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Evaluation and Management of Constipation

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ABSTRACT

Constipation is a common clinical problem. The evaluation and management of most patients are within the capability of interested, well-trained primary care physicians. The diagnostic evaluation includes an adequate history to exclude treatable etiologies, anatomic evaluation of the colon, and functional studies in refractory patients. Treatment options include medication adjustment and associated disease treatment, followed by a trial of daily fiber or laxatives. Appropriate patients should be referred for consideration of surgical treatment, which usually involves a colectomy and ileoproctostomy for colonic inertia.

Constipation is a common clinical problem. Rather than a definable disease, it is better thought of as a constellation of symptoms. The prevalence of constipation in Western countries has been reported to range from 2% to 27%. Constipation is more common in women, nonwhites, and persons older than 65 years. Annually, constipation accounts for 2.5 million physician visits, 20 000 hospitalizations, and 3 million laxative prescriptions in the United States.[1,2]

Defining constipation has been difficult. Many patients describe constipation as the passage of hard stools, a sense of incomplete evacuation, excessive straining, or excessive time spent in unsuccessful defecation. From a medical standpoint, constipation has been defined as the inability to evacuate stool completely and spontaneously more than 3 times per week. Most clinicians use a combination of these subjective and objective criteria.[3,4] Another way to characterize unsatisfactory defecation is as infrequent stool, difficult stool passage, or both.[5] Additional clinical details are listed in Table 1.

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ETIOLOGY AND PATHOPHYSIOLOGY

Constipation has been associated with many medical disorders and as a side effect of various medications (Tables 2 and 3).[6] In a few patients, no cause of their abnormal bowel function can be determined; in such cases, the constipation is referred to as *idiopathic*. As our knowledge of colonic physiology has improved, we have been able to subdivide constipated patients on the basis of physiologic testing into three categories: normal-transit constipation, slow-transit constipation, and outlet obstruction (obstructive or dyssynergic defecation). In normal-transit (functional) constipation, the stool transit through the colon is normal, but the patient has subjective symptoms. These patients may have a defecation disorder. If intermittent colonic dysfunction is not present during the test, the dysfunction might be too subtle for current testing methods, or the patient might have a misperception of normal bowel function. Slow-transit constipation (colonic inertia) is a heterogeneous motility disorder that in some patients is associated with neuroenteric changes in the colon,[7] is related to disorders such as anorexia nervosa, or is caused by medication associated with slowing of transit.[8] In severe refractory cases, surgical treatment may be required. Outlet obstruction or defecatory disorders include pelvic floor dyssynergia and structural abnormalities such as rectal intussusception and rectocele.

EVALUATION

Evaluation starts with a thorough history and physical examination.[9] The nature and duration of the symptoms are important. Recent changes in bowel habits increase the chances of identifying a cause. Medications that alter bowel function (Table 2) and medical conditions such as hypothyroidism and diabetes (Table 3) should be considered. Patients without an identifiable cause of constipation or those with risk factors for colorectal cancer (eg, age greater than 35, family history) should have an anatomic evaluation of their colon. This can be accomplished with a colonoscopy, a barium enema, or computed tomographic colography. These tests exclude tumors, strictures, and large bowel disease. Because consti-

Table 1. Definition of Constipation[5]

Unsatisfactory defecation characterized by infrequent stool, difficult stool passage, or both.
Difficult stool passage includes
• Straining
• Lumpy or hard stool
• Difficulty passing stool
• Incomplete or prolonged evacuation
• Prolonged time to stool
• Need for manual maneuvers to pass stool
• Symptoms reported for a least 3 months

pated patients often have difficulty with the cleansing required for a colonoscopy, a barium contrast study is usually the best option for evaluating chronic constipation. After anatomic causes are excluded, a trial of fiber or laxatives is usually appropriate. If these measures fail, additional studies such as colonic transit study to document slow colonic transit and studies of outlet function (defecogram, manometry, or balloon expulsion test) are indicated.[10]

