Evaluation of Constipation

DAISY A. ARCE, M.D., CARLOS A. ERMOCILLA, M.D., and HILDEGARDO COSTA, M.D.
State University of New York Health Science Center at Brooklyn College of Medicine, Brooklyn, New York

Constipation is the reason for 2.5 million physician visits per year in the United States, with more than one half of these visits to primary care physicians. Patients and physicians frequently define constipation differently. To determine the underlying cause of constipation, it is important to evaluate the patient's general health, psychosocial status, medical illnesses, dietary fiber intake, and use of constipating medications. The differential diagnosis of constipation and the approach to its evaluation differ in adults and children. Tests of physiologic function are usually reserved for constipation that does not respond to conventional therapy. Family physicians can effectively manage most patients who have constipation. (Am Fam Physician 2002;65:2283-90,2293,2295-6. Copyright© 2002 American Academy of Family Physicians.)

▶ *Two patient information handouts on constipation, written by the authors of this article, are provided on page 2293 and page 2295.*

Members of various family practice departments develop articles for "Problem-Oriented Diagnosis." This is one in a series from the Department of Family Practice at SUNY Health Science Center at Brooklyn College of Medicine. Guest coordinator of the series is Miriam Vincent, M.D.

Constipation is a symptom, rather than a disease, and represents a subjective interpretation of real or imagined disturbance of bowel function.[1] Although constipation can have many causes, it is most often functional or idiopathic.[2,3]

Constipation is more prevalent in children and the elderly.[2,3] In children, few benign medical conditions are as distressing as a disorder of defecation. In adults, chronic constipation has been shown to diminish perceived quality of life. Constipation may also signal more serious underlying problems such as colonic dysmotility or mass lesions.[4]

Epidemiology

The exact prevalence of constipation in the U.S. population is not known, although one epidemiologic study[5] found an overall prevalence of 14.7 percent. In adults, constipation occurs more frequently in blacks and women, and usually becomes more prevalent with increasing age.[6] Constipation affects 3 percent of preschool-age children and 1 to 2 percent of school-age children; in the latter group, constipation is more common in boys.[7]

In the United States, more than $800 million is spent on laxatives each year. Constipa-

tion is also responsible for 2.5 million physician visits, with patients over 65 years of age accounting for the greatest number of these visits.[4,8-10] In children, constipation is the reason for nearly 5 percent of outpatient visits to pediatric clinics and more than 25 percent of referrals to pediatric gastroenterologists.[2,11]

Definition of Constipation

Constipation has different meanings to different people. A patient's perception of constipation may include not only the objective observation of infrequent bowel movements but also the subjective complaints of straining at stooling, incomplete evacuation, abdominal bloating or pain, hard or small stools, or a need for digital manipulation to enable defecation.

Although constipation is often defined as decreased frequency of defecation, that alone is not a sufficient criterion.[10] In fact, this parameter needs to be adjusted in young children, because of the wide variability in normal defecation frequency in this age group[2,11] *(Table 1)*.[2]

An international committee has recommended operational definitions of chronic functional constipation in adults, infants, and young children *(Table 2)*[12,13] [Evidence level C, consensus opinion]. These definitions can be used to guide the evaluation and treatment of constipation.

Anatomy and Physiology

The process of defecation involves the propulsion of stool through the colon to the rec-

TABLE 2

Rome II Criteria for Defining Chronic Functional Constipation in Adults, Infants, and Young Children

Adults

Two or more of the following for at least 12 weeks in the preceding 12 months:

Straining in more than 25% of defecations

Lumpy or hard stools in more than 25% of defecations

Sensation of incomplete evacuation in more than 25% of defecations

Sensation of anorectal obstruction or blockade in more than 25% of defecations

Manual maneuvers (e.g., digital evacuation, support of the pelvic floor) to facilitate more than 25% of defecations

Fewer than three defecations per week

Loose stools are not present, and there are insufficient criteria for the diagnosis of irritable bowel syndrome.

Infants and young children

At least two weeks of the following:

Scybalous, pebble-like, hard stools for the majority of stools, or firm stools two or fewer times per week

No evidence of structural, endocrine, or metabolic disease

Adapted with permission from Thompson WG, Longstreth GF, Drossman DA, Heaton KW, Irvine EJ, Muller-Lissner SA. Functional bowel disorders and functional abdominal pain. Gut 1999;45(suppl 2):II43-7, and Rasquin-Weber A, Hyman PE, Cucchiara S, Fleisher DR, Hyams JS, Milla PJ, et al. Childhood functional gastrointestinal disorders. Gut 1999;45(suppl 2):II60-8.

tum, the recognition of stool within the rectum, and the conscious act of defecation.

