



NCC Pediatrics Continuity Clinic Curriculum: **Constipation** *Faculty Guide*

Goals & Objectives: *To understand the differential diagnosis & management of constipation in the pediatric patient:*

- Name 8 diagnoses in the differential diagnosis of constipation.
- Identify at least 5 “red flags” in the history of a patient presenting with constipation.
- List the medications (oral and rectal) used in constipation and their indications.
- Write out the behavioral and dietary management of constipation.

Pre-Meeting Preparation:

Please read/review the following enclosures:

- “Evaluation & Treatment of Constipation in Infants & Children” (AAFP, 2006)
- Patient Resources: Parent Handout; Stool Diary; Management Plan

Conference Agenda:

- *Review Constipation Quiz*
- *Complete Constipation Cases*
- **“Hands-on” Activity:** *Using a finger inserted into a balled fist, simulate the DRE findings of the following conditions: Hirschsprung’s, neurologic dysfunction, functional constipation, and normal anal tone.*

Post-Conference: *Board Review Q&A*

Extra-Credit:

- [Childhood Defecation Disorders](#) (IFFGD, 2006)—*parent-friendly review*
- [Prevalence, Symptoms, & Outcome of Constipation in Infants & Toddlers](#) (JPeds, 2005)
- [Evaluation & Treatment of Constipation: Recs from NASPGHN](#) (CPG, 2006)

Evaluation and Treatment of Constipation in Infants and Children

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Constipation in children usually is functional and the result of stool retention. However, family physicians must be alert for red flags that may indicate the presence of an uncommon but serious organic cause of constipation, such as Hirschsprung's disease (congenital aganglionic megacolon), pseudo-obstruction, spinal cord abnormality, hypothyroidism, diabetes insipidus, cystic fibrosis, gluten enteropathy, or congenital anorectal malformation. Treatment of functional constipation involves disimpaction using oral or rectal medication. Polyethylene glycol is effective and well tolerated, but a number of alternatives are available. After disimpaction, a maintenance program may be required for months to years because relapse of functional constipation is common. Maintenance medications include mineral oil, lactulose, milk of magnesia, polyethylene glycol powder, and sorbitol. Education of the family and, when possible, the child is instrumental in improving functional constipation. Behavioral education improves response to treatment; biofeedback training does not. Because cow's milk may promote constipation in some children, a trial of withholding milk may be considered. Adding fiber to the diet may improve constipation. Despite treatment, only 50 to 70 percent of children with functional constipation demonstrate long-term improvement. (*Am Fam Physician* 2006;73:469-77, 479-80, 481-2. Copyright © 2006 American Academy of Family Physicians.)

► **Patient information:** Two patient information handouts on constipation in children, written by the authors of this article, are provided on pages 479 and 481.

Constipation has been defined as “a delay or difficulty in defecation, present for two or more weeks, sufficient to cause significant distress to the patient.”¹ This condition is responsible for an estimated 3 to 5 percent of physician visits by children.² Constipation often causes more distress to parents and other caregivers than to the affected child. Many caregivers worry that a child's constipation is the sign of a serious medical problem.

As children age, normal physiologic changes occur in the intestines and colon that decrease the daily number of stools from a mean of 2.2 in infants younger than one year to a mean of 1.4 in one- to three-year-old children (*Table 1*).^{1,3} Thus, less frequent stooling may not be constipation. If, however, constipation is defined as “failure to evacuate the lower colon completely,”⁴ even children who stool daily in small amounts may be considered to have constipation. Encopresis, which is the involuntary leakage of feces into the undergarments, may be an indication of constipation.

This article reviews the differentiation of organic and functional constipation in infants and children. The treatment of functional constipation also is reviewed.

Epidemiology

Up to one third of children ages six to 12 years report constipation during any given year.⁵ Constipation generally first appears between the ages of two and four years.⁶

Encopresis is reported by 35 percent of girls and 55 percent of boys who have constipation.⁷ In toddlers (ages two to four years), the distribution of constipation and soiling is equal in boys and girls. However, by school age (five years), encopresis is three times more common in boys than in girls.⁴ At the age of 10 years, approximately 1.6 percent of children still have some encopresis.⁴

Etiology and Pathophysiology

Continence is maintained by involuntary and voluntary muscle contractions. The internal anal sphincter has an involuntary resting tone that decreases when stool enters the rectum. The external anal sphincter is under voluntary control. The urge to defecate is triggered when stool comes into contact with the mucosa of the lower rectum.

If a child does not wish to defecate, he or she tightens the external anal sphincter and squeezes the gluteal muscles. These actions can push feces higher in the rectal vault and reduce the urge to defecate. If a

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
If a rectal examination cannot be performed, an abdominal radiograph can be used to diagnose rectal impactions in children.	C	8
Orally administered polyethylene glycol is recommended for disimpaction in children with functional constipation. This agent has been shown to be more effective than lactulose.	B	11
Behavioral treatment is recommended as an adjunct to medical therapy in children with functional constipation.	A	14, 15
Biofeedback is not recommended because it does not improve outcomes when it is combined with medical therapy for functional constipation in children.	B	16

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 374 or <http://www.aafp.org/afpsort.xml>.

child frequently avoids defecating, the rectum eventually stretches to accommodate the retained fecal mass, and the propulsive power of the rectum is diminished.

The longer that feces remains in the rectum, the harder it becomes. Passage of a hard or large stool may cause a painful anal fissure. The cycle of avoiding bowel movements because of a fear of painful defecation may progress to stool retention and infrequent bowel movements, a condition that is termed functional constipation.

Most children who present with constipation have functional constipation. Rarely, however, constipation has a serious organic cause. For confident diagnosis of functional constipation, family physicians should be alert for warning signs that may indicate the presence of a pathologic condition (Table 2).⁵

**Differential Diagnosis:
Functional vs. Organic Constipation
NEONATES**

Organic causes of constipation most commonly are found in neonates (Table 3).¹ Failure to pass a meconium stool within 48 hours of birth should raise suspicion for Hirschsprung's disease (congenital aganglionic megacolon). Hirschsprung's disease occurs in one of 5,000 children and usually is diagnosed in infancy.¹

In neonates, it is important to confirm the anatomic position and patency of the anus. The absence of an anal wink or a cremasteric reflex, the presence of a pilonidal dimple or hair tuft, or a decrease in lower extremity tone, strength, or reflexes may suggest a spinal cord abnormality such as tethered cord, myelomeningocele, or spinal cord tumor.

INFANTS

If Hirschsprung's disease is not recognized in the neonatal period, the affected infant may present with symptoms such as abdominal distension, pencil-thin stools, failure to thrive, and bilious vomiting. If an infant has any of these symptoms, and the physical examination shows an empty rectum, Hirschsprung's disease should be suspected. A delay in diagnosing this disease places the infant at risk for enterocolitis, with fever, explosive bloody diarrhea, and abdominal distension, in the second or third month of life.

Hypothyroidism is suggested in an infant with bradycardia, poor growth, and large fontanelles. Cystic fibrosis may present with constipation and should be considered in an

**TABLE 1
Normal Frequency of Bowel Movements
in Infants and Children**

<i>Age</i>	<i>Mean number of bowel movements per week</i>	<i>Mean number of bowel movements per day</i>
0 to 3 months: breastfed	5 to 40	2.9
0 to 3 months: formula-fed	5 to 28	2.0
6 to 12 months	5 to 28	1.8
1 to 3 years	4 to 21	1.4
> 3 years	3 to 14	1.0

Adapted with permission from Fontana M, Bianchi C, Cataldo F, Conti Nibali S, Cucchiara S, Gobio Casali L, et al. Bowel frequency in healthy children. Acta Paediatr Scand 1989;78:682-4, with information from reference 1.

