Bloody Diarrhea in an Elderly Patient

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Clinical Case
A 75-year-old woman presents with a 1-day history of left lower-quadrant abdominal pain and loose stools that contain blood. She denies fever. She has hypertension for which she takes a diuretic and an angiotensin-converting enzyme inhibitor. She has had irritable bowel syndrome (IBS) since she was a young woman and it has been stable with only occasional bloating and constipation for which she takes no medications. For many years, she has been taking occasional ibuprofen for joint aches. Her blood pressure is 128/82 mm Hg and her heart rate is 80 beats per minute. Examination of her abdomen reveals mild left lower-quadrant tenderness and normal bowel sounds.

Background
The occurrence of bloody diarrhea immediately should prompt the clinician to focus on the colon as the injured organ (Table 1). The differential diagnosis for acute onset of bloody diarrhea in an elderly woman principally is infectious and ischemic colitis; far less common is inflammatory bowel disease. Also to be considered are colitides related to her medications, specifically nonsteroidal anti-inflammatory drugs, neoplastic conditions, and fecal impaction with stercoral ulcers. Other diseases that can cause bloody diarrhea, such as allergic colitis and amyloid, rarely need to be considered.

There are no studies that have evaluated whether infectious or ischemic colitis is the more common cause of bloody diarrhea in the elderly. The elderly are at increased risk for infectious diarrhea and its complications; especially the hemodynamic consequences of dehydration. In an analysis of 28,538 deaths from diarrhea in the United States, among adults 55 years and older, most occurred in persons older than 74 years. The reasons for this propensity mainly are related to immunosenescence, or an overall decrease in immune function as a consequence of advancing age (Table 2). The most common causes of enteric infection in patients older than 50 years are, in order of decreasing frequency, Campylobacter, Salmonella, Shigella, and Escherichia coli O157:H7.4

Clostridium difficile always must be considered, especially if the elderly person has been in a hospital or chronic care facility. The elderly particularly are predisposed to infection with C difficile because of increased nosocomial exposure and frequent courses of antibiotics, and a decreased ability of their polymorphonuclear leukocytes to phagocytose these organisms.5 Despite this susceptibility, however, C difficile colitis does not seem to be more severe in the elderly and has the same prognosis as in the younger population.6 The bloody nature of the diarrhea, however, makes C difficile an unlikely possibility because it causes bloody diarrhea in fewer than 10% of cases.7,8

Salmonella and Shigella generally cause more severe disease in the elderly and may present with sepsis and only minor gastrointestinal symptoms. Salmonella has been shown to be the cause of most deaths attributed to outbreaks of infectious intestinal disease in nursing homes,9 but in a healthy ambulatory septuagenarian, it likely is transmitted as a food-borne illness and has a better prognosis, despite symptoms implying mucosal invasion. Shigella would be less likely in this particular patient because it usually is associated with poor hygiene and crowded living conditions. E coli O157:H7 is the pathogen most frequently isolated from visibly bloody stools; 63% of stools with this organism contain visible blood, and of visibly bloody stool specimens, 39% contained Shiga toxin-producing E coli O157:H7.10 Similar

Abbreviations used in this paper: CI, colon ischemia; CT, computed tomography; IBS, inflammatory bowel syndrome.

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0016-5085/05/$30.00
doi:10.1053/j.gastro.2004.11.021
Colon ischemia (CI) is a diagnostic possibility that must be considered highly in any elderly person presenting with symptoms of new-onset colitis. The incidence of CI was, until recently, difficult to ascertain, largely because the disease was not as well recognized as it is now. CI may mimic or be mimicked by other diseases, and symptoms of CI often are short-lived, so patients may not seek medical attention. In our own experience (unpublished data, 1998), CI was found in 1% of all colonoscopies and flexible sigmoidoscopies performed in the endoscopy suite at Montefiore Medical Center.