The colon terminates in the rectum, which, in turn, passes through the levator ani muscles and becomes the anal canal. Two groups of muscles encircle the anal canal: the internal anal sphincter (involuntary control) and the external anal sphincter (voluntary control). The nearly 90-degree angle formed at the junction of the rectum and the anal canal is also important. This junction straightens with flexion of the hips, which explains the physiologic advantage of squatting for defecation.[14]

Within three to four hours after ingestion, food enters the cecum; after several more hours, it reaches the rectum. When the rectal wall is distended by stool, reflex contraction of the rectum occurs, the internal anal sphincters relax, and fecal material is pushed into the anal canal. At this point, the stretch receptors of the anoderm perceive the stool, and a decision is made on whether to expel the stool by relaxing the external anal sphincter, squatting, and increasing intra-abdominal pressure with the Valsalva maneuver, or to postpone defecation by contracting the external anal sphincter and the gluteal muscle.[11,15,16]

Pathophysiology

Constipation can occur because of an alteration in stool consistency or colonic motility or caliber. It can also result from any change in the process of rectal evacuation. From a practical standpoint, constipation is generally caused by one of two mechanisms: obstruction of the movement of luminal contents or poor colonic propulsive activity. Obstruction of colonic flow may be caused by an anatomic or functional disorder. Poor propulsive activity may be caused by inhibition of motility (i.e., effects of a drug or metabolic disease) or diffuse nerve or muscle disease (e.g., multiple sclerosis, Chagas' disease).

The differential diagnosis of constipation in adults and children is broad *(Tables 3[17] and 4[11])*. However, most patients are found to have no discernible cause for this symptom and are labeled as having chronic functional or idiopathic constipation[11,17] [Evidence level C, expert opinion].

Diagnostic Approach

A thorough investigation of constipation may be indicated for one of two reasons: (1) to exclude systemic disease or a structural disorder of the intestines, or (2) to elu-

TABLE 3
Selected Causes of Constipation in Adults

Functional causes: dietary factors (low residue), motility disturbance (slow transit time, outlet delay, irritable bowel syndrome), sedentary lifestyle

Structural abnormalities: anorectal disorders (anal or perianal fissures, thrombosed hemorrhoids), colonic strictures (diverticulosis, ischemia, radiation therapy), colonic mass lesions with obstruction (adenocarcinoma), idiopathic megarectum

Endocrine and metabolic conditions: diabetes mellitus, hypercalcemia, hyperparathyroidism, hypokalemia, hypothyroidism, pregnancy, uremia

Neurogenic conditions: cerebrovascular events, multiple sclerosis, Parkinson's disease, Hirschsprung's disease, spinal cord tumors

Smooth muscle and connective tissue disorders: amyloidosis, scleroderma

Psychogenic conditions: anxiety, depression, somatization

Drugs: antacids, anticholinergics, antidepressants, calcium channel blockers, cholestyramine (Questran), clonidine (Catapres), diuretics, levodopa (e.g., with carbidopa [Sinemet]), narcotics, nonsteroidal anti-inflammatory drugs, psychotropics, sympathomimetics

Adapted with permission from Cheskin LJ. Constipation and diarrhea. In: Barker LR, Burton JR, Zieve PD, eds. Principles of ambulatory medicine. 5th ed. Baltimore. Williams & Wilkins, 1999:498-503.