TABLE 2

Warning Signs for Organic Causes of Constipation in Infants and Children

<i>Warning signs or symptoms</i>	<i>Suggested diagnosis</i>
Passage of meconium more than 48 hours after delivery, small-caliber stools, failure to thrive, fever, bloody diarrhea, bilious vomiting, tight anal sphincter, and empty rectum with palpable abdominal fecal mass	Hirschsprung's disease
Abdominal distention, bilious vomiting, ileus	Pseudo-obstruction
Decrease in lower extremity reflexes or muscular tone, absence of anal wink, presence of pilonidal dimple or hair tuft	Spinal cord abnormalities: tethered cord, spinal cord tumor, myelomeningocele
Fatigue, cold intolerance, bradycardia, poor growth	Hypothyroidism
Polyuria, polydipsia	Diabetes insipidus
Diarrhea, rash, failure to thrive, fever, recurrent pneumonia	Cystic fibrosis
Diarrhea after wheat is introduced into diet	Gluten enteropathy
Abnormal position or appearance of anus on physical examination	Congenital anorectal malformations: imperforate anus, anal stenosis, anteriorly displaced anus

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opipari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

infant with constipation and concomitant rash, failure to thrive, fever, or pneumonia.

CHILDREN

Functional constipation is the cause of symptoms of constipation in more than 95 percent of children older than one year.⁵ However, when warning signs are present, organic causes must be considered (Table 2).⁵

Short-segment Hirschsprung's disease may remain undiagnosed until a child is older than three years. Metabolic causes of constipation include hypercalcemia; hypothyroidism; and, more rarely, diabetes insipidus. Other causes include gluten enteropathy, cystic fibrosis, and lead toxicity.

Children with developmental or behavioral issues (e.g., mental retardation, autism, oppositional defiant disorder, depression) may be taking constipating medications such as opiates, phenobarbital, and tricyclic antidepressants.¹

Clinical Diagnosis

The findings of the history and physical examination are instrumental in differentiating functional from organic constipation in all children. Because the causes of constipation differ according to age, algorithms for the differential diagnosis are different for neonates and infants (Figure 1)⁵ and for children older than one year (Figure 2).⁵

MEDICAL HISTORY

A careful history should be obtained to identify possible organic causes of constipation

(Table 4).⁵ Functional constipation is almost always the diagnosis in children older than one year. The medical history generally confirms this diagnosis.

The passage of infrequent, large-caliber stools is highly suggestive of functional constipation. Fecal soiling, especially after a child has been toilet trained for some time, suggests rectal impaction from functional constipation. One study⁸ found that 78 percent of children with encopresis had fecal

TABLE 3

Differential Diagnosis of Constipation by Age*

Infants	Children (older than 1 year)
Hirschsprung's disease	Functional constipation (more than 95 percent of cases)
Congenital anorectal malformations	Organic causes
Neurologic disorders	Hirschsprung's disease
Encephalopathy	Metabolic causes: hypothyroidism, hypercalcemia, hypokalemia, diabetes insipidus, diabetes mellitus
Spinal cord abnormalities: myelomeningocele, spina bifida, tethered cord	Cystic fibrosis
Cystic fibrosis	Gluten enteropathy
Metabolic causes: hypothyroidism, hypercalcemia, hypokalemia, diabetes insipidus	Spinal cord trauma or abnormalities
Heavy-metal poisoning	Neurofibromatosis
Medication side effects	Heavy-metal poisoning
	Medication side effects
	Developmental delays
	Sexual abuse

*—Diagnoses listed by frequency.

Information from reference 1.

Functional Constipation in Infants

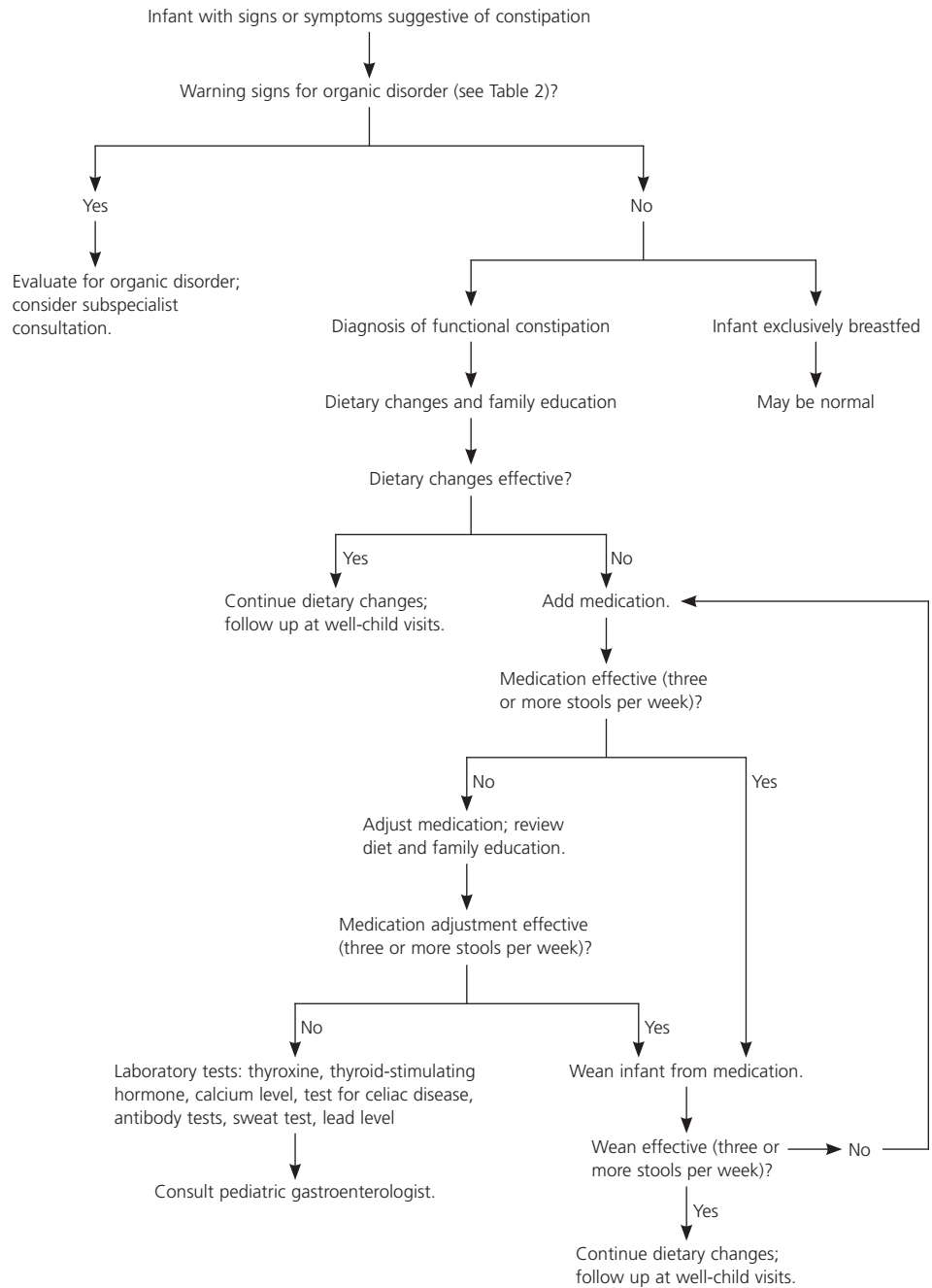


Figure 1. Diagnosis and management of functional constipation and encopresis in infants (age less than one year).

