When to Suspect Ischemic Colitis

Recognition of ischemic colitis requires a high level of suspicion because presenting symptoms can often be misleading. The authors identify causes of this variable and potentially deadly condition and discuss strategies for diagnosis and treatment.

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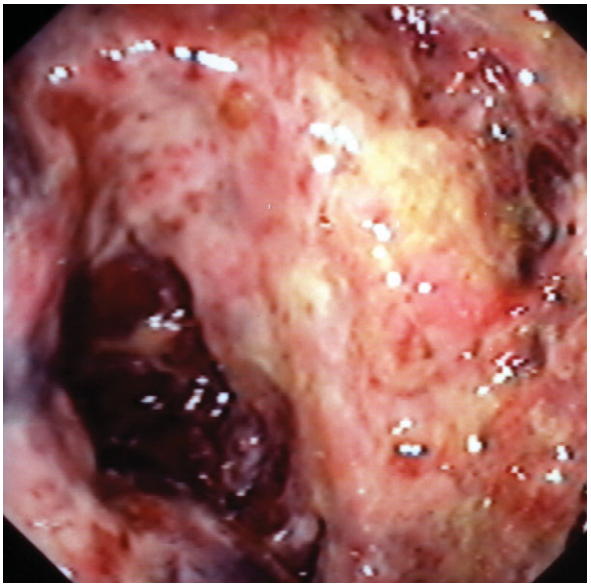
Ischemic colitis, the most common form of intestinal ischemic pathology, was first reported secondary to inferior mesenteric artery ligation during surgical procedures involving the aorta or the colon but is now thought to be a multifactorial event.[1] Although its reported predominance is in the elderly, it can affect individuals ranging in age from 29 to 98 years, depending on the predisposing risk factors. Ischemic colitis causes as many as one in 1,000 hospitalizations in the US each year.[2,3]

The clinical presentation and course of ischemic colitis vary widely, ranging from transient self-limiting ischemia with minimal sequelae to acute fulminant ischemia with transmural infarction that may progress to necrosis and death.[4] A careful history may detail predisposing factors for ischemic colitis, including atherosclerosis, embolic event, aortic aneurysm, recent surgery, and dehydration. A better understanding of the relevant anatomy and the precipitating factors may increase the awareness, and thereby improve the recognition and diagnosis, of this condition in the emergency department.

CASE REPORT

A 48-year-old man presented to the emergency department with concerns of severe epigastric pain. He described a 1-day history of mild to moderate epigastric pain, nausea, and "gas discomfort." Shortly after eating a meal, the patient experienced pain that abruptly turned severe and sharp, which he rated as 10 on a 1-to-10 scale. The pain radiated to the left side of his chest and was associated with nausea and one episode of vomiting. At that point he called for an ambulance. The EMS team established intravenous access and administered oxygen and aspirin en route to the hospital. On arrival, the patient's pain had decreased but was still present, and he was triaged with a chief concern of "chest pain." He said his only other recent symptom had been constipation, with no hematochezia or melena.



Colonoscopy showing ischemic colitis.

The patient's medical history included aortic stenosis, hypertension, and congestive heart failure. Surgical history was significant for a mechanical aortic valve replacement 1 month earlier. His current medication regimen, with which