Three studies on the epidemiology of CI now have been published and have shown incidence rates for CI that ranged from 6.1 to 47 per 100,000 person-years.13–15 Interestingly, these rates were 3- to 6-fold higher in patients with IBS; this wide range of incidence rates was confirmed in a recently published systematic review of bibliographic databases.13 The reason why CI appears to be more common in patients with IBS than in healthy controls is unknown. It is possible that the increase is apparent but not real, and attributable to faulty coding of claims data. Some IBS patients are seekers of medical care and may choose to visit their physicians for complaints that other patients might ignore; thus, patients with IBS who visit a gastroenterologist regularly are more likely to undergo colonoscopy and be diagnosed with CI if they develop transient hematochezia. Finally, it is possible that there is a true but as of yet ill-understood relationship between IBS and CI, such as hypersensitivity of the colonic vasculature, autonomic hyperresponsiveness, or differences in serotonergic receptors and sensitivities in IBS patients that predisposes them to CI or perhaps other colon diseases. Coates et al17 recently reported decreased components of serotonergic signaling including mucosal 5-hydroxytryptamine (5-HT) and serotonin reuptake transporter in patients with IBS and ulcerative colitis compared with controls.

Recent concern about CI possibly complicating the use of serotonergic agents to treat IBS has led to experimental studies showing that the vasoconstrictor effect of serotonin may be exaggerated in the presence of atherosclerosis, diabetes, or hypertension. One factor that may predispose patients to CI is constipation, which may increase intraluminal pressure, and in turn decrease colon blood flow and cause shunting of blood from the mucosa to the serosa, thereby further predisposing to mucosal ischemia. In the usual case of CI in an elderly individual, however, no cause is found and the cause is ascribed to localized episodes of nonocclusive ischemia.

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To *Salmonella*, it usually is transmitted as a food-borne infection, mainly from undercooked hamburger meat, but also from a wide variety of other foods, including meats, cheeses, and even unpasteurized apple cider.11 The organism adheres to the colonic mucosa, where it produces Shiga-like toxins that damage the mucosa as well as vascular endothelium, initiating a series of coagulative events including platelet aggregation and fibrin thrombi that result in a hemorrhagic colitis with many features of ischemia. Patients may develop hemolytic uremic syndrome or thrombotic thrombocytopenic purpura as complications of this infection.

It is unusual that inflammatory bowel disease has its onset in the advanced years. In 1981, we published a study of 81 patients who developed symptoms of new-onset colitis after the age of 50 years.12 A retrospective diagnosis of definite or probable ischemic colitis was made in three quarters of the patients, one half of whom had original discharge diagnoses of ulcerative colitis, Crohn’s disease, or nonspecific colitis. Because that study was retrospective, stool cultures could not be performed if they were not performed on admission, but it still is likely that ischemia explains most of the second and smaller incidence peaks of the bimodal age curves attributed to inflammatory bowel disease.

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Nonsteroidal anti-inflammatory drug colopathy also must be considered as a cause of colitis in this woman. In one study, the mean interval between taking the medication and presentation was 20 months, so the length of time she had been on ibuprofen safely cannot be used as evidence to discard this diagnostic possibility. Although its prevalence is not known, there is increasing recognition that nonsteroidal anti-inflammatory drugs may damage the large intestine as well as the stomach and small intestine. Colitis (possibly ischemic) and colon ulcers, colonic hemorrhage or slow bleeding with iron-deficiency anemia, perforation, and stricture formation with obstruction all are reported complications from nonsteroidal anti-inflammatory drug use, drugs which probably exert their effects by inhibiting prostaglandin synthesis, thus changing the balance between vasodilating and vasoconstricting prostaglandins to favor the latter. Nonsteroidal anti-inflammatory drugs also may worsen underlying inflammatory bowel disease.

Because this elderly woman is ambulatory and reasonably healthy, and there is no history of worsening constipation, fecal impaction with stercoral ulceration or proximal CI, although a possible cause of bloody diarrhea, is not discussed further.

**Potential Management Strategies**

Bloody diarrhea most often originates from the colon. Colonic diarrhea is distinguished from diarrhea of small-bowel origin, by the presence of blood and mucus, and typically is passed in small volumes accompanied by lower abdominal or pelvic pain. Diagnostic testing for colonic bloody diarrhea includes stool evaluation and examination of the colon. Stool can be examined for gross and occult blood, white blood cells, lactoferrin, bacteria, and parasites, whereas the colon can be evaluated using a variety of imaging techniques including colonoscopy, barium enema, and computed tomography (CT). Magnetic resonance and angiography, and conventional angiography are used to evaluate the vasculature in cases of acute or recurrent severe bleeding.