Colonic transit studies can be performed in several ways.[11] My preference is to have the patient ingest 24 radiopaque markers (commercially available in a single capsule as Sitzmarkers, Konsyl Pharmaceuticals, Ft Worth, Tex) and obtain abdominal radiographs on days 1, 3, and 5 after ingestion of the markers (Figure 1). Eighty percent of normal subjects will pass 80% of the markers by day 3. An abnormal test suggestive of colonic inertia will have 20 or more markers distributed throughout the colon on day 3 or 5. With outlet obstruction or rectal dysfunction, more than 20 markers have usually grouped in the distal sigmoid colon or proximal rectum on day 3 or 5.

To evaluate outlet function, several complementary studies are available. A balloon expulsion test is a simple functional examination that can be easily performed in the office or in conjunction with anorectal manometry. A latex balloon is inflated with 60 mL of air or water within the rectum. The patient is asked to expel the balloon in a private bathroom. Expelling the balloon within 8 minutes denotes a normal expulsion time. This test has been shown to predict reliably the presence of nonrelaxing puborectalis muscle or rectal dysmotility and is my preferred initial evaluation.

Defecography provides a real-time video image of the patient defecating. The test involves the injection of a radiopaque artificial stool into the distal colon and rectum. The patient is then instructed to have a bowel movement while sitting on a special commode placed in front of a fluoroscopic x-ray machine. Video radiographs and still films are taken during evacuation, straining, and attempts to tighten the sphincters. Cinedefecography provides a dynamic picture of the interaction between the anal sphincter complex and

Table 2. Medications Associated with Constipation

Anticholinergics
Antidepressants
Antipsychotics
Cation-containing agents
Aluminum (antacids, sucralfate)
Bismuth
Calcium (antacids, supplements)
Iron supplements
Neurally active agents
Opiates
Antihypertensives
Gaglionic blockers
Vinca alkaloids
Calcuim channel blockers
Resins
Cholestyramin
Others
Antihistamines
Antiparkinsonian drugs
Diuretics
Nonsteroidal anti-inflammatory agents

Table 3. Secondary Causes of Constipation

Endocrine and metabolic disorders
Chronic renal failure
Diabetes mellitus
Hypothyroidism
Hypercalcemia
Hypokalemia
Pregnancy
Neurogenic disorders
Autonomic neuropathy
Cerebrovascular disease
Chagas' disease
Dementia
Depression
Hirschsprung's disease
Multiple sclerosis
Muscular dystrophy
Parkinson's disease
Spinal cord lesions
Collagen, vascular, and muscle disorders
Amyloidosis
Dermatomyositis
Myotonic dystrophy
Systemic sclerosis

Figure 1. Transit study. Abdominal radiograph taken on day 1 with 24 markers distributed throughout the colon.

the rectum and helps to define abnormalities in the pelvic floor. It identifies abnormalities such as rectocele, intussusception, or a nonrelaxing puborectalis muscle. Assessment of the amount of artificial contrast evacuated by the patient during the examination also documents the functional significance of identified lesions.

Anorectal manometry objectively measures anal sphincter muscle pressure and the anorectal sensory response to different stimuli. The test is performed with a sensory catheter and a recording device. Failure of the sphincter muscles to relax during defecation (nonrelaxing puborectalis muscle) and an absence of the rectoanal inhibitory reflex (suggestive of Hirschsprung's disease) are evaluated.

All the aforementioned anatomic and functional evaluations are available at Ochsner Clinic in the departments of radiology, gastroenterology, or colon and rectal surgery. Anatomic abnormalities such as strictures, cancers, or volvulus should be referred for appropriate surgical treatment. Colonic inertia is confirmed by an abnormal transit study and a normal outlet study. Selected patients with colonic inertia should be referred for colonic resections. Patients with outlet dysfunction are a more challenging problem.