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opipari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

Functional Constipation in Children

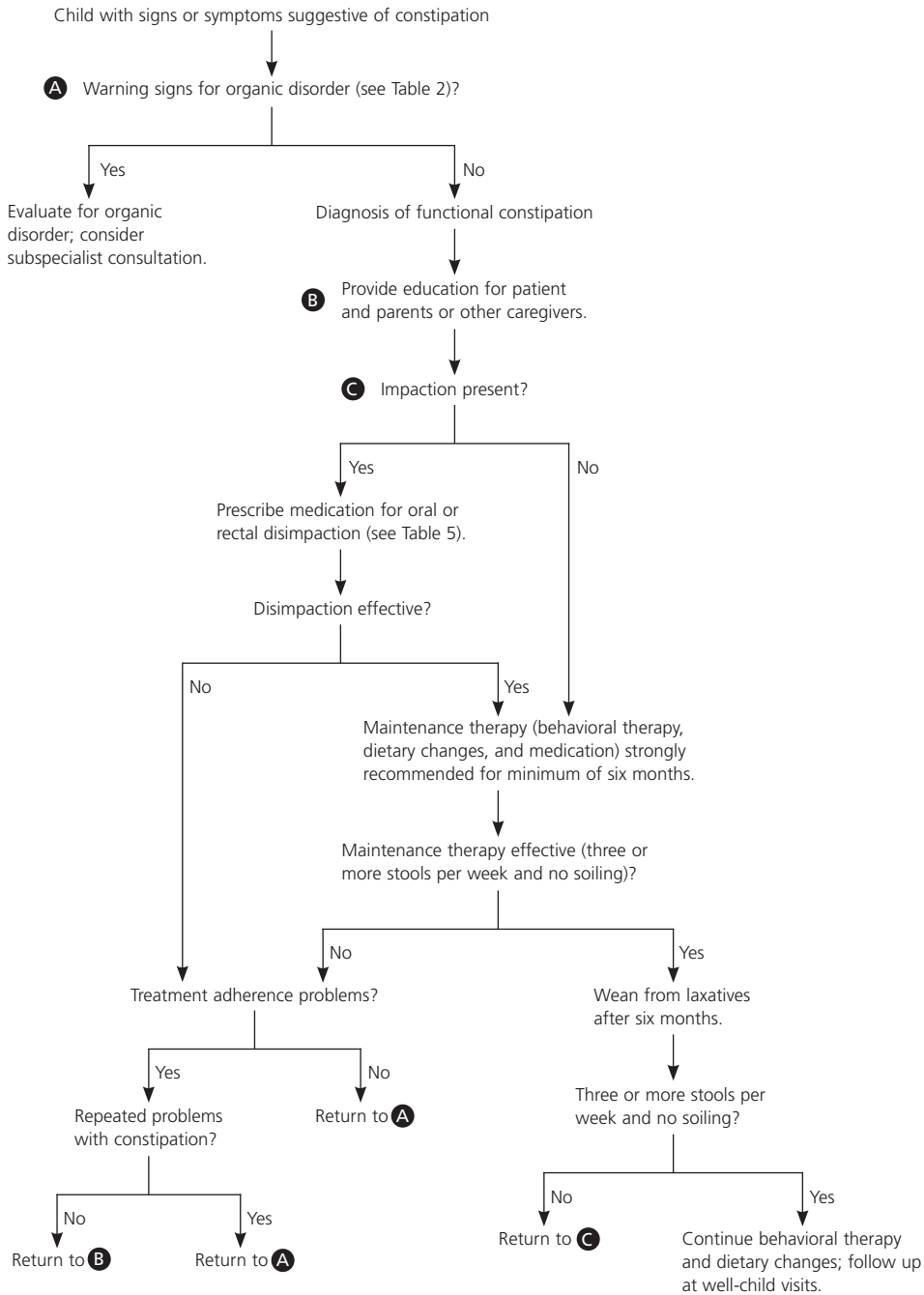


Figure 2. Diagnosis and management of functional constipation and encopresis in children (age older than one year).

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opipari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

Constipation in Infants and Children

impaction. Approximately three of every four children with constipation have pain with defecation.² The history may indicate that a child with constipation has a low-fiber diet containing few fruits and vegetables.

When evaluating children with constipation, family physicians should ask about toileting behavior, such as the timing of bowel movements, postures suggestive of stool retention (e.g., standing with legs crossed, rocking, squeezing the gluteal muscles), restricted access to toilets, and toilet avoidance or refusal.¹

PHYSICAL EXAMINATION

A digital rectal examination should be performed to assess rectal tone and determine the presence of rectal distention or impaction (Table 4).⁵ The finding of rectal impaction may confirm the diagnosis of functional constipation. The presence of anal fissures (or papillae indicative of chronic anal fissures) also suggests functional constipation.

DIAGNOSTIC TESTING

If the rectal examination reveals fecal impaction, no confirmatory imaging studies are

needed. If a rectal examination is not possible or is too traumatic for the child, abdominal radiography may be considered. One study⁸ found that a plain-film abdominal radiograph showing fecal impaction was highly predictive of the finding of fecal impaction on digital rectal examination. If stool is present in the rectum, a barium enema is no more useful than a plain-film radiograph. Computerized tomography is not indicated.

In the child with infrequent bowel movements and no signs of constipation, colonic transit time can be evaluated with radiopaque markers. When Hirschsprung's disease is suspected, anal manometry is useful. Appropriate relaxation of the anal sphincter reliably excludes this disease.¹

Treatment of Functional Constipation

Early intervention may improve the chance for complete resolution of functional constipation.⁷ Treatment goals include disimpacting the rectum and then maintaining a regular bowel-movement routine. Months of treatment may be necessary before maintenance medications can be weaned.

FAMILY EDUCATION

Education for parents and caregivers is an important component of treatment for functional constipation. The affected child also should be educated if old enough to understand this medical problem and its treatment.

By explaining the pathophysiology of functional constipation, family physicians can help parents and caregivers understand why the child is unable to have bowel movements of normal caliber and frequency. The child's fear of a painful bowel movement is the most common motivating factor for fecal retention. The fecal retention seldom is an oppositional behavior. Furthermore, encopresis in a child usually is involuntary.

Dietary modifications commonly are recommended for children with functional constipation. One randomized controlled trial⁹ showed that fiber supplementation improved constipation better than placebo, especially in children with encopresis. A double-blind crossover study¹⁰ found that constipation may be a manifestation of cow's

TABLE 4
Findings Consistent with Functional Constipation

History

Stool passed within 48 hours of birth
Extremely hard stools, large-caliber stools
Fecal soiling (encopresis)
Pain or discomfort with stool passage; withholding of stool
Blood on stools; perianal fissures
Decreased appetite, waxing and waning of abdominal pain with stool passage
Diet low in fiber or fluids, high in dairy products
Hiding while defecating before toilet training is completed; avoiding the toilet

Physical examination

Mild abdominal distention; palpable stool in left lower quadrant
Normal placement of anus; normal anal sphincter tone
Rectum packed with stool; rectum distended
Presence of anal wink and cremasteric reflex

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opipari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

TABLE 5

Suggested Agents for Disimpaction in Infants and Children with Functional Constipation