**Stool Examination for Occult Blood and White Blood Cells**

If a patient truly is passing grossly bloody stools, there is little to be gained by documenting that the stools contain blood because the decision to examine the colon will not be influenced by the results—whether gross blood, occult blood, or no blood. Testing the stool for blood is useful only if the patient recently has eaten certain foods such as beets or borscht. Stool examination for white blood cells usually is of little help in a patient with bloody diarrhea because it will not alter management. Stool white cells indicate a break in mucosal integrity and can be seen with any of the inflammatory disorders listed in the differential diagnosis. Lactoferrin is a product of neutrophils and is an alternative, and perhaps more sensitive, test than microscopic examination for neutrophils. One exception to this rule is that patients with Shiga toxin–producing *E coli* often have bloody diarrhea and a negative or low level of fecal lactoferrin.

**Stool Examination for Enteric Pathogens**

All of the likely bacterial causes of colitis can be isolated with stool culture, but *C difficile* colitis usually is diagnosed not by culture, but by assay of the stool for toxin A and/or B. Most laboratories routinely culture bloody diarrhea for *Salmonella*, *Shigella*, *Campylobacter*, and *E coli* O157:H7. *E coli* O157:H7 is identified on MacConkey’s sorbitol agar by its inability to ferment sorbitol. Because this characteristic is shared with other coliforms, any sorbitol-negative colonies then are tested for Shiga toxin production or with specific antisera to O157:H7 to identify them with certainty. One stool specimen for culture and 3 for ova and parasites are standard, but it is most important to minimize errors in the collection and handling of the specimen; it has been shown that for *Entamoeba histolytica*, 3 specimens increase the diagnostic yield over 1 specimen by 22.7%.

**Radiography**

Although insensitive and nonspecific, plain films of the abdomen can be helpful by revealing an abnormal gas pattern, such as a featureless tubular colon, against the relatively radiodense abdomen. Today, plain film examination has been replaced by CT scanning, which is more sensitive and can provide a wealth of information on bowel-wall thickness, disease location, complications such as perforation and fistula formation, associated lymphadenopathy, and perhaps the status of the major mesenteric arteries and veins. It is rare, however, that a specific diagnosis is made on CT scan. Segmental nonspecific abnormalities are the most common abnormality, seen in 89% of 54 cases of CI in one series and including bowel wall thickening that may be shaggy and edematous or dry and sharply defined. It is unusual for infectious colitis to be segmental. Findings with a poor prognosis include intramural gas (pneumatosis coli), or gas in the peritoneal cavity, portal vein, or mesentery. It is rare that vascular occlusion of the superior mesenteric or inferior mesenteric arteries is seen on CT scanning. Oral and intravenous contrast should be given unless it is thought mesenteric angiography is to be performed, in
which case oral contrast may overlie and thus obscure the vasculature.

**Endoscopic Examination**

The colon, similar to other organs, reacts to disease in only a limited number of ways and hence manifests a limited number of symptoms. Various disease processes in the colon, therefore, whether they be infectious, inflammatory, ischemic, allergic, neoplastic, or metabolic may mimic each other. Thus, *Salmonella* colitis may resemble ulcerative colitis, ischemia may resemble Crohn’s disease or neoplasia, and *E coli* O157:H7 may mimic or perhaps cause ischemic colitis with or without pseudomembranes. The role of colonoscopy, therefore, also is limited.

Colonoscopy can identify abnormal segments of bowel (eg, edema or ulcers), but it is rare that a specific diagnosis is made by inspection: gangrene (ischemic colitis), the snow white sign (hydrogen peroxide colitis), and possibly the recently described single-stripe sign (a single inflammatory band consisting of erythema and erosion/ulceration along the longitudinal axis of the colon) of ischemic colitis are noteworthy exceptions. Flexible sigmoidoscopy obviously is easier to perform and possibly safer than colonoscopy but is of use only if the disease process is within its reach. For any disease that is isolated to the proximal transverse or ascending colon, flexible sigmoidoscopy is not helpful. Thus, for example, ischemia and *C difficile* are confined to the ascending and/or transverse colon in only approximately 10%–15% of cases, and the use of a flexible sigmoidoscope will suffice for diagnosis in most, but not all, patients. In a patient who is acutely ill with colitis, it rarely is important to evaluate the full extent of disease and probably is safer to halt insertion of the instrument once disease is encountered, rather than to evaluate the colon fully. As soon as the most distal abnormalities are encountered in a patient with acute colitis, it is reasonable to obtain a biopsy examination and then stop the examination. Colonoscopy can be performed if need be at a time when the patient is stable, more comfortable, and at less risk for complication.

