung's disease, and is often seen in children with cerebral palsy, generalized hypotonia or mental retardation. Other causes are endocrine, metabolic and gastrointestinal disorders (Table 1).

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EVALUATION

History

The history should include information regarding the general health of the child and the presenting signs and symptoms which include the stooling habits. A careful history needs to elicit the intervals, amount, diameter, and consistency of bowel movements deposited into the toilet and of stools deposited into the underwear. The amount, intervals, diameter and consistency of bowel movements is important because some children may have daily bowel movements but evacuate incompletely, as evidenced by periodic passage of very large amounts of stool of hard to loose consistency.

Do the stools clog the toilet? Is stool withholding present? What was the age at onset of constipation and of soiling? Was there a problem with the timing of passage of meconium? The character of the stools from birth is reviewed for consistency, caliber, volume and frequency. Was there a precipitating event, such as an anal fissure with blood on the stool, an episode of anal streptococcal infection, lichen sclerosus and atrophicus, sexual abuse, hospitalization? Is the child aware of the encopretic event? Is abdominal pain present? Severe attacks of abdominal pain can occur either just before a bowel movement, for several days prior to a large bowel movement, or daily. Many children suffer from vague chronic abdominal pain. Daytime wetting, nighttime wetting, and urinary tract infection are common in these children (5).

What are the dietary habits? At what age was cow's milk introduced into the diet and did that cause problem? The history should address the emotional and social adjustment of the child. The clinical features of children with functional fecal retention are listed in Table 2.

Table 2
Clinical Features of Functional Fecal Retention

Difficulties with defecation began early in life (in 49% before 1 year of age)

Infrequent passage of voluminous bowel movements into the toilet

Obstruction of the toilet by the stools

Symptoms due to fecal retention
- Retentive posturing
- Encopresis, which can consist of just a smear, a small or a large BM
- Abdominal pain and anal or rectal pain (in 50%)
- Anorexia

Urinary symptoms
- Daytime urinary incontinence
- Nighttime urinary incontinence
- Urinary tract infection

Behavior
- Nonchalant attitude regarding the encopresis
- Hiding soiled underwear
- Unaware of the offensive odor

Physical Examination

The physical examination should be thorough in order to rule out an underlying disorder. Weight and height should be plotted. Often an abdominal fecal mass is felt on abdominal examination. Sometimes the mass extends throughout the entire colon but more commonly the mass is felt suprapubically and midline, sometimes filling the left or the right lower quadrant. External examination of the perineum and perianal area may show fecal material, anal irritation or fissures. The rectum is packed with stool, either of hard consistency or, more commonly, the outside of the fecal impaction feels like clay and the core of the fecal retention is rock hard. Sometimes the retained stool is soft to loose. A low anal pressure during digital rectal examination suggests either fecal retention with inhibition of anal resting pressure, a disease involving the external or internal anal sphincter, or both. The neurologic examination should include perineal sensation testing in cooperative children using a Q-tip. Loss of perianal skin sensation can be associated with various neurologic diseases of the spinal cord.

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Laboratory investigation

A careful history and physical examination including the rectal examination will help to differentiate functional fecal retention from fecal retention due to anatomic, neurologic or organic disease. A history of painful defecation, passage of huge stools at infrequent intervals, and retentive posturing are diagnostic for functional fecal retention. Some children with functional fecal retention have several bowel movements per day and never or rarely eliminate a huge stool. Documenting a large fecal mass in the rectum confirms the functional fecal retention. A careful physical examination is necessary to provide reassurance to the clinician and parents that there is no evidence for disease. Anal stenosis and Hirschsprung's disease are ruled out by a normal size anal canal with a dilated rectum on physical examination.

Most children with functional fecal retention require no or minimal laboratory work-up. Minimal work-up may include blood studies, urine culture and abdominal radiographs. A plain abdominal film can be very useful in some children for assessing the presence or absence of retained stool and its extent; whether or not the lower spine is normal; in a child with absence of a fecal mass on abdominal and rectal examination; in children who vehemently refuse the rectal examination; in children who are markedly obese; and in children who come for evaluation who are already on laxative treatment. Failure to appreciate the degree of stool retention can lead to erroneous treatments or further delay effective treatment.

TREATMENT

Very few controlled studies in children with functional fecal retention have been performed, and therefore, evidence for the quality of the different treatments are rarely derived from prospective randomized studies (6–8). The evidence comes from well designed cohort studies and case control studies, and often is the opinion of a respected clinician and researcher working with these children (9–15).