TREATMENT

General Measures

Initial management includes patient education and an explanation of normal bowel habits.[12] Medications known to cause constipation should be discontinued or minimized, and metabolic abnormalities (eg, hypothyroidism) should be corrected. Regular exercise and increases in fiber and oral fluids are encouraged. Patients are informed that their constipation developed over time and that correction is not likely to occur overnight. Alternative measures will often need to be tried until the symptoms are resolved. Recent major developments have significantly improved treatment options: re-evaluation and reduction in the number of stimulant laxatives, newer osmotic agents, introduction of intestinal secretory agents, availability of biofeedback for defecatory disorders, and appreciation of the highly selective but important role of surgery. A stepwise approach as described in Table 4 will usually lead to success.

Bulking (Fiber) Agents

Dietary fiber increases stool bulk, water content, and bacterial proliferation. This increased fecal mass reduces colonic transit time in most patients. The goal is to increase total fiber intake to 20 to 30 g daily, which can often be achieved through diet and fiber supplements, as documented in multiple studies.[13,14] Patients are encouraged to increase their intake of fruits, vegetables, and high-fiber breakfast cereals or raw bran. High-fiber cereals contain 8 to 10 g of fiber per serving. Patients with lactose intolerance or poor dietary compliance are better managed with dietary supplements such as psyllium or methylcellulose. Patient compliance with fiber recommendations is often poor because of the side effects of bloating, flatulence, and distension. Different types and amounts of fiber will affect patients differently. For this reason, patients are encouraged to start at lower doses and slowly increase their intake. If one type of fiber does not improve symptoms, other types should be tried. Varying the amounts or frequency of ingested fiber might also be necessary. Patients are advised to continue a regimen for 3 or 4 days before making any change to identify what is hindering or improving the patient's functioning.

Pharmacologic

Osmotic laxatives, such as polyethylene glycol (Miralax) or lactulose (Chronulac), can be used in

Table 4. Pharmacologic Management of Constipation

Medication	Adult Dosages*	Average Monthly Cost**
Bulk (fiber) laxatives		
Psyllium (Metamucil, Konsyl)	Titrate up to 12–20 g/day	$9–25
Methylcellulose (Citrucil)	2–3 tablets 1–3 times daily	$3–8
Polycarbophil (FiberCon)	2–3 tablets 1–3 times daily	$14
Gum (Benefiber)	2 tsp 1–3 times daily	$16
Bran	12 g/day	
Osmotic laxatives		
Unabsorbed sugars or inert agents		
Lactulose (Cephulac, Chronulac)	15–30 mL once or twice daily	$37
Sorbitol 70% (Cytosol)	15–30 mL once or twice daily	$11
Polyethylene glycol (Miralax)	17–36 g once or twice daily	$21–83
Polyethylene glycol and electrolytes (Golytely, Nulytely, Colyte)	17–36 g once or twice daily	$46
Salts		
Magnesium hydroxide (Milk of Magnesia)	15–30 mL once or twice daily	$9
Magnesium citrate (Evac-O-Mag)	50–300 mL as needed	$6
Sodium phosphate		
Fleet Phospho-Soda	15–30 mL once a daily	$4
Osmo-prep	1–3 tablets once or twice a day	$171
Stimulant laxatives		
Bisacodyl (Ducolax)	10 mg orally, daily	$8
	5–10 mg suppository nightly	$29
Senna (Senokot)	70–100 g daily	$2
Cascara sagrada (Colamin)	2–5 mL daily	
Aloe (casanthranol)	30–60 mg daily	
Castor oil (Purge)	15–30 mL daily	
Secretory agents		
Lubiprostone (Amitiza)	24 mg twice a day	$206
Emollients and stool softeners		
Mineral oil	1–15 mL orally at night for children	$10
	15–45 mL for adults	
Docusate sodium (Colase)	100 mg twice daily	$24
Enema		
Tap-water enema	2–500 mL daily	
Phosphate enema (Fleet enema)	120 mL daily	$3
Mineral oil retention enema (Fleet mineral oil enema)	100 mL daily	$3

* Provider should consult prescribing information.