It is important to be aware that although the risk for colonoscopy in patients with CI is small, overinflation of the colon, with the consequent increases of intraluminal pressure, decreases the total colonic blood flow and renders the colon susceptible to ischemic injury. A decrease in blood flow becomes significant with pressures of 30 mm Hg or greater and can be decreased significantly by the use of carbon dioxide as the insufflating agent.

The advantages of carbon dioxide include the fact that it is rapidly absorbable, thus minimizing discomfort from overdistention; it is not explosive and its use diminishes the partial pressure of any explosive gas in the colon; it is a vasodilator; and it is not retained by patients with chronic obstructive pulmonary disease.

Biopsy specimens play an important diagnostic role and should be taken, although their major contribution is to distinguish acute self-limited colitis from an acute presentation of chronic disease. The former is characterized by straight glands, and an inflammatory reaction through the lamina propria that mainly is polymorphonuclear. The latter is typified by branching glands, and a primarily basal chronic inflammatory reaction with mononuclear cells. It is rare that a specific diagnosis is made on mucosal biopsy examination in a patient with bloody diarrhea, but exceptions include Crohn’s disease, amyloid, schistosomiasis, amebiasis, malakoplakia, and tuberculosis. Colonoscopy performed early (in the first 24–48 hours of presentation) in patients with CI may allow the examiner to see the subepithelial hemorrhages that typify CI (Figure 1A). After 24–48 hours, these areas of hemorrhage either are resorbed, leaving subtle erythema (ischemic colopathy), or the mucosa overlying them breaks down and ulcerates (ischemic colitis, Figure 1B). It is rare that the diagnosis of CI is made unequivocally on mucosal pinch biopsy examination, unless gangrene or ghost cells are seen. Suggestive histologic changes for ischemia include subepithelial hemorrhage with hemosiderin-laden macrophages and submucosal fibrosis.

More than 60% of patients with CI have complete resolution of their disease (Figure 1C) and fewer than 5% have a recurrence. Among those who develop irreversible disease, approximately 15%–20% present with gangrene, 10%–15% develop a stricture, and approximately 10% develop chronic segmental ischemic colitis.

**Angiography**

Mesenteric angiography is used to evaluate the intestinal vasculature in patients who are thought to have acute or chronic mesenteric ischemia. It is not used to diagnose CI. Acute mesenteric ischemia is a dynamic process in which blood flow is decreased acutely on presentation and if the condition is not diagnosed and corrected promptly, a mortality of between 80% and 100% can be expected.

In patients with CI, blood flow usually has normalized spontaneously by the time the patient develops bloody diarrhea, and so it does not have to be corrected. Furthermore, in elderly people, abnormalities on angiography rarely correlate with symptoms of CI, although age-related abnormalities in the splanchnic vessels may be identified, including the narrowing of small vessels, tortuosity of the long colic arteries, and
fibromuscular dysplasia of the superior rectal artery. Thus, the presence of vascular disease does not imply a relation to the disease process. Indeed, there are elderly persons who have occlusion of all 3 mesenteric vessels and no abdominal symptoms.

An exception to the generalization regarding the lack of usefulness of angiography may be isolated right CI. The right colon is supplied by the superior mesenteric artery and we have seen several cases in which isolated right CI was followed-up within several weeks by acute mesenteric ischemia from thromboembolic disease. In general, isolated right CI has a worse prognosis than does ischemia involving other areas of the colon.

Magnetic resonance angiography is a new technique to evaluate the vessels without injection of intra-arterial contrast material. It is a reasonable test for diagnosis but offers no therapeutic capability (ie, the ability to infuse a vasodilator or embolize an acutely bleeding vessel). Diagnostically, magnetic resonance angiography would not be indicated in a patient suspected of CI for the same reason that angiography is not required.