<i>Medications</i>	<i>Treatment side effects and comments</i>
Infants (younger than 1 year)	
Glycerin suppositories	No side effects
Enema: 6 mL (0.2 oz) per kg (maximum: 135 mL [4.5 oz])	If needed, administer the first enema in the physician's office.
Children (1 year and older)	
Rapid disimpaction	
Enemas: 6 mL per kg (maximum: 135 mL) every 12 to 24 hours one to three times	Invasive, risk of mechanical trauma
Mineral oil	Feces may not return after administration. Lubricates hard impaction
Normal saline	For large impaction, administer a normal saline or phosphate enema one to three hours after the mineral oil enema. Abdominal cramping
Hypertonic phosphate	May not be as effective as hypertonic phosphate enema Abdominal cramping Risk of hyperphosphatemia, hypokalemia, and hypocalcemia, especially in children with Hirschsprung's disease or renal insufficiency, or if the hypertonic phosphate solution is retained Some experts do not recommend phosphate enemas for children younger than 4 years; others do not recommend the enemas for children younger than 2 years.
Milk and molasses (1:1)	Used for impactions that are difficult to clear
Combination treatment: enema, suppository, and oral laxative	
Day 1: enema every 12 to 24 hours	See enema section above
Day 2: bisacodyl suppository (10 mg) every 12 to 24 hours	Abdominal cramping, diarrhea, hypokalemia
Day 3: bisacodyl tablet (5 mg) every 12 to 24 hours	Abdominal cramping, diarrhea, hypokalemia
Repeat three-day cycle one or two times if necessary.	
Oral or nasogastric polyethylene glycol electrolyte solution: 25 mL (0.8 oz) per kg per hour (maximum: 1,000 mL [33.3 oz] per hour) for four hours	Nausea, cramping, vomiting, bloating, aspiration Large volume of solution to be given Administration usually requires hospitalization and use of nasogastric tube.
Slower disimpaction	
Oral high-dose mineral oil: 15 to 30 mL (0.5 to 1.0 oz) per year of child's age per day (maximum: 240 mL [8 oz]) for three or four days	Risk of lipoid pneumonia Give chilled.
Oral senna: 15 mL every 12 hours for three doses	Abdominal cramping May not see output until dose two or three
Oral magnesium citrate: 1 oz per year of child's age per day (maximum: 300 mL [10 oz]) for two or three days	Hypermagnesemia
Maintenance medications (see Table 6)	Maintenance medications also may be used for disimpaction.

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opiari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

milk intolerance in some children. Therefore, a trial of withholding milk for a brief period may be considered.

DISIMPACTATION

Disimpaction can be accomplished with enemas, rectal suppositories, and oral agents (Table 5).⁵ No randomized controlled studies have compared methods of disimpaction.

Rectal disimpaction with enemas is rapid, but it is also invasive and possibly traumatic for the child. A common protocol in children older than two years is to administer a mineral oil enema followed by a phosphate enema.

Few studies have compared oral medications for disimpaction. In one study of children with chronic constipation,¹¹ the osmotic laxative polyethylene glycol

TABLE 6

Suggested Maintenance Medications for Use After Disimpaction in Children Older Than One Year with Functional Constipation*

<i>Medications</i>	<i>Treatment side effects and comments</i>
Oral administration	
Lubricant	Softens stool and eases passage
Mineral oil: 1 to 3 mL per kg per day given once daily or in divided doses twice daily	Chill or give with juice. Risk of lipoid pneumonia Adherence problems Leakage may occur if dose is too high or impaction is present.
Osmotic laxatives	Retain water in stool, which adds bulk and softness
Lactulose (concentration: 10 g per 15 mL): 1 to 3 mL per kg per day given in divided doses twice daily	Abdominal cramping, flatus Lactulose is a synthetic disaccharide.
Magnesium hydroxide (milk of magnesia; concentration: 400 mg per 5 mL): 1 to 3 mL per kg per day given in divided doses twice daily	With overdose or renal insufficiency: risk of hypermagnesemia, hypophosphatemia, or secondary hypocalcemia
Magnesium hydroxide (concentration: 800 mg per 5 mL): 0.5 mL per kg per day given in divided doses twice daily	
Polyethylene glycol powder (17 g per 240 mL of water or juice): 1 g per kg per day given in divided doses twice daily (approximately 15 mL per kg per day)	Titrate dosage at three-day intervals to achieve mushy stool consistency. Solution may be prepared in advance for administration over one to two days.
Sorbitol: 1 to 3 mL per kg per day given in divided doses twice daily	Excellent adherence Less costly than lactulose
Stimulants	Short-term use only; improves effectiveness of colonic and rectal muscle contractions
Senna syrup (8.8 g sennoside per 5 mL)	Risk of idiosyncratic hepatitis, melanosis coli, hypertrophic osteoarthropathy, analgesic nephropathy, abdominal cramping
Age two to six years: 2.5 to 7.5 mL per day given in divided doses twice daily	
Age six to 12 years: 5 to 15 mL per day given in divided doses twice daily	Melanosis coli improves after medication is stopped. Tablets and granules are available.
Bisacodyl (5-mg tablets): one to three tablets given once or twice daily	Abdominal cramping, diarrhea, hypokalemia
Rectal administration	
Glycerine suppository	No side effects
Bisacodyl suppository (10 mg): one-half to one suppository administered once or twice daily	Abdominal cramping, diarrhea, hypokalemia

*—A single agent may be sufficient to achieve daily, comfortable defecation.

Adapted with permission from Felt B, Brown P, Coran A, Kochhar P, Opiari-Arrigan L. Functional constipation and soiling in children. University of Michigan Health System guidelines for clinical care 2003. Accessed online February 2, 2005, at: <http://cme.med.umich.edu/pdf/guideline/peds03.pdf>.

(PEG 3350) was significantly more effective than lactulose during a two-week treatment period, and its use was preferred by 73 percent of caregivers. Randomized trials^{12,13} have found several different doses of polyethylene glycol to be effective for disimpacting children, with reasonable acceptance by parents and children. Other oral medications for rectal disimpaction include mineral oil, senna, polyethylene glycol electrolyte solution (GoLYTELY, NuLYTELY), and magnesium citrate.

MAINTENANCE

The goal is to maintain soft bowel movements once or twice a day. Ensuring regularity is important because rectal impaction can recur, restarting the constipation cycle.

Maintenance medications include mineral oil, lactulose, milk of magnesia, polyethylene glycol powder (MiraLax), and sorbitol. These and other maintenance medications vary in acceptance of use (Table 6).⁵

Adjuncts to maintenance medications have been studied. In two randomized tri-

als,^{14,15} more children who received behavioral treatment plus medications achieved remission of encopresis after three and six months than children who received medical treatment alone. (A behavioral treatment plan is described in one of the patient information handouts that accompany this article.)

A Cochrane review¹⁶ of data from eight studies found higher rates of persisting (up to 12 months) defecation problems when biofeedback training was added to conventional medical treatment. Therefore, biofeedback training is not recommended for children with functional constipation.

Long-Term Prognosis

Functional constipation is difficult to treat, and the relapse rate is high. In one study,¹⁷ 52 percent of children with constipation and encopresis still had symptoms after five years of treatment. A second study¹⁸ found that 30 percent of children who had been treated medically for constipation for a mean of 6.8 years continued to have intermittent constipation.

If a child's symptoms do not improve after six months of good adherence to a treatment regimen, referral to a pediatric gastroenterologist may be warranted.⁷

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Constipation and Your Child



Bowel patterns vary from child to child just as they do in adults. What's normal for your child may be different from what's normal for another child. Most children have bowel movements 1 or 2 times a day. Other children may go 2 to 3 days or longer before passing a normal stool.

If your child doesn't have daily bowel movements, you may worry that she is constipated. But if she is healthy and has normal stools without discomfort or pain, this may be her normal bowel pattern.