Most children with functional fecal retention will benefit from a precise, well-organized plan. The treatment is comprehensive and has four phases including 1) education; 2) removal of the fecal retention; 3) prevention of re-accumulation of stools through reconditioning to normal bowel habits and laxative use, and 4) withdrawal of treatment.

1. EDUCATION

For some children and their parents, education is the start of successful management. The child and parent are told that many children are troubled with this condition, and that we understand the condition and its treatment. We explain normal defecation to the child and parents. We discuss realistic expectations for response to therapy. We stress that months to years of treatment will be necessary. In most cases, a detailed plan eliminates the parents' and the child's frustration and improves compliance with the prolonged treatment necessary.

2. DISIMPACTION

Disimpaction can be accomplished with hypertonic phosphate enemas, hyperosmolar milk of molasses,

Table 3
Removal of Fecal Impaction

(A) Rectal route
- Phosphate enema (30 mL/5 kg body weight, >1 year of age 135 mL)
- Older children who do not respond to phosphate enemas can be disimpacted with a hyperosmolar milk of molasses enema (1:1 milk and molasses) with the infusion stopped when the child indicates discomfort (200–600 mL).
- Mineral oil enema followed by a phosphate enema (30 mL/5 kg body weight, >1 year of age 135 mL

(B) Oral route
- Polyethylene glycol electrolyte solution given orally or by nasogastric tube, until clear fluid is excreted through the anus. Large volumes were necessary for disimpaction. The average was 12 liters given over 23 hr at 14 to 40 mL/kg/hr in children 1–18 years of age (21).
- For a child who vehemently fears enemas, the fecal mass can be softened and liquefied with large quantities of oral laxatives with the administration continued until the fecal mass has passed.

mineral oil and phosphate enemas, polyethylene glycol oral electrolyte solution and high doses of laxatives (Table 3).

3. MAINTENANCE TREATMENT

Toilet sitting: An important component of the treatment is behavior modification, in particular regular toilet use and learning to relax the pelvic floor and anal muscles during defecation attempts. The child >3 years of age is asked to sit on the toilet for up to 5 minutes, 3-4 times daily after meals. Parents are asked to keep a stool diary, recording bowel movements, encopretic episodes, medication use, abdominal pain, and urinary incontinence. This can be combined with a reward system.

Fiber: It is important to reinforce a well balanced diet containing age appropriate amounts of fiber in every child (recommended grams of fiber are 1 g/year of age plus 5 g) and regular meal times.

Laxatives: Daily defecation is maintained by daily administration of laxatives after disimpaction. Laxatives are used according to age, body weight, and severity of the fecal retention. Suggested starting dosages of commonly used laxatives are given in Table 4. The dosage needs to be adjusted to induce 1–2 bowel movements per day and prevent fecal retention and encopresis. The actual choice of medication is not as important as an adequate dosage and the child's and parent's compliance with the treatment regimen.

Milk of magnesia is successful due to the relative non-absorption of magnesium and the resultant increase in luminal osmolality. In children who have fecal retention of mostly soft-formed stools, usually 1 mL/kg body weight daily is adequate. In severe constipation with rock-hard stools or very infrequent bowel movements, the starting dosage is 3 mL/kg body weight daily.

Mineral oil is converted into hydroxy fatty acids which induce fluid and electrolyte accumulation. Dosages are 1–5 mL/kg body weight daily. Mineral oil should never be force-fed or given to patients with dysphagia or vomiting because of the danger of aspiration pneumonia. Anal seepage of the mineral oil is an undesirable side effect. Mineral oil is efficient, does not deplete tissue stores of fat soluble vitamins, and

Table 4
Medication for the Treatment of Functional Fecal Retention

	Age	*Dose*
Lubricant		
• Mineral oil	>12 mo	1–5 mL/kg body weight/day, divided in 1–2 doses
Osmotic laxatives		
• Milk of Magnesia		1–3 mL/kg body weight/day, divide in 1–2 doses
• Lactulose		1–3 mL/kg body weight/day, divided in 1–2 doses
• Sorbitol		1–3 mL/kg body weight/day, divided in 1–2 doses
• Polyethylene glycol 3350 (MiraLax®)		0.5–1.4 g/kg body weight/day, divided in 1–2 doses
Stimulants		
• Senna (Senokot®)		5 mL or 1 tablet with breakfast, maximum 15 mL or 3 tablets with breakfast
Rectal treatment		
• Bisacodyl suppository	school-age	5 or 10 mg suppository daily
• Enema		
Phosphate enema	school-age	135 mL enema daily
Glycerin enema	school-age	20–30 mL daily (1:1 diluted with normal saline)

does not cause histologic changes or cancer in the gut of children (16).