TABLE 4
Selected Causes of Constipation in Children

Functional causes: dietary factors (inadequate dietary fiber, excessive cow's milk intake, dehydration, malnutrition), motility disturbance (slow transit), stool withholding, inflammatory bowel disease

Structural abnormalities: anal disorders (imperforate anus, anteriorly displaced anus, anal or perianal fissures, anal stenosis), colonic strictures (primary or secondary), pelvic masses (sacral teratoma)

Endocrine, metabolic, and immunologic conditions: celiac disease, cystic fibrosis, diabetes mellitus, hypercalcemia, hyperparathyroidism, hypokalemia, hypothyroidism, pregnancy, uremia

Neurogenic conditions: cerebral palsy, hypotonia (Down syndrome, prune-belly syndrome), spinal cord abnormalities (spina bifida, spinal tumors)

Neuromuscular conditions: aganglionosis (Hirschsprung's disease [congenital], Chagas' disease [acquired]), infant botulism, pseudo-obstruction syndrome

Connective tissue disorders: scleroderma, systemic lupus erythematosus

Drugs: antacids, anticholinergics, antidepressants, bismuth, laxatives, opiates, phenobarbital, sympathomimetics

Adapted with permission from Abi-Hanna A, Lake AM. Constipation and encopresis in childhood. Pediatr Rev 1998;19:23-30.

> *The Rome II criteria can be used to diagnose chronic functional constipation in adults, infants, and young children.*

cidate the underlying pathophysiologic process when constipation does not respond to simple treatment.

ADULTS

History. The evaluation begins with clarification of what the patient means by "constipation." The assessment includes the nature of the bowel movements (size, consistency, frequency) and the duration of the complaint.

Acute constipation is more often associated with organic disease than is long-standing constipation. It is important to determine whether the patient has a history or signs and symptoms of a neurologic, endocrine, or metabolic disorder. The patient must be asked about "red flags" that suggest the presence of an underlying gastrointestinal organic disorder. Important red flags include abdominal pain, nausea, cramping, vomiting, weight loss, melena, rectal bleeding, rectal pain, and fever.

During the first visit, it is helpful to obtain a history of the patient's working, eating, and bowel habits. Questions should be asked about dietary fiber intake, level of physical activity, and use of medications, including over-the-counter agents (e.g., laxatives, vitamins, bismuth compounds). The patient's perspective and concerns should be elicited, and a careful psychosocial history should be obtained, with attention given to depression, anxiety, and stress management.

Physical Examination. The physical examination is directed at identifying underlying causes of constipation. The patient's weight is recorded, and overall nutritional status is noted. The patient's skin is checked for pallor and signs of hypothyroidism (e.g., reduced body hair, skin dryness, fixed edema), and the abdomen is examined for masses, distention, tenderness, and high-pitched or absent bowel sounds. The rectal examination includes careful inspection and palpation for masses, anal and perianal fissures, inflammation, and hard stool in the ampulla. The color and consistency of the stool should be noted.

A focused neurologic examination should be performed to search for focal deficits and delayed relaxation phase of the deep tendon reflex (suggestive of hypothy-

> *Most patients are found to have no discernible cause for their constipation and are labeled as having chronic functional constipation.*

roidism). The patient should also be evaluated for signs of depression, anxiety, and somatization.

Diagnostic Studies. Laboratory studies and colorectal imaging are appropriate when constipation is persistent and fails to respond to conservative treatment, or when a particular disorder is suspected. Laboratory tests may include a complete blood cell count and thyroid-stimulating hormone, calcium, glucose, potassium, and creatinine levels. The stool should be tested for occult blood.

Flexible sigmoidoscopy and colonoscopy are excellent for identifying lesions that narrow or occlude the bowel. Colonoscopy, if readily available, is the examination of choice in adult patients with constipation who have iron deficiency anemia, a positive guaiac stool test, or a first-degree relative with colon cancer.[18] An alternative examination is barium enema and flexible sigmoidoscopy, a

The Authors

DAISY A. ARCE, M.D., is assistant professor in the Department of Family Practice at the State University of New York (SUNY) Health Science Center at Brooklyn College of Medicine, where she also serves as medical director of the Family Practice Center and predoctoral coordinator of the Family Practice Clerkship. Dr. Arce received her medical degree from the University of Panama School of Medicine, Panama City, and completed a family practice residency at SUNY Health Science Center at Brooklyn.

CARLOS A. ERMOCILLA, M.D., is clinical assistant instructor in the Department of Family Practice at SUNY Health Science Center at Brooklyn College of Medicine. Dr. Ermocilla graduated from the University of Panama School of Medicine and completed an internship at SUNY Health Science Center at Brooklyn.

HILDEGARDO COSTA, M.D., is a pediatric gastroenterology and nutrition fellow in the Department of Pediatrics at SUNY Health Science Center at Brooklyn College of Medicine. Dr. Costa received his medical degree from the University of Panama School of Medicine and completed a pediatric residency at Woodhull Medical and Mental Health Center, Brooklyn, N.Y.