Children with constipation have stools that are hard, dry, and difficult or painful to pass. These stools may occur daily or may be less frequent. Although constipation can cause discomfort and pain, it's usually temporary and can be treated.

Constipation is a common problem in children. It's one of the main reasons children are referred to a specialist called a *pediatric gastroenterologist*. Read more to learn about constipation and its causes, symptoms, and treatments, as well as ways to prevent it.

What causes constipation?

Constipation frequently occurs for a variety of reasons.

- **Diet.** Changes in diet, or not enough fiber or fluid in your child's diet, can cause constipation. (See "Getting enough fiber in your diet.")
- **Illness.** If your child is sick and loses his appetite, a change in his diet can throw off his system and cause him to be constipated. Constipation may be a side effect of some medicines. Constipation may result from certain medical conditions (such as hypothyroidism or low thyroid).
- **Withholding.** Your child may withhold his stool for different reasons. He may withhold to avoid pain from passing a hard stool—it can be even more painful if your child has a bad diaper rash. Or he may be dealing with issues about independence and control—this is common between the ages of 2 and 5 years. Your child also may withhold because he simply doesn't want to take a break from play. Your older child may withhold when he's away from home, at camp or school, because he's embarrassed or uncomfortable using a public toilet.
- **Other changes.** In general, any changes in your child's routine (such as traveling, hot weather, or stressful situations) may affect his overall health and how his bowels function.

If constipation isn't treated, it may get worse. The longer the stool stays inside the lower intestinal track, the larger, firmer, and drier it becomes. Then it becomes more difficult and painful to pass the stool. Your child may hold back his stool because of the pain. This creates a vicious cycle.

What are the symptoms of constipation?

Symptoms of constipation may include the following:

- Many days without normal bowel movements
- Hard stools that are difficult or painful to pass
- Abdominal pain (stomachaches, cramping, nausea)
- Rectal bleeding from tears called *fissures*

What is encopresis?

If your child withholds her stools, she may produce such large stools that her rectum stretches. She may no longer feel the urge to pass a stool until it is too big to be passed without the help of an enema, laxative, or other treatment. Sometimes only liquid can pass around the stool and leaks out onto your child's underwear. The liquid stool may look like diarrhea, confusing both parent and pediatrician, but it's not. This problem is called *encopresis*.

- Soiling (See "What is encopresis?")
- Poor appetite
- Cranky behavior

You also may notice your child crossing her legs, making faces, stretching, clenching her buttocks, or twisting her body on the floor. It may look like your child is trying to push the stool out but instead she's really trying to hold it in.

How is constipation treated?

Constipation is treated in different ways. Your pediatrician will recommend a treatment based on your child's age and how serious the problem is. If your child's case is severe, he may need a special medical test, such as an x-ray. In most cases, no tests are needed.

Treatment of babies. Constipation is rarely a problem in younger infants. It may become a problem when your baby starts solid foods. Your pediatrician may suggest adding more water or juice to your child's diet.

Treatment of older children. When a child or teen is constipated, it may be because his diet doesn't include enough high-fiber foods and water. Your pediatrician may suggest adding more high-fiber foods to your child's diet, and encourage him to drink more water. These changes in your child's diet will help get rid of abdominal pain from constipation.

Severe cases. If your child has a severe case of constipation, your pediatrician may prescribe medicine to soften or remove the stool. *Never give your child laxatives or enemas unless your pediatrician says it's OK; laxatives can be dangerous to children if not used properly.* After the stool is removed, your pediatrician may suggest ways you can help your child develop good bowel habits to prevent stools from backing up again.

How can constipation be prevented?

Because each child's bowel patterns are different, become familiar with your child's normal bowel patterns. Make note of the usual size and consistency of her stools. This will help you and your pediatrician determine when constipation occurs and how severe the problem is. If your child doesn't have normal bowel movements every few days, or is uncomfortable when stools are passed, she may need help in developing proper bowel habits.

Getting enough fiber in your diet

The American Academy of Pediatrics recommends that children between the ages of 2 and 19 years eat a daily amount of fiber that equals their age plus 5 grams of fiber. For example, 7 grams of fiber is recommended if your child is 2 years old (2 plus 5 grams).

The following are some high-fiber foods:

Food	Grams of Fiber
Fruits	
Apple with skin (medium)	3.5
Pear with skin	4.6
Peach with skin	2.1
Raspberries (1 cup)	5.1
Vegetables Cooked	
Broccoli (1 stalk)	5.0
Carrots (1 cup)	4.6
Cauliflower (1 cup)	2.1
Beans Cooked	
Kidney beans (½ cup)	7.4
Lima beans (½ cup)	2.6
Navy beans (½ cup)	3.1
Whole Grains Cooked	
Whole-wheat cereal (1 cup flakes)	3.0
Whole-wheat bread (1 slice)	1.7

You can...

- Encourage your child to drink plenty of water and eat more high-fiber foods.
- Help your child set up a regular toilet routine.
- Encourage your child to be physically active. Exercise along with a balanced diet provides the foundation for a healthy, active life.

Remember

If you are concerned about your child's bowel movements, talk with your pediatrician. A simple change in diet and exercise may be the answer. If not, your pediatrician can suggest a plan that works best for your child.

The information contained in this publication should not be used as a substitute for the medical care and advice of your pediatrician. There may be variations in treatment that your pediatrician may recommend based on individual facts and circumstances.

From your doctor



Constipation Management



I. Cleanout Phase

Give your child the following:

- ___ Miralax: Give ___ capful mixed in 8oz of liquid ___ times/day for ___ days.
- ___ Pediatric Fleet Enema: Give ___ enema ___ times/day for ___ days.
- ___ Dulcolax Tablets: Give ___ tablet ___ times/day for ___ days.
- ___ Dulcolax Suppository: Insert 1 suppository into rectum ___ for ___ days.
- ___ Magnesium Citrate: Drink ___ oz ___ times/day for ___ days.
- ___ Fleets PhosphoSoda: Drink ___ oz or ___ cc ___ times/day followed by 8 oz of water for ___ days.

II. Maintenance Phase

After the cleanout phase is complete, give your child the following:

- ___ Miralax: Give ___ capful mixed in 8 oz of liquid ___ times/day.
- ___ Milk of Magnesia: Give ___ tablespoons ___ teaspoons ___ times/day.
- ___ Lactulose: Give ___ tablespoons ___ teaspoons ___ times/day.
- ___ Mineral Oil: Give ___ tablespoons ___ teaspoons ___ times/day.
- ___ Dulcolax Tablets: Give ___ tablet ___ times per week

III. Daily Behaviors

1. Make sure your child drinks plenty of water every day
2. Have your child sit on the toilet and try to have a bowel movement for 10 minutes each day approximately 30 minutes after breakfast and dinner. Give your child a foot stool to put his feet on if his feet do not touch the floor. Toilet time is not a punishment and should be a calm pleasant relaxed event. **This is a very important part of your child's care!**
- 3 Increase your child's intake of fresh fruits and vegetables.
4. Turn off the TV & computer, and have your child participate in some form of exercise for at least 30 minutes a day.

Constipation takes a long time to develop—and can take many months to correct. Please be patient with your child!