** Monthly cost information retrieved from www.drugstore.com, October 2007.

patients with continuing symptoms who do not respond to fiber. These agents are safe to use long term and do not promote dependency. The lay and medical belief that these agents harm the colon (''cathartic colon'') and promote dependency, habituation, or abuse is not supported by objective data.[15,16] These osmotic agents (unabsorbed agents, sugars, or salts) work by retaining or pulling fluid into the intestinal lumen. The dose should be titrated over several days to produce a semisolid stool. Excessive doses of these agents can produce fluid overload or electrolyte abnormalities, so they must be used with care in patients with renal insufficiency or cardiac dysfunction. Nonabsorbed sugars may also produce flatulence.

Emollient laxatives soften stool by reducing surface tension, thereby allowing intestinal fluids to penetrate the fecal mass. Mineral oil requires caution in elderly and neurologically impaired patients and in those with impaired swallowing because it carries the

risk of aspiration and the potential for interference with absorption of fat-soluble vitamins.

Stimulant laxatives are used in patients with significant constipation who do not respond to fiber or osmotic laxatives. These agents increase intestinal motility and stimulate fluid secretion into the bowel lumen. Despite folklore, there is little evidence that chronic use of stimulants causes ''cathartic colon.'' Chronic use of laxatives that contain anthraquinones can cause melanosis coli, a brown-black pigmentation of the colonic mucosa. This condition has no clinical consequence and will regress if the patient stops taking the laxative. Although anthraquinones were a common component of laxatives in the past, currently they are rarely seen except in ''natural'' over-the-counter preparations. When stimulants are being used, it is important to find the least expensive product that can adequately relieve the patient's symptoms. Different agents or combinations may be required.

Secretory agents constitute a new option for managing constipation. Lubiprostone (Amitiza, Sucampo Pharmaceuticals, Bethesda, Md) is a chloride-channel activator that acts locally on the apical membrane of the gastrointestinal tract to increase intestinal fluid secretion. It is indicated for treatment of idiopathic constipation.

Enemas can be self-administered to assist evacuation. Tap water is preferred for small-volume stimulation, and oil-retention enemas are useful for hard or impacted stool. Small volumes and near-normal osmolity are preferred to prevent injury to the mucosa and fluid absorption.

Table 4 summarizes the pharmacologic options available to manage constipation and lists the average monthly costs for each option. The therapeutic goal for all agents is to use the least expensive agents that relieve the patient's symptoms. Over time, some medications may become less effective and might need to be altered or combined with other agents. Patients who remain refractory to maximal medical therapy may benefit from a surgical referral.

Surgical

A small group of patients who are refractory to these regimens might be considered for surgical treatment. Improvements in physiologic evaluations and experience have helped to optimize patient selection for surgery.[17,18] The two groups of patients who benefit from surgery are those with either an anatomic abnormality or a specific functional aberration, such as colonic inertia. Surgery has a limited role in treating outlet obstruction.

Several operations are used to treat colonic inertia. All involve a colonic resection and have varied from a segmental resection (left or right colectomy), to a subtotal colectomy with cecorectal or ileosigmoid anastomosis, to a total colectomy. The best results have been obtained with colectomy and ileorectal anastomosis (ileoproctostomy).[19] Doing a lesser operation has led to a high incidence of recurrent constipation. Overall, the more colon removed, the lower the incidence of constipation and the greater the number of bowel movements. As a compromise, most surgeons currently perform a total colectomy with an ileorectal anastomosis with the anastomosis at the level of the sacral promitory. This leaves 12 to 18 cm of rectum and allows a patient to average 2 to 4 bowel movements per day. The stool is looser than normal but becomes formed after a short period of adaptation. Patients have good control, and the incidence of recurrent constipation is very low. More than 95% of properly selected patients can be expected to be satisfied with their surgical treatment, and the results will last long term. About 5 to 7 patients a year are offered surgical therapy of colonic inertia at the Ochsner Clinic. No mortalities have occurred to date, and the vast majority of patients have been pleased with their results.