Address correspondence to Daisy A. Arce, M.D., State University of New York Health Science Center at Brooklyn, Department of Family Practice, 450 Clarkson Ave., Box 67, Brooklyn, NY 11203 (e-mail: darce@netmail.hyscbklyn.edu). Reprints are not available from the authors.

Constipation in Adults

The rightsholder did not grant rights to reproduce this item in electronic media. For the missing item, see the original print version of this publication.

FIGURE 1.

TABLE 5
Recommended History in the Evaluation of Children with Constipation

The rightsholder did not grant rights to reproduce this item in electronic media. For the missing item, see the original print version of this publication.

combination that can demonstrate potentially diagnostic features such as colonic dilatation and strictures[19] [Evidence level C, expert opinion].

If extracolonic and mechanical causes of constipation are excluded by laboratory studies and colorectal imaging, a complete physiologic evaluation is warranted. Possible tests include anal manometry, balloon insertion, defecography, and colonic transit studies.

Anal manometry is performed to assess the anal sphinc-

ter, pelvic floor, and associated nerves. A special pressure-sensitive catheter is inserted into the anus to measure resting and squeeze pressures of the sphincter. Increased anal sphincter pressures are often associated with pelvic floor dysfunction. However, the principal purpose of anorectal manometry in the setting of chronic constipation is to exclude adult-onset or short-segment Hirschsprung's disease (congenital megacolon), which should be suspected in the absence of a rectoanal inhibitory reflex.

Balloon insertion is the simplest and perhaps most physiologic test to demonstrate rectal evacuation. Studies have found that healthy volunteers can expel the balloon, whereas most patients with pelvic floor dysfunction cannot.[8,20]

Defecography and colonic transit studies are particularly useful in patients with intractable constipation or pelvic floor disorders. Videodefecography is specifically designed to evaluate evacuatory disorders such as rectal prolapse and rectocele.[21] For this study, the patient's rectum is filled with thickened barium (to simulate the consistency of stool). The patient is then seated on a water-filled commode and examined from a lateral view with fluoroscopy. Views are obtained with the patient at rest, squeezing to defer a bowel movement, and straining to evacuate the rectum.[8]

For colonic transit studies, serial abdominal radiographs are obtained after the patient swallows a capsule filled with radiopaque markers. In normal persons, most of the markers should pass by day 5; in a patient with slow colonic transit, the markers will be scattered throughout the colon. If the patient has pelvic outlet obstruction, more than 20 percent of the markers will be held up in the rectum.[9,17,18]

A suggested approach to the evaluation and management of constipation in adults is provided in *Figure 1*[22] [Evidence level C, expert opinion].

CHILDREN

There is an interesting dichotomy in the approach to constipation in children: the differential diagnosis is lengthy, but the likelihood of undertaking an extensive exclusionary evaluation is small.[11]

History. A thorough history is recommended as part of the complete evaluation *(Table 5).*[2] Based on the symptoms, it may be possible to narrow the differential diagnosis to a specific anatomic or pathophysiologic disorder *(Table 6).*[7]

Constipation frequently begins with the transition from breast milk to formula, or from strained foods to table

TABLE 6

Possible Causes of Constipation and Related Symptoms in Children

The rightsholder did not grant rights to reproduce this item in electronic media. For the missing item, see the original print version of this publication.

foods. Cow's milk is the most constipating component of the young child's diet.[11] The transition to a daycare setting or an all-day school, with consequent loss of privacy, may be a contributing factor to constipation.

When possible, the family should be asked to prepare a five- to seven-day symptom and diet history before the office visit. The frequency and character of the stool should be recorded, along with episodes of pain. Stool withholding and retention may occur as the child attempts to avoid painful defecation. In one study,[23] 63 percent of children with constipation and soiling had painful defecation that began before three years of age.

Physical Examination. A complete physical examination should be performed to search for an organic disorder *(Table 7).*[2] Childhood functional constipation is a clinical diagnosis that frequently can be made on the basis of a typical history and an essentially normal physical examination. A fecal mass in the suprapubic area is demonstrable in most children who present with constipation.[24]

External examination of the perianal area and at least one digital rectal examination are essential. One study[25] assessing the frequency of digital rectal examination by primary care physicians found that this examination was not performed

before referral in 77 percent of children with chronic constipation; 54 percent of these children were found to have fecal impaction [Evidence level B, nonrandomized study].