Constipation Quiz

1. Define Constipation:








- A) Failure to evacuate the lower colon completely.
- B) A delay or difficulty in defecation for ≥ 2 weeks
- C) Type 1 & 2 on the Bristol Stool Chart¹
- D) < 2 stools/wk & h/o of large diameter stools²
- E) All of the Above**

Rome III Criteria: 1mo of **at least two** of the following in $< 4yo$

- Two or fewer defecations per week
- At least one episode/week of incontinence after potty-trained
- History of excessive stool retention
- History of painful or hard bowel movements
- Large fecal mass in the rectum
- Large diameter stools which may obstruct the toilet

Sxs may include irritability, decreased appetite, and/or early satiety, which disappear following passage of a large stool.

Bristol Stool Chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid

2. Please complete the following laxative classification table:

	Bulk-producers	Stool softeners	Lubricants	Osmotics	Stimulants
Mechanism	<i>Cause the stool to be bulkier and more retain water</i>	<i>Enable additional water & fats to be added to the stool</i>	<i>Makes the stool more slippery and easy to pass</i>	<i>Attracts water, adding bulk and softening the stool</i>	<i>Stimulate peristaltic action</i>
Examples	Dietary Fiber Metamucil	Docosate (Colace)	Mineral Oil	Sodium phos, mag citrate, milk of magnesia; PEG (Miralax), lactulose, glycerin supp	Senna (Senokot), Bisacodyl (Ducolax)

3. What is the goal of maintenance therapy? How long should it be continued?

1-2 soft stools per day. Therapy may be required for months to years (duration of treatment roughly correlates with duration of chronic constipation).

Constipation Cases

Case 1: Nicholas is a 6 year old male who presents with fecal soiling on a daily basis, which began in late October. He claims he "can't tell when" he is about to soil. His parents report multiple bouts daily of fecal urgency where he rushes to the toilet, only to pass small amounts of diarrheal stool. His toilet sitting behavior is peculiar in that he sits far back on the toilet seat with his knees extended and his toes pointed, straining at defecation. Once or twice weekly he will pass a very large caliber formed stool, which has on occasion plugged the plumbing. This pattern was not thought to be a problem by his parents as it began shortly after they began potty training him at two years old so that he could enter preschool earlier than rest of the neighborhood kids.

What additional history would you like to know?

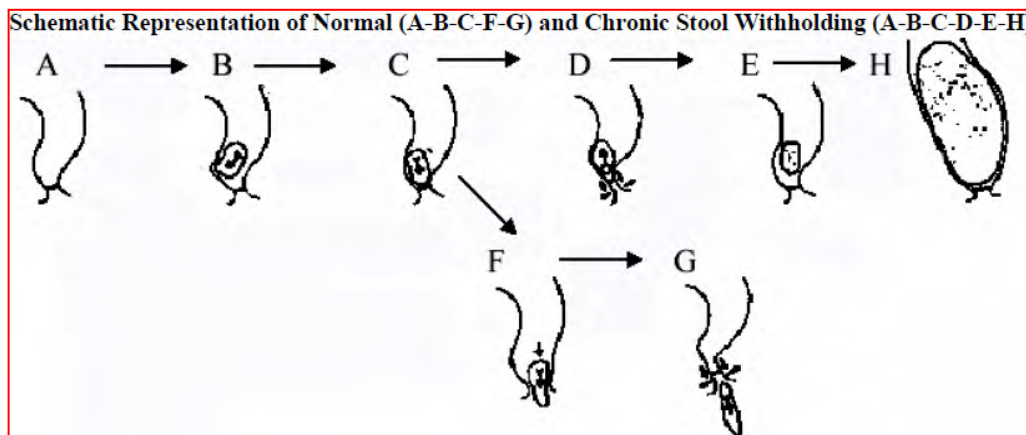
- **Dietary history:** How much dairy? How much fiber? How much fluid?
- **Birth Hx:** Meconium stool within 1st 24 hrs
- **ROS for organic disorders:** See [Table 2](#) (*Hirschsprung, spinal cord disorder, hypothyroidism, diabetes insipidus, CF, gluten enteropathy, congenital anomaly*)
- **Toilet training/Toileting behavior:** See [Behavior II](#) for discussion of stool withholding.

The dietary history finds that he eats the school breakfast and lunch, and will often not touch his vegetables at supper. Closer questioning indicates he does not pick fruit or vegetables from the salad bar at school, and the school typically offers only sweet buns or a burrito for breakfast. Physical examination finds a midline mass in the lower abdomen, with a rectal examination that shows a normally placed anus with an intact anal wink and a perineum coated with stool. The anus is shortened with the internal anal sphincter dilated by a massive amount of formed stool. You are unable to accurately assess the diameter of the rectum as the stool appears to fill the pelvic bowl. The stool tests negative for occult blood.

What diagnosis does this history/physical suggest?

Chronic constipation, with overflow incontinence/ encopresis (reported by 55% boys with constipation; 35% of girls)

What is the pathogenesis of this diagnosis? Graphic from IFFGD, 2006—Extra Credit article.



A. The rectum is empty. There is no urge to defecate.

B. Stool enters the rectum and stretches the rectal wall, causing a sensation of fullness.

C. Rectal wall distension causes relaxation of the internal anal sphincter, allowing the stool to descend into the proximal anal canal. This causes awareness that stool passage is imminent.

F/G. Defecation occurs when the pelvic floor relaxes, and the pressure in the rectum is greater than the pressure from the external anal sphincter and the pelvic floor.

D. The pelvic floor muscles contract to maintain continence, moving stool up and out.

E. If the stool remains in the rectum after the pelvic floor returns to its resting state, then stool will no longer be in contact with the anus. The rectal wall relaxes; reducing the pressure and wall tension, and the urge to defecate abates.

H. Over wks-mos, the **rectal wall stretches** to accommodate the retained fecal mass and the propulsive power of the rectum is diminished. The longer feces remain in the rectum, the harder it becomes. **Passage of a hard or large stool may cause a painful anal fissure.** The cycle of avoiding BM because of a **fear of painful defecation** may progress to further **stool retention**.

What are the key features of behavioral management for this patient?

If the child is toilet trained, they should be encouraged to sit on the toilet, and try to have a BM, for **five minutes, 15-30min after a meal or snack**. Try to do at least **twice a day**. Listening to music may make this less boring, but the child should concentrate on pushing with the belly muscle and relaxing the buttocks. A large hot drink or after bathing may also help.

The child must be comfortable. **Place a box or stool under the feet of smaller children** to raise their knees higher than their hips. Very small children may feel safer if they face backwards on the toilet (“hugging the bowl”) or use a potty chair. Increase physical activity, as **exercise** helps move stool down the colon.

In older children, it is important to encourage them to take responsibility for his or her actions. The child should be responsible for taking the medicine without a fight, for sitting on the toilet, and for cleaning up stool accidents. Having a **calendar** to mark down doses and “sits” can help keep track (*see Stool Diary*). Children respond well to a carefully planned, consistent system of rewards for appropriate behavior (see [Behavior I](#)).

Occasionally, a **counselor** may be helpful to reduce the tension that children and families feel because of constipation and soiling, especially when the child’s condition becomes a “family problem”. It is important to try to **avoid anger or punishment** around accidents. Most often, the child is not being defiant; he or she simply cannot feel the stool coming out.

How would you disimpact this patient?

Various options presented in **Table 5** and in **Constipation Management Parent Handout**. A commonly used protocol here is **1 capful Miralax + 8oz of water. Repeat BID-TID for 3-4 days.** If PO-only is ineffective, providers will often add clean-out “from below” (i.e. enemas).

What maintenance therapy would you provide?

Various options presented in **Table 6** and in **Constipation Management Parent Handout**. A commonly used protocol here is **1/2-1 capful Miralax + 8oz of water. Titrate to achieve 1-2 soft, mushy stools per day** (think: peanut butter or toothpaste). The goal of maintenance is to prevent stool buildup, allow the colon to return to its proper shape and function, and to encourage the child to have controlled bowel movements in the toilet.