Lactulose, a nonabsorbable carbohydrate, is hydrolyzed to acids by the colonic flora, causing increased water content by the osmotic effects of lactulose and its metabolites. It is used commonly in Europe, but rarely in the United States because of high cost. Sorbitol can be used instead. Dosages are 1–3 mL/kg body weight daily.

Polyethylene glycol 3350 (MiraLax®, Braintree Laboratories, Inc., Braintree, Massachusetts) is a new osmotic laxative. It is similar to GoLytely (Braintree Laboratories, Inc., Braintree, Massachusetts) and Colyte (Schwarz Pharma, Inc., Milwaukee, Wisconsin), but without electrolytes and therefore has no salty taste. Seventeen grams of the powder is dissolved in 240 mL of water, fruit juice, Kool-aid or Crystal Light. Polyethylene glycol 3350 was effective, safe and palatable when given for 2 months to children with constipation with or without encopresis (17) and for 12 months to children with constipation and encopresis (18).

If the above mentioned steps, defecation trials and laxatives, have not resulted in marked improvement and retention of liquid stool and/or gas is a problem, then senna should be added. Senna has an effect on intestinal motility as well as on fluid and electrolyte transport and will stimulate defecation. Senna dosage depends on age and treatment response, usually 1–3 tablets (can be crushed and mixed in food) or 1–3 teaspoons of the syrup (which is much more expensive than the tablets) are given with breakfast daily.

Older children who do not respond completely to oral laxatives or continue with fecal soiling can be treated with a 5-mg or 10-mg bisacodyl suppository daily. One suppository is given daily prior to breakfast or supper. An enema (phosphate or glycerin) can be given daily instead of the suppository (Table 4). The advantage of using rectal medication in the morning is that the bowel clean-out is accomplished prior to leaving for school and soiling will rarely occur during school hours. The rectal route is often used for a few months only and then an oral laxative is used.

The management of functional fecal retention requires considerable patience and effort on the part of the child and parents. It is important to provide necessary support and encouragement through frequent office visits during the many months or years of treatment. Progress should be assessed by reviewing the stool and symptom diaries. The abdominal and rectal examination should be repeated in order to be sure that the child is adequately treated. If necessary, dosage adjustment is made, and the child and parents are encouraged to continue with the regimen. Toilet sitting frequency is adjusted once the child has regular daily bowel movements and independently uses the toilet.

Psychological treatment: Adherence to the treatment program will improve the fecal retention and encopresis in all children. The presence of coexisting behavioral problems often is associated with poor treatment outcome. If the coexisting behavior problems are secondary to the fecal retention and encopresis then they improve with treatment. Psychological intervention and family counseling can help some of these children.

Biofeedback treatment: In the past, many uncontrolled studies suggested that biofeedback treatment could be a treatment for children with functional fecal retention and abnormal defecation dynamics, an abnormal contraction of the pelvic floor and anal muscles during defecation attempts. Recovery rates in uncontrolled studies ranged from 37% to 100%. This could not be confirmed in randomized controlled studies. No significant benefit of the addition of biofeedback to behavioral plus laxative treatment was observed in 4 of 5 randomized studies (8,19).

4. WITHDRAWAL OF MEDICATION

After regular bowel habits are established, the laxative dose is gradually decreased to a dose that will maintain one to two bowel movements daily and prevent fecal retention and soiling. After six months, a further reduction or discontinuation of laxatives is attempted. Treatment needs to resume if constipation recurs. Stopping the laxative too soon is the most common cause for relapse.

OUTCOME

Adherence to the treatment program will improve the functional fecal retention in every child and cure the

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encopresis in many. Complete recovery, defined as 3 bowel movements/week with no or minimal soiling (2/months) while off laxatives, is less frequently seen. Twelve-months follow-up studies in children with functional fecal retention and encopresis have shown that approximately 50% of patients have discontinued laxatives and have at least 3 bowel movements/week and no soiling (10,14,20). Nolan, et al showed that significantly more children receiving behavioral intervention plus laxative therapy improved and recovered compared with those receiving behavioral intervention alone (6).

Long-term follow-up studies revealed that 65% of 215 American children with functional fecal retention and encopresis had recovered after a mean of 4 years (Loening-Baucke, unpublished data) and 66% of Belgian children (20). Five-year follow-up studies revealed that 48% of Italian children with functional fecal retention (11) and 75% of Dutch children (9) had recovered.

Functional fecal retention is a frequent disorder, requires many months to years of behavioral plus laxative treatment, and can be dramatically improved in most children. ■

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