It is important to look for signs of spinal dysraphism, such as sensory and motor deficits, urinary incontinence, absent cremasteric reflex, pigmentary abnormalities, and hair tufts in the sacrococcygeal area. Other red flags, such as delayed growth, should raise suspicion for a malabsorptive disorder (e.g., celiac disease, cystic fibrosis).[24]

Diagnostic Studies. In children with constipation, the initial history and physical examination usually reveal no other problems. In the absence of red flags, no testing or subspecialist consultation is needed before treatment is initiated.[24]

Functional constipation is the most likely diagnosis in older children. In children younger than one year of age, the possibility of Hirschsprung's disease must be considered. This disorder, which occurs in one of 5,000 children, is diagnosed in 40 percent of affected children by three months of age, in 61 percent by 12 months of age, and in 82 percent by four years of age.[7]

Fecal occult blood testing is recommended in all infants with constipation, and in children of any age who have abdominal pain, failure to thrive, intermittent diarrhea, or a

TABLE 7
Physical Examination of Children with Constipation

General appearance

Vital signs: temperature, pulse, respiratory rate, blood pressure

Growth parameters: height, weight, head circumference

Head (skull, ears, eyes, nose) and neck (throat)

Lungs, chest, and cardiovascular system

Back and spine: dimple, tuft of hair

Abdomen: distention, palpable liver and spleen, fecal mass

Anal inspection: position of anus, presence of stool around anus or on clothes, perianal erythema, skin tags, anal or perianal fissures

Rectal examination: anal wink, anal tone, presence and consistency of stool, fecal mass, other masses, explosive stool on withdrawal of finger, occult blood in stool

Neurologic examination: tone, strength, cremasteric reflex, deep tendon reflexes

Adapted with permission from Baker SS, Liptak GS, Colletti RB, Croffie JM, Di Lorenzo C, Ector W, et al. Constipation in infants and children: evaluation and treatment. A medical position statement of the North American Society for Pediatric Gastroenterology and Nutrition. J Pediatr Gastroenterol Nutr 1999;29:612-26.

The rightsholder did not grant rights to reproduce this item in electronic media. For the missing item, see the original print version of this publication.

family history of colon cancer or colonic polyps. Blood tests, which may include thyroid function tests, urea nitrogen measurements, and electrolyte, calcium, magnesium, or lead levels, are indicated to exclude some systemic disorders that may be suggested by the findings of the history and physical examination.

Plain-film radiography is useful to assess the presence of a fecal mass in a child who is not cooperative with abdominal and rectal examinations. Barium enema is used primarily to rule out anatomic abnormalities or to evaluate Hirschsprung's disease and colonic strictures (necrotizing enterocolitis)[11] [Evidence level B, nonrandomized studies]. Magnetic resonance imaging of the lumbosacral spine can demonstrate intraspinal problems such as tethered cord, tumors, and sacral agenesis.

Anorectal manometry is indicated to demonstrate the rectoanal inhibitory reflex and to rule out Hirschsprung's disease. Suction rectal biopsy can be valuable in diagnosing Hirschsprung's disease. It is now possible to stain rectal tissue for ganglion cells (lacking in Hirschsprung's disease) and acetycholinesterase (increased in Hirschsprung's disease). A full-thickness rectal sample is obtained by the surgeon to document normal colonic segments at the time of diverting colostomy for aganglionosis.[11]

A suggested approach to the evaluation and management of constipation in children is provided in *Figure 2*[2] [Evidence level C, expert opinion].

FIGURE 2.