What dietary recommendations would you make for this patient and family?

- Increase dietary fiber (e.g. fruits, vegetables, bran, whole grains)
- Increase fluid intake
- Decrease dairy intake ($\leq 16-20$ oz/day total) . . . Consider possible milk intolerance.
- Decrease “constipating foods” (e.g. rice, bananas, potatoes, corn, cooked carrots)

Case 2: Mom calls you about Dina. She is a one month old female and mom is concerned because she hasn't stoolled in 3 days. Previously, she had stoolled four to five times a day. She was a term delivery with no issues and stoolled within the first 48 hours of life.

What other history questions would be important at this time?

- **Birth Hx:** Term? PNC? Meconium stool within 1st 24 hrs?
- **Feeding Hx:** Breastfed or formula-fed. If breastfed, lactation issues (milk supply, milk transfer). UOP (as a sign of dehydration)
- **ROS for organic disorders:** *See Table 2*

Dina is exclusively breastfed, she is urinating well, continues to eat well and seems happy and playful. Her weight was over birthweight at her 2 week well child and there were no concerns during that visit. Her abdomen seems a little fuller to mom, but Dina does not seem bothered.

Are you concerned?

No. This can be a normal stooling pattern in a breastfed baby. See Case 1-[Telephone Triage](#).

What is your advice for this mom? Should she be seen immediately? Tomorrow?

Recall the Barton-Schmitt Telephone Triage Protocols. This is a **non-urgent/routine** issue, which can be managed with **home care** or at the 2mo visit **UNLESS** the parent is still concerned.

Dina is now 5 months old. Mom brings her in for a visit because every time she tries to start solid foods, Dina goes from stooling every 3-4 days (which has been her norm) to “never”. Mom reports the first time she tried solids (about 3 weeks ago) Dina went 7 days without stooling and was very uncomfortable and fussy. Mom finally gave her a glycerin suppository and stopped the solids for a little bit. A week or so later, she tried again with similar results. This time she had gotten some advice to try some clear juice, so she tried pear juice for 2 days with no success. Again, she had to give a suppository on the 7th day which produced a fairly explosive stool. She is growing well and is otherwise developmentally normal.

Are you concerned? Is there other history you would like to obtain?

Yes. Concern for some sort of **distal obstruction** (i.e. **Hirschsprung's disease** or congenital anorectal malformations—including **anal stenosis**). Review warning s/s of Hirschsprung's: passage of mec >48hrs after delivery (when stoolled—what did it actually look like?), small-caliber stools, FTT, bloody diarrhea, bilious emesis, abdominal distension.

What would be important on exam? What findings might increase your concern?

Important to do rectal exam and neuro exam (for spinal cord abnormalities). Concerning findings include distended abdomen, tight anal sphincter, empty rectum with palpable abdominal fecal mass, explosive stool when rectal exam is completed.

* **Faculty Note:** This case was based on a patient of Dr. Kimball-Eayrs who ended up having anal stenosis, diagnosed at 5-months.

Constipation Board Review

1. A 16-year-old girl presents with a complaint of constipation. She passes two to three small, pellet-like stools per week and claims that she has not experienced a "normal bowel movement" in 2 months. She usually skips breakfast and buys lunch at school. Both parents are employed, but the family tries to eat dinner together, usually at 8 pm during the week. Physical examination demonstrates a well-developed, well-nourished adolescent who has no unusual findings. Rectal examination reveals normal anal sphincter tone and an empty rectal vault.

Of the following, the MOST appropriate treatment of this patient's constipation includes

- A. lactulose
- B. methylcellulose**
- C. milk of magnesia
- D. mineral oil
- E. polyethylene glycol

The adolescent described in the vignette has erratic eating habits and presents with the recent onset of a small-volume, infrequent stooling pattern. Physical examination reveals no obvious abnormalities, and rectal examination demonstrates normal anal sphincter tone and a rectal vault devoid of feces. This young woman is exhibiting nonretentive (nonwithholding) constipation that should be treated with a diet that includes increased fluid intake and a commercially available fiber supplement such as methylcellulose.

The dietary history and absence of feces in the rectal vault reported for the girl in the vignette suggest that a more conservative approach that does not encompass medications may be attempted initially. Recent evidence indicates that fiber supplements for constipation management are an important addition to the therapeutic armamentarium, particularly for those in whom dietary history suggests poor fiber intake. Multiple fiber supplements are available over the counter, and two of the most frequently used are psyllium and methylcellulose. No available evidence suggests superiority of one formulation over another; patients should be encouraged to use whichever product is the most palatable to them, thus assuring the greatest likelihood of compliance. Depending on the patient's response to this non-pharmacologic approach, therapy using an osmotic agent may be added after an adequate trial of the fiber supplement.

Constipation comprises nearly 5% of all primary care pediatric and nearly 25% of all pediatric gastroenterology visits in the United States. Although many factors, including physiologic, anatomic, and psychological disorders may be involved, most affected children exhibit no identifiable pathologic condition, and the term "functional constipation" is applied to their condition. In the young child, constipation most commonly is the consequence of hard, painful bowel movements that lead to voluntary stool withholding. Stress, dietary changes, toilet training, and being "too busy" to use the bathroom are among the many precipitating factors.

Prolonged withholding results in fecal stasis and fluid reabsorption in the colon, with an increase in stool size and consistency. Physical findings often include mild abdominal distention and a palpable stool mass in the left lower quadrant. Rectal examination typically demonstrates a rectal vault filled with firm stool, often extending to the anal verge.

A careful history and physical examination should direct the clinician to prescribing an appropriate course of therapy. For children who have stool withholding (with or without encopresis), behavior modification may be beneficial as an adjunct to medical therapy, particularly for the patient older than 5 years of age. However, treatment should include some form of pharmacologic intervention.

Oral medications used in the treatment of constipation fall into three defined categories: **osmotic agents, lubricants, and stimulants**. Each drug class possesses a different mechanism of action. In general, stimulants (eg, senna, bisacodyl), which promote enhanced colonic transit, should be avoided as long-term therapy, although they may have some efficacy during an initial "clean-out" period. Lubricants such as mineral oil have long been used as stool-softening agents and to reduce withholding while promoting rectal evacuation. Although mineral oil-containing laxatives theoretically may interfere with vitamin absorption, no available evidence supports this assertion.

Currently, the most frequently used medications for treatment of functional constipation are the osmotic agents, including lactulose (a synthetic disaccharide), sorbitol, and polyethylene glycol (PEG 3350). These agents increase intestinal intraluminal osmolality, thereby inducing water movement. A softer, larger volume of stool is produced, with gradual dissolution of hard fecal matter. These medications are well tolerated long-term, and their doses may be titrated to achieve maximal effectiveness. Recent evidence indicates that PEG 3350 has greater palatability and acceptance over all age ranges, and preliminary clinical data suggest that polyethylene glycol is safe and effective in infants. However, recommendations regarding its use in children younger than 1 year of age must await further clinical trials. Magnesium hydroxide also acts as an osmotic agent, but abdominal cramping and the risk of overdosing, leading to hypermagnesemia, hypophosphatemia, and hypocalcemia, make this a less desirable alternative for long-term use.

2. You are evaluating a 2-day-old term infant because of abdominal distention. He fed normally the first day after birth, but has had progressively increasing vomiting, which now is bilious. Physical examination demonstrates upslanted palpebral fissures, a prominent tongue, and mild hypotonia. Upon passage of a nasogastric tube, you aspirate 80 mL of green-yellow material from his stomach. Abdominal radiographs, including a left lateral decubitus film, reveal dilated loops of bowel and air-fluid levels but no evidence of pneumatosis.

