MEDICAL INTELLIGENCE

CURRENT CONCEPTS

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FECAL IMPACTION

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IN a society conscious of its bowels, enduring a fecal impaction and its treatment may be a severe humiliation. Impactions can occur in any age group, but in certain groups — especially incapacitated or institutionalized elderly people — the disorder is not only common but commonly overlooked.[1-3] In one year-long study, 42 percent of the patients admitted to geriatric wards had a fecal impaction.[4] Humiliation, however, is less important than the substantial morbidity and cost of this largely preventable problem.[2,4,5]

PATHOPHYSIOLOGY

Fecal impaction's pathophysiologic considerations are identical to those of constipation, and the colon is the primary organ involved. The colon's excretory function is complex and incompletely understood, in part because the techniques used to study it are neither sensitive nor reproducible[6] and in part because of the diverse factors that influence colonic motility.

Both systemic and local factors influence the colon's function and produce three types of muscular activity: segmentation waves, peristaltic waves, and mass movements. Rhythmic segmentation waves are responsible for mixing the contents of the stool, but they may impede propulsion. An increase in segmentation-wave activity has been noted in patients with constipation.[7] The more coordinated peristaltic waves, which occur regularly throughout the day, are partly responsible for the distal movement of the colon's fecal contents.[8] Mass movements, on the other hand, occur only once or twice a day, but they move stool farther and more rapidly than peristaltic waves. Mass movements commonly occur after a meal (the gastrocolic reflex), and their decrease or absence has been implicated as a cause of constipation in the elderly.[4,8]

An important systemic influence on the colon is the balance between sympathetic and parasympathetic activity. Parasympathetic activity promotes propulsion by increasing peristalsis and mass movements, whereas sympathetic activity inhibits it by increasing segmentation-wave activity.[9] Adrenergic function is mediated through the myenteric plexus of the colon from both spinal and supraspinal sources.[10,11] Although impaction is the disorder most frequently affecting elderly people, congenital or acquired abnormalities of the myenteric plexus — including Hirschsprung's disease,[12] Chagas' disease,[8] the "cathartic syndrome,"[11] which is associated with the long-term use of cathartic agents,[13] and idiopathic megacolon[14,15] — can also cause impaired motility.

Hormones and metabolic factors are other systemic influences on colonic motility. Hormones that increase motility include gastrin,[16] vasoactive intestinal polypeptide,[16] cholecystokinin,[17] serotonin,[7] the prostaglandins E_1 and $F_{2\alpha}$,[18] thyroxine,[19] and estrogen.[20] Hormones that inhibit motility and promote constipation include prolactin,[20] the endorphins,[21] glucagon,[22] and secretin.[16] Metabolic abnormalities such as hypokalemia or hypercalcemia also adversely affect colonic motility, and they are common in cardiovascular disease and cancer.[15,23]

By far the most important local factor regulating colonic function is diet. An adequate intake of fiber and fluid is important in preventing constipation.[15,19,23] An adequate provision of carbohydrate and the avoidance of excessive protein promote the colonization of the colon by lactobacilli, the production of organic anions, and an acid pH in the colonic lumen, all of which stimulate motility.[24] The presence of neoplastic or inflammatory obstructing lesions (which can be intrinsic or extrinsic to the colon) may also be important.

The motor activity of both the intrinsic smooth muscle of the bowel and the striated skeletal muscles of the abdominal wall, pelvic floor, and diaphragm are important in proper defecation.[10,25] The atrophy of these muscles through the loss of anterior horn cells is a common part of the aging process, and it also complicates such neuromuscular disorders as Parkinson's disease,[26] multiple sclerosis,[3,15] and amyotrophic lateral sclerosis.[15] The weakness of these muscle groups hinders straining and alters the anorectal angle, making the passage of stool from the rectum difficult.[25]

The sensory function of the rectum and anus is also important in defecation. An abnormality has been documented in the ability of elderly patients and patients with spinal-cord lesions to sense rectal distention.[2,8,10,27] The anal canal is lined with a stratified epithelium rich in pain fibers. Painful lesions in this area — such as hemorrhoids, fissures, or perirectal abscesses — will therefore result in a reflex inhibition of the passage of stool.[25]

Whatever the cause of fecal retention, the colon's normal absorption of salt and water[8] contributes to the hardening of the stool, and its peristaltic activity causes packing. Given the limited distensibility of the anal passage and the marked distensibility of the rectum, a mass of feces can become too large to pass. Once an impaction exists, neurologic impair-

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ment may contribute to the associated problems of fecal incontinence and paradoxical diarrhea. The inability to discriminate between the passage of liquid and gas and the inability to coordinate the activity of the involuntary smooth musculature of the internal anal sphincter with that of the voluntary striated muscle of the external sphincter have been demonstrated in patients with impaction complicated by incontinence and diarrhea.[14,27] A ball-valve effect allows the seepage of liquid stool around the obstructing mass of harder feces during the normal propulsive movements of the colon.[28]

Causes

A complete review of the causes of fecal impaction is beyond the scope of this article. Some, however, deserve mention. In most situations, impaction is the result of a number of interacting pathophysiologic factors.