**Recommended Management Strategy**

The likely diagnoses in this septuagenarian with no debilitating underlying diseases, who is on few medications, has not traveled extensively, is not systemically ill, and has had no obvious recent exposure to or epidemiologic risks for diarrheal disease, are infectious and ischemic colitis. Stool culture for enteropathogens including *E coli* O157:H7, stool examination for ova and parasites, and a complete blood count is an appropriate initial approach to diagnosis. Although there is no history of travel to remote or underdeveloped countries, it is still possible that the patient has been exposed to a parasite from a contaminated water source or food product. Bloody diarrhea is an unusual symptom of parasitic infestation and in the United States is most likely to result from amebiasis. *C difficile* colitis would be very unlikely in this patient because of the lack of a history of exposure to antibiotics and the fact that *C difficile* colitis is grossly bloody in fewer than 10% of cases. If the hemoglobin level were not low, signifying that the blood loss was not more profound than the history suggested, and if the white blood cell count was not more than 15,000 ccm, it would be appropriate to wait for the results of cultures before proceeding further. If stool cultures were positive and the bloody diarrhea ceased, it would be reasonable just to observe the patient’s course without further evaluation. If stool tests were negative, colonoscopy would not be necessary in most cases and would show only nonspecific findings. Of course, in an elderly person, an acute presentation of a colon disorder could be used to prompt a screening colonoscopy.

**Evolution of Case**

The patient ceased passing bloody bowel movements after the first day, never became anemic, and felt well. A complete blood count showed a hemoglobin level of 13.7 g/L and a white blood count of 10,800 ccm. Plain film of the abdomen was not performed and a CT scan of the abdomen was negative except for some mild thickening of the sigmoid colon. The stool culture for enteric pathogens including *E coli* O157:H7 and ova and parasite examination of a fresh liquid stool sample were negative. The colonoscopy revealed a 15-cm segment of sigmoid colon with focal ulcerations, subepithelial hemorrhage, and edema; the mucosa was
normal proximal and distal to the abnormal segment. Biopsy examinations from the abnormal area revealed only nonspecific inflammation with focal congestion; biopsy examinations from adjacent normal-appearing mucosa were normal. Insertion of the colonoscope was stopped once the proximal extent of the disease was defined.

**Subsequent Management**

Management of this patient with minimal symptoms, brief illness, and rapid recovery mainly is observation. Because abdominal pain accompanied the bleeding, a CT was performed and served to localize the abnormal segment of colon. A colonoscopy was performed to view the abnormal mucosa, make a visual diagnosis if possible, and obtain biopsy specimens in the hope, albeit slight, of making a specific diagnosis. No study of the vasculature was performed because, as noted earlier, abnormalities usually do not correlate with the colonic disease and blood flow to the colon in CI has normalized by the time symptoms develop.

Antibiotics may be appropriate for some patients with CI because older experimental studies in dogs showed a decrease in the severity and extent of bowel damage when they were given before or during an ischemic event; antibiotics have resulted in prolonged survival after intestinal ischemia in rats. Antibiotics also offer theoretic protection against bacterial translocation, which may occur with loss of mucosal integrity. In this particular patient with no signs of toxicity, an almost-normal white blood count, and symptoms that resolved after less than 24 hours, the use of broad-spectrum antibiotics is highly controversial and none were given. In patients with CI, antibiotics should be used routinely in those who are hospitalized, acutely ill with leukocytosis greater than 10,000 ccm, febrile, having severe abdominal pain, and in those who require surgery. There is no role for the use of local or systemic corticosteroids, sulfasalazine, aminosalicylates, or fatty acid enemas in the acute management of ischemic colitis.

It is most likely that the patient will continue to do well and that she will have no recurrence of her disease. Such recurrence is seen in approximately 5% of patients and suggests an underlying disorder with coagulopathy, autoimmune, obstructive, or anatomic explanation. In such cases, a full evaluation to exclude a coagulation or autoimmune disorder is recommended. Colonoscopy is needed to exclude a potentially obstructive lesion that might have precipitated the ischemic events and magnetic resonance angiography can be considered, but usually, just as in the single episode of CI, will not reveal an anatomic explanation for the ischemia.

**References**


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