Several reports have documented patients' quality of life after surgical management.[19–22] FitzHarris and colleagues surveyed 75 patients who had undergone total abdominal colectomy and ileorectal anastomosis a mean of 3.9 years (range, 0.5–9.6) before the survey.[19] Using a 54-item validated questionnaire (Gastrointestinal Quality-of-life Index), these investigators found that 81% of the patients were at least somewhat pleased with their bowel frequency, but 41% cited abdominal pain, 21% incontinence, and 46% diarrhea at least some of the time. However, 93% stated that they would undergo subtotal colectomy again if given a second chance. Long-term studies have confirmed that initial success is maintained in most appropriately selected patients.[23] The most common long-term complication has been bowel obstructions.[19]

Correctable outlet problems such as rectal prolapse respond well to perineal procedures such as an Altemeier or Delorme, whereas a symptomatic rectocele can be corrected with a transanal or transvaginal repair.[24] Patients with normal colonic motility and outlet obstruction from a nonrelaxing puborectalis muscle should initially be offered biofeedback. This therapy is available from the Ochsner Clinic physical therapy department. The few patients who are not helped by this therapy may be considered for a botulinum A toxin injection into the puborectalis muscle.

Patients with colonic inertia and rectal dysmotility may be offered an ileostomy or a restorative procto-

Table 5. Recommendations

Diagnostic evaluation
• Adequate history to exclude treatable etiologies
• Anatomic evaluation of colon
• Functional study (colonic transit study) in refractory patients
• Outlet evaluation
Treatment options
• Medication adjustment and associated disease treatment
• Trial of daily fiber or laxatives
• Surgical referral for appropriate patients
• Biofeedback for outlet obstruction
• Colectomy and ileoproctostomy for colonic inertia

colectomy.[25] The potential benefits of these procedures must be balanced against the functional limitations and the associated morbidity.

Fecal Impaction

Patients with fecal impactions can be managed by several maneuvers.[26] Low impactions often require digital disimpaction, which can be assisted by the administration of an oil-retention enema (Fleet Mineral Oil). An effective alternative in patients without an intestinal obstruction is the administration of an oral osmotic laxative. A polyethylene glycol solution (Miralax, Braintree Laboratories, Braintree, Mass) can be administered at a rate of 1 capful in 4 oz of water every 15 minutes until stool evacuation occurs. After resolution of the impaction, patients who have not had a recent colon evaluation (eg, barium enema or colonoscopy) should have one, and a maintenance bowel program (daily fiber or laxative) should be initiated.

SUMMARY

Constipation is a common clinical problem. The evaluation and management of most patients as described in this article are within the capability of interested, well-trained primary care physicians. Major elements of the diagnostic evaluation and treatment recommendations are summarized in Table 5. Patients who fail to respond to conservative management should be considered for referral to a specialist.