Of the following, the condition that BEST explains this baby's clinical findings is

- A. duodenal atresia
- B. Hirschsprung disease**
- C. meconium ileus
- D. necrotizing enterocolitis
- E. neonatal intussusception

The infant described in the vignette has clinical features of **Down syndrome**. Infants who have Down syndrome are at risk for a number of gastrointestinal malformations, most notably duodenal atresia and Hirschsprung disease. The air in the distal small bowel apparent in the radiograph obtained for the infant in the vignette excludes duodenal atresia and annular pancreas. The lack of pneumatosis on the radiograph for this term infant makes necrotizing enterocolitis unlikely. Neonatal intussusception is extremely rare, and meconium ileus is associated with cystic fibrosis, not Down syndrome.

Hirschsprung disease is characterized by congenital absence of a portion of the enteric nervous system (aganglionosis). The aganglionic segment of bowel typically begins at the anal verge and extends proximally. Disease limited to the rectosigmoid colon ("short segment" Hirschsprung) accounts for 80% to 90% of cases. The remainder of cases can involve a larger portion of the distal colon ("long segment Hirschsprung"), the entire colon ("total colonic Hirschsprung"), or the colon and small bowel. The aganglionic segment of bowel is unable to contract, leading to either severe constipation or a functional bowel obstruction. It can be difficult to distinguish between functional constipation and Hirschsprung disease in childhood. In general, patients who have Hirschsprung disease have a history of delayed passage of meconium; 95% of affected infants fail to pass meconium in the first day after birth. Stools of

infants and toddlers who have Hirschsprung disease often are very thin. Because of the hypertensive anal sphincter and aperistaltic distal colon, affected children almost never have encopresis. On rectal examination, an infant or child who has short segment Hirschsprung may have an "explosion of stool" after the examiner's finger is removed.

If Hirschsprung disease is suspected strongly, the patient should undergo further diagnostic testing. Anorectal manometry demonstrates a hypertensive anal sphincter that fails to relax. Barium enema may demonstrate a narrowed rectosigmoid (aganglionic segment) and a dilated proximal colon, with a "transition zone" (area of caliber change between the normal and aganglionic segment). The definitive test for Hirschsprung disease is rectal biopsy, which demonstrates absent ganglion cells in the submucosa and muscularis propria of the rectum. If Hirschsprung disease is identified, surgical resection of the aganglionic colon and anastomosis of the normal colon to the anorectal canal is the treatment of choice.

3. A 5-year-old child presents to your office with a history of recurrent rectal prolapse that occurs at the time of bowel movements. Both the mother and child are very concerned when the rectal tissue protrudes from the anus, but the prolapse typically resolves without treatment.

Of the following, the MOST common cause of rectal prolapse in children is

- A. celiac disease
- B. cystic fibrosis
- C. *Enterobius vermicularis* infestation (pinworms)
- D. functional constipation**
- E. rectal polyps

Rectal prolapse is the herniation of rectal tissue out of the anus. Prolapse typically occurs during defecation and often resolves spontaneously when a child relaxes after defecation. Nevertheless, prolapse usually is of major concern to a parent and child, and ongoing prolapsed may be associated with rectal bleeding from tissue ulceration. The most common cause of rectal prolapse is chronic functional constipation, which accounts for 30% of cases. Other less common causes include rectal polyps, repaired anorectal malformations, constipation due to myelomeningocele, and cystic fibrosis. Although cystic fibrosis probably accounts for fewer than 10% of patients who have recurrent rectal prolapse, it still is recommended that any child who has recurrent rectal prolapse undergo a sweat test to exclude this condition. Temporary rectal prolapse also may be seen in children who have acute diarrheal disease, but should resolve after the illness. Celiac disease and pinworm infection are uncommon causes of rectal prolapse.

Up to 20% of patients who have recurrent prolapse do not have an identifiable cause. Treatment of rectal prolapse typically involves treating constipation with a combination of a lubricant (eg, mineral oil, polyethylene glycol) and a gentle stimulant (eg, senna). If there is significant rectal bleeding, colonoscopy should be considered to exclude lead points or ulcers.

Patients who have persistent rectal prolapse despite medical therapy should be referred to a pediatric surgeon. Initial surgical therapy consists of sclerotherapy (injection of hypertonic saline or D50W into the rectal wall). For patients whose rectal prolapse persists despite sclerotherapy, rectopexy or anorectoplasty can be attempted. The prognosis is usually excellent.

4. A 3-year-old child presents with a history of intermittent painless rectal bleeding. Approximately once or twice a week, she passes a formed stool that contains up to "a teaspoon" of blood. Physical examination demonstrates no fissures or hemorrhoids. Hematocrit measurement and results of coagulation studies are normal. The bleeding persists despite stool softeners.

Of the following, the test that is MOST likely to establish a diagnosis is

- A. colonoscopy**
- B. computed tomography scan of the abdomen
- C. Meckel scan (radionuclide technetium scan)
- D. magnetic resonance angiography
- E. stool culture

The patient described in the vignette has small-volume, painless rectal bleeding that persists despite stool softeners. There is no fever or signs of systemic illness to suggest an infection. The clinical presentation is more consistent with a **colonic polyp** than with infection or Meckel diverticulum. Of the choices offered, colonoscopy is most likely to identify the polyp. A radionuclide scan can help identify a Meckel diverticulum, but usually Meckel diverticulum presents with large-volume rectal bleeding. The absence of fever or cramping argues against *Salmonella* infection, which would require stool culture for diagnosis. Abdominal computed tomography scan and magnetic resonance angiography sometimes are useful in identifying bleeding gastrointestinal lesions, but they are not indicated until a polyp has been ruled out.

Rectal bleeding in a child can either be visible or occult (not seen, but detected by stool guaiac testing). Occult blood may occur or may result from causes anywhere in the gastrointestinal tract, including the esophagus (esophagitis), stomach (gastritis), small intestine, or colon. In contrast, visible maroon or bright red blood usually arises from the distal small bowel or colon.

Conditions causing lower gastrointestinal bleeding can be divided into two basic categories: those that cause bleeding in association with pain and those that result in painless rectal bleeding. **Although constipation probably is the most common cause of rectal bleeding, patients who have constipation typically produce hard stools with small amounts of blood (less than 1 mL) on the surface of the stool.** Hemorrhoidal bleeding usually results in blood on the toilet paper, but not on the stool. In contrast, patients who have colonic inflammation (colitis) generally have significant abdominal pain, especially around the time of defecation. The most common causes of colitis are infectious organisms (including enteric bacterial pathogens, *Clostridium difficile*, and amebae), inflammatory bowel disease, and Henoch-Schönlein purpura. In the infant, necrotizing enterocolitis, Hirschsprung disease, and allergic colitis can cause colonic inflammation.

Painless rectal bleeding generally is caused by anatomic rather than inflammatory lesions. Meckel diverticulum is an extra piece of intestine, typically located in the distal ileum, which can ulcerate and cause large-volume painless rectal bleeding. In toddlers, excessive numbers of lymph nodes in the colon (lymphoid nodular hyperplasia) sometimes may present with rectal bleeding. Colonic polyps may be either single or multiple and can be removed at colonoscopy. If more than one polyp is identified at the time of colonoscopy or if the histology is not typical for a juvenile polyp, the patient may need further evaluation for a hereditary polyposis syndrome.