The importance of the use of drugs cannot be overemphasized. The use of narcotics predisposes a patient to impaction.[29,30] Although depression and psychosis can cause constipation, the agents used to treat them, such as tricyclic antidepressants and phenothiazines, may also contribute to the problem because of their anticholinergic properties.[3,15] Antihypertensive medications that have alpha-adrenergic, beta-adrenergic, or calcium-channel–blocking properties are reported to cause constipation.[15,31] Diuretics cause the depletion of fluids and hypokalemia, which promote constipation. The use of sucralfate, iron, and antacids containing aluminum also predisposes patients to impaction.[3,15,32] The long-term use of stimulant laxatives damages the myenteric plexus ("cathartic syndrome"),[13] and even the use of bulk-forming laxatives such as psyllium seed with insufficient hydration may cause impaction.[33]

In elderly people, lack of mobility plays a part. Upright posture and exercise have been shown to promote colonic motility.[8] Among elderly people with dementia, neglecting the urge to defecate contributes to constipation.[4,8] The problem is magnified when natural daily routines are disturbed, and this often occurs in institutions.[34] Poor dentition, a decreased production of saliva, and dehydration (especially in the warmer months) compound the problem.[16,19] A decreased intake of fiber and a lack of variety in meals born of financial constraints have also been implicated.[19] Elderly people are subject to serious underlying illness, including adenocarcinoma of the colon, and they have more situational depression and take more medications than younger people; all of these contribute to constipation.[4,16,19] In patients of any age with psychosis, many of these factors are also present.[34]

In patients with chronic renal failure, disturbances in fluid volume and electrolyte activity predispose to impaction, as do the effects of uremia and underlying diseases such as diabetes mellitus on the autonomic nervous system. In addition, the use of calcium preparations, antacids containing aluminum, and ion-exchange resins contributes to the risk of impaction. Not only does renal failure increase the likelihood of impaction, but malnutrition and the use of immunosuppressive agents in situations such as renal transplantation also increase the incidence of subsequent complications.[35,36] Proximal or right-colonic impactions occur with increased frequency in transplant recipients, possibly because uremia inhibits vagal activity, but also because the transplanted kidney is frequently placed on the right side.[35]

Patients with malignant neoplasms are also at risk for fecal impaction.[37] The neoplasm itself, either directly by mechanical obstruction or indirectly through metastasis to the spinal cord, may cause impaction. The effects of opiates, antidepressants, and chemotherapeutic agents may contribute to the problem. Vincristine, for example, causes a neuropathy of the bowel.[37] General debility, immobilization, dehydration, and the metabolic effects of a cancer (most important among them hypercalcemia and hypokalemia) also promote impaction.

Impaction is common when neurologic problems are complicated by weakness and immobility, as in stroke, multiple sclerosis, and amyotrophic lateral sclerosis.[3,15] In Parkinson's disease, progressive immobility, rigid abdominal muscles, ineffectual diaphragms, and the use of anticholinergic medications all contribute to the risk of impaction.[26,34] In patients with spinal-cord injuries or tumors, fecal impaction is the most common late gastrointestinal complication,[38] and it may also trigger autonomic dysreflexia, provoking a hypertensive emergency.[39] The site of the spinal-cord lesion often dictates the site of the impaction. Cervical and thoracic injuries tend to cause proximal impactions; rectal impactions commonly occur after lumbosacral injury.[38] In patients with higher spinal lesions, an impaction may be caused more by an inability to sense feces in the rectum than by motor impairment. Digital stimulation may therefore promote relatively normal reflex defecation.[8]

In children, a habitual neglect of the urge to defecate because it interferes with play may promote impaction.[28,40] The refusal to defecate may also be a strategy to gain a parent's attention.[15] Painful anorectal lesions, such as fissures, may also inhibit the urge to defecate.[15] A fecal impaction in a child, however, should always raise the possibility of cystic fibrosis.[41] Rectal prolapse may complicate fecal impaction.

Clinical Presentation

The presentation of fecal impaction can be subtle and nonspecific, and the patients most prone to impaction are often unable to communicate particular problems.[42] Impaction should be considered when evaluating clinical deterioration in any patient in a high-risk group, especially if the frequency or consistency of bowel movements changes. The continued passage of some stool does not rule out an impaction. Among healthy elderly people, the incidence of constipation appears to increase with age, but less than 1 percent of the people consuming a Western diet have fewer than three bowel movements a week.[8,16] If the

frequency of bowel movements falls below one every other day, a diagnosis of impaction should be considered.

Although impaction's typical symptoms, such as anorexia, nausea, vomiting, and abdominal pain, may be present, many other symptoms in a number of organ systems have been reported.[3,43] Paradoxical diarrhea and incontinence may be among the most common presenting symptoms in patients in institutions and those who have dementia or psychosis.[1,19] In the elderly, acute states of confusion may complicate an impaction.[2,3,43-45] Urinary problems of frequency, retention, and overflowing incontinence are also thought to be commonly caused by the mechanical effects of fecal impaction, especially in children and elderly people.[46,51] Urinary and fecal problems commonly occur together in elderly people, however, and this may imply a shared neurologic basis.[4] Because impactions tend to recur, a history of impaction is a useful clue to the presence of another.

Presenting signs may be confusing. Temperatures as high as 39.5°C, (103°F) and dysrhythmias and tachypnea caused by the impaired motility of the diaphragm have all been reported with fecal impaction.[2,3,44] Hemorrhoids, although commonly seen in association with fecal impaction, are a nonspecific sign. In one series, however, 54 of 55 consecutive patients with impaction had hemorrhoids.[4] Other common signs related to obstruction, such as abdominal tenderness and distention, are seen late in the course of an impaction.

Among patients prone to impaction, a rectal examination is critical in most clinical situations. In one study in a coronary care unit, a gentle rectal examination was well tolerated and safe, and also uncovered a high frequency of potential impactions.[52] Although most impactions are in the rectal vault, the absence of palpable stool on rectal examination does not rule out a fecal impaction.[1-3,53] Impactions can occur anywhere in the colon. Proximal or "high" impactions, however, often suggest an adenocarcinoma of the colon.[2] In addition, impacted stool can be of any consistency (soft to rock-hard) and can take many forms (a single mass or multiple pellets).[1,2,15]

Laboratory abnormalities associated with impactions are nonspecific. Leukocytosis in which levels reach 15×10^9 cells per liter (15,000 per cubic millimeter) may occur.[2] Electrolyte abnormalities, such as hyponatremia or hypokalemia, may be associated with impaction. Stool that is positive for blood may reflect the mucosal irritation of an impaction, but it may also be a sign of an underlying adenocarcinoma of the colon.[2]

When a fecal impaction is suspected but the rectal examination is negative, plain abdominal radiography to look for masses of stool or signs of obstruction, such as colonic dilatation and unusual air–fluid levels in the small bowel, is indicated.[2,5,54,55] The cecum suffers the brunt of obstruction by virtue of its distensibility, and the closer the obstruction lies to the cecum the larger the number of air–fluid levels in the small bowel. On plain films, masses of stool typically have a bubbly or speckled appearance and are almost always readily visible.[54,55]

Complications

The most common serious complication of fecal impaction is fecal incontinence.[10,27,28,40] This can engender enmity and indifference in care givers and embarrassment in patients. The continuous seepage of moist bacteria-laden mucus and stool also fosters the development of decubitus ulceration. Infections of the urinary tract may also be caused by contamination,[3,44,56] obstruction,[50,51] or the direct passage of bacteria from the intestine to the bladder ("enterorenal syndrome").[56]

The obstruction of the large bowel is also common with impaction. Although impaction was the cause of only 1.3 percent of the cases of mechanical obstruction in an unselected population,[57] the incidence is much higher in high-risk populations. For example, up to 45 percent of patients with spinal-cord injury will have a fecal impaction.[38] Mortality among patients with obstruction and impaction ranges from 0 to 16 percent, depending on the population; it is higher among the very young and the very old.[5,57]

The effects of pressure and ischemic necrosis on the wall of the colon may cause stercoral ulcerations. These are clinically silent unless a complication ensues. Stercoral ulcers can bleed occultly, but massive bleeding is uncommon.[58-61] They can become perforated on rare occasions. Perforation has a high mortality rate, in part because it often occurs in elderly or malnourished people and in part because recognition of the condition is frequently delayed.[58,59,62] Clinical features suggesting perforation include a history of constipation coupled with signs of localized or generalized peritonitis and radiographic evidence of free peritoneal air.[59,63] Perforation of the cecum at a distance from the impaction and perforation of a diverticulum due to increased intraluminal pressure have also been reported.[5,44,59,64] The treatment is surgical; exteriorization and colostomy give the best results.[59]

Less common complications attributed to fecal impaction include autonomic dysreflexia,[39] pneumothorax from straining,[44] hepatic encephalopathy,[65] rectal prolapse,[44] dysfunctional labor,[66] hypoxia,[3] volvulus,[16,34] and profound shock from the massive loss of fluid into the bowel.[67] Fecal masses, termed fecalomas, are not only caused by tumors but can also mimic them. Invasive and expensive workups for presumed gastrointestinal or pelvic tumors may be rendered unnecessary by a rectal examination. Examined by barium-enema radioscopy, fecalomas are generally larger than colonic tumors, lack an annular appearance, and have greater retrograde mobility. They also exhibit a "meniscus sign," the outline of the barium column around the upper and lower margins of the fecal mass.[68]

Prevention

The best treatment is prevention. Adequate dietary fiber and carbohydrates, increased exercise, the treatment of underlying diseases and depression, and

changes in environment or medication will often prevent fecal impaction.[19,23,24,69] Simple measures to retrain the bowel — such as allowing the gastrocolic reflex sufficient protected time to operate shortly after breakfast or supper, making bathroom facilities easier to use for those who cannot walk, and making toilets conducive to defecation — can be helpful. Raising the height of the toilet seat to make getting on and off simpler may be harmful even though it can prevent falls. Squatting or the elevation of the legs aids defecation by improving the position of the abdominal muscles, and footstools or lower toilet seats may help.[23] Biofeedback from a rectal balloon has been used in retraining patients with diminished rectal sensation.[70]

The regular use of laxatives or enemas in patients with severe constipation is sometimes necessary but carries risks. In general, bulk-forming laxatives (with or without stool softeners) are the safest and most effective agents in the prevention of impactions.[7,69,71] Adequate hydration must be ensured. Osmotic agents (such as sorbitol, lactulose, and magnesium and phosphate salts) produce frequent side effects, such as cramps and electrolyte abnormalities, and should be avoided if possible.[16,71] Irritant laxatives, such as bisacodyl, senna, cascara, and phenolphthalein, also have frequent side effects, and their long-term use may cause melanosis coli as well as damage to the myenteric plexus.[7,13,71] The lubricant laxative mineral oil should not be taken for extended periods because it can cause aspiration pneumonitis and it interferes with the absorption of fat-soluble vitamins.[7,23]

Treatment

When an impaction exists, efforts to remove it by catharsis from above not only are ineffectual but may worsen the abdominal pain or contribute to complications.[72] Although enemas and suppositories alone may eliminate the impaction, the manual fragmentation and extraction of the fecal mass are almost always indicated first. The procedure usually requires local anesthesia and lubrication with lidocaine jelly, then gentle, progressive anal dilation with first one and then two fingers.[1,23] A scissoring action is used to fragment the impaction. In women, applying transvaginal pressure with the other hand may also aid fragmentation and expulsion.[73] A pudendal block or spinal or general anesthesia is rarely required.[1,23] Once fragmentation and partial expulsion have occurred, bisacodyl suppositories, enemas, or rectal lavage may be used.[1,19,23] An enema with mineral oil can supply further lubrication. Standard sodium-phosphate or tapwater enemas are acceptable, but in elderly patients their volume should be small, and they should be directed to the site of the obstruction. Enemas containing phosphate salts should not be used in patients with renal insufficiency, who risk hyperphosphatemia.[74] Soap, hydrogen peroxide, and hot-water enemas should never be used, because they irritate the rectal mucosa and may cause bleeding.[74]

When an impaction is beyond the reach of the fingers, a lavage directed by sigmoidoscopic visualization can be effective.[1] Water-soluble contrast media (Gastrografin or Hypaque [meglumine diatrizoate and diatrizoate sodium]) in 20 to 50 percent solutions directed to the site of the obstruction by fluoroscopy have eliminated proximal impactions.[36,75] These agents stimulate hyperperistalsis, and because of their high osmolality, they draw water into the bowel and lubricate the fecal mass. Whole-gut irrigation with 2 liters per day of an isosmotic solution of nonabsorbable polyethylene glycol (Golytely or Colyte) has also been successful in nonemergency cases without complete obstruction.[76,77]

If these procedures fail, surgery may be necessary. Except in Hirschsprung's disease and recurrent volvulus, operations such as total colectomy with ileosigmoid or ileorectal anastomosis have met with varied success and are often complicated by postoperative intestinal obstruction.[16,78] High rates of complications and mortality can be expected in elderly patients.[57]

Endoscopic or radiographic examination of the colon to find any underlying neoplasm is almost always indicated at least once, particularly if the patient has anemia, weight loss, or a stool sample that contains occult blood.[2,19] The balance of risk and benefit may militate against performing these relatively invasive procedures in elderly patients and those with dementia or psychosis.[42] However, endocrine and metabolic screening, including the measurement of thyroid function, electrolyte activity, and urea nitrogen levels, is always indicated.

Summary

Fecal impaction is a common disorder with variable presentation and many potential complications. Its pathophysiology is complex, and the treatment is often difficult and frustrating. Preventive measures are likely to be cost effective in populations at high risk, such as institutionalized or debilitated elderly people, mentally ill patients, those with chronic renal failure or cancer, and those who are neurologically impaired.

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