REFERENCES

1. Drossman DA, Li Z, Andruzzi E, et al. U.S. householder survey of functional gastrointestinal disorders: prevalence, sociodemography, and health impact. *Dig Dis Sci*. 1993;38:1569–1580.
2. Vrees MD, Weiss EG. The evaluation of constipation. *Clin Colon Rectal Surg*. 2005;18:65–75.
3. 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–II47.
4. Thompson WG. The road to Rome. *Gut*. 1999;45(suppl 2):II80.
5. Brandt LJ, Prather CM, Quigley EM, Schiller LR, Schoenfeld P, Talley NJ. Systematic review on the management of chronic constipation in North America. *Am J Gastroenterol*. 2005;100(suppl 1):S5–S21.
6. Beck DE. Constipation. In: Fazio VW, ed. *Current Therapy in Colon and Rectal Surgery*. Toronto: BC Decker; 1990:339–343.
7. Wedel T, Spiegler J, Soellner S, et al. Enteric nerves and interstitial cells of Cajal are altered in patients with slow-transit constipation and megacolon. *Gastroenterology*. 2002;123: 1459–1467.
8. Weld A. Constipation and constipation syndromes. In: Weinstein WM, Hawkey CJ, Bosch J, eds. *Clinical Gastroenterology and Hepatology*. Philadelphia: Elsevier Mosby; 2005:443–451.
9. Beck DE. Initial evaluation of constipation. In: Wexner SD, Bartolo DCC, eds. *Constipation: Etiology, Evaluation and Management*. Oxford: Butterworth-Heinemann Publishing Co; 1995:31–38.
10. Wexner SD, Daniel N, Jagelman DG. Colectomy for constipation: physiologic investigation is the key to success. *Dis Colon Rectum*. 1991;34:851–856.
11. Camilleri M, von der Ohe M. Methods to measure small bowel and colonic transit. In: Wexner SD, Bartolo DCC, eds. *Constipation: Etiology, Evaluation and Management*. Oxford: Butterworth-Heinemann Publishing Co; 1995:39–51.
12. Siegel JD, DiPalma JA. Medical treatment of constipation. *Clin Colon Rectal Surg*. 2005;18:76–84.
13. Ashraf W, Park F, Lof J, Quigley EM. Effects of psyllium therapy on stool characteristics, colon transit and anorectal function in chronic idiopathic constipation. *Aliment Pharmacol Ther*. 1995;9:639–647.
14. Ramkumar D, Rao SS. Efficacy and safety of traditional medical therapies for chronic constipation: systematic review. *Am J Gastroenterol*. 2005;100:936–971.
15. Wald A. Is chronic use of stimulant laxatives harmful to the colon? *J Clin Gastroenterol*. 2003;36:386–389.
16. Müller-Lissner SA, Kamm MA, Scarpignato C, Wald A. Myths and misconceptions about chronic constipation. *Am J Gastroenterol*. 2005;100:232–242.
17. Schmitt SL, Wexner SD, Bartolo DCC. Surgical treatment of colonic inertia. In: Wexner SD, Bartolo DCC, eds. *Constipation: Etiology, Evaluation and Management*. Oxford: Butterworth-Heinemann Publishing Co; 1995:153–159.
18. Takahashi T, Fitzgerald SD, Pemberton JH. Evaluation and treatment of constipation. *Rev Gastroenterol Mex*. 1994;59:133–138.
19. Beck DE. Surgical management of constipation. *Clin Colon Rectal Surg*. 2005;18:81–84.
20. FitzHarris GP, Garcia-Aguilar J, Parker SC, et al. Quality of life after subtotal colectomy for slow-transit constipation. *Dis Colon Rectum*. 2003;46:433–440.
21. Nyam DC, Pemberton JH, Ilstrup DM, Rath DM. Long-term results of surgery for chronic constipation. *Dis Colon Rectum*. 1997;40:273–279.
22. Lim JF, Ho YH. Total colectomy with ileorectal anastomosis leads to appreciable loss in quality of life irrespective of primary diagnosis. *Tech Coloproctol*. 2001;5:79–83.

23. Pi Pikarsky AJ, Singh JJ, Weiss EG, Nogueras JJ, Wexner SD. Long-term follow-up of patients undergoing colectomy for colonic inertia. *Dis Colon Rectum*. 2001;44:179–183.
24. Ellis CN. Treatment of obstructed defecation. *Clin Colon Rectal Surg*. 2005;18:85–95.
25. Stewart J, Kumar D, Keighley MR. Results of anal or low rectal anastomosis and pouch construction for megarectum and megacolon. *Br J Surg*. 1994;81:1051–1053.
26. Araghizadeh F. Fecal impactions. *Clin Colon Rectal Surg*. 2005;18:116–119.