REFERENCES

1. Mollen RM, Claassen AT, Kuijpers JH. The evaluation and treatment of functional constipation. Scand J Gastroenterol Suppl 1997;223:8-17.
2. Baker SS, Liptak GS, Colletti RB, Croffie JM, Di Lorenzo C, Ector W, et al. Constipation in infants and children: evaluation and treatment. A medical position statement of the North American Society for Pediatric Gastroenterology and Nutrition. J Pediatr Gastroenterol Nutr 1999;29:612-26.
3. Talley NJ, Fleming KC, Evans JM, O'Keefe EA, Weaver AL, Zinsmeister AR, et al. Constipation in an elderly community: a study of prevalence and potential risk factors. Am J Gastroenterol 1996; 91:19-25.
4. Schaefer DC, Cheskin LJ. Constipation in the elderly. Am Fam Physician 1998;58:907-14.
5. Stewart WF, Liberman JN, Sandler RS, Woods MS, Stemhagen A, Chee E, et al. Epidemiology of Constipation (EPOC) study in the United States: relation of clinical subtypes to sociodemographic features. Am J Gastroenterol 1999;94:3530-40.
6. Lennard-Jones JE. Constipation. In: Feldman M, Sleisenger MH, Scharschmidt BF, eds. Sleisenger & Fordtran's Gastrointestinal and liver disease: pathophysiology, diagnosis, management. 6th ed. Philadelphia: Saunders, 1998:174-97.
7. Felt B, Wise CG, Olson A, Kochhar P, Marcus S, Coran A. Guideline for the management of pediatric idiopathic constipation and soiling. Multidisciplinary team from the University of Michigan Medical Center in Ann Arbor. Arch Pediatr Adolesc Med 1999;153:380-5.
8. Browning SM. Constipation, diarrhea, and irritable bowel syndrome. Prim Care 1999;26:113-39.
9. Evans JM, Fleming KC, Talley NJ, Schleck CD, Zinsmeister AR, Melton LJ III. Relation of colonic transit to functional bowel disease in older people: a population-based study. J Am Geriatr Soc 1998;46:83-7.
10. Wald A. Constipation. Med Clin North Am 2000; 84:1231-46.
11. Abi-Hanna A, Lake AM. Constipation and encopresis in childhood. Pediatr Rev 1998;19:23-30.
12. Thompson WG, Longstreth GF, Drossman DA, Heaton KW, Irvine EJ, Muller-Lissner SA. Functional bowel disorders and functional abdominal pain. Gut 1999;45(suppl 2):II43-7.
13. Rasquin-Weber A, Hyman PE, Cucchiara S, Fleisher DR, Hyams JS, Milla PJ, et al. Childhood functional gastrointestinal disorders. Gut 1999;45(suppl 2):II60-8.
14. Laney DW Jr, Balistreri WF. The gastrointestinal tract and liver. Constipation. In: Rudolph AM, Kamei RK, eds. Rudolph's Fundamentals of pediatrics. 2d ed. Stamford, Conn.: Appleton & Lange, 1998:399-405.
15. Di Lorenzo C. Childhood constipation: finally some hard data about hard stools! [Editorial]. J Pediatr 2000;136:4-7.
16. Leung AK, Chan PY, Cho HY. Constipation in children. Am Fam Physician 1996;54:611-8,627.
17. Cheskin LJ. Constipation and diarrhea. In: Barker LR, Burton JR, Zieve PD, eds. Principles of ambulatory medicine. 5th ed. Baltimore: Williams & Wilkins, 1999:498-503.
18. Prather CM, Ortiz-Camacho CP. Evaluation and treatment of constipation and fecal impaction in adults. Mayo Clin Proc 1998;73: 881-6.
19. Winawer SJ, Fletcher RH, Miller L, Godlee F, Stolar MH, Mulrow CD, et al. Colorectal cancer screening: clinical guidelines and rationale. Gastroenterology 1997;112:594-642.
20. Parsons DP, Isler JT. Office management of common anorectal problems. Approach to the patient. Prim Care 1999;26:15-34.
21. Agachan F, Pfeifer J, Wexner SD. Defecography and proctography. Results of 744 patients. Dis Colon Rectum 1996;39:899-905.
22. Kerney DJ, McQuaid KR. Approach to the patient with gastrointestinal disorder. In: Grendell JH, McQuaid KR, Friedman SL, eds. Current diagnosis and treatment in gastroenterology. Stamford, Conn.: Appleton & Lange, 1996:1-28.
23. Partin JC, Hamill SK, Fischel JE, Partin JS. Painful defecation and fecal soiling in children. Pediatrics 1992;89(6 pt 1):1007-9.
24. Di Lorenzo C. Pediatric anorectal disorders. Gastroenterol Clin North Am 2001;30:269-87.
25. Gold DM, Levine J, Weinstein TA, Kessler BH, Pettei MJ. Frequency of digital rectal examination in children with chronic constipation. Arch Pediatr Adolesc Med 1999;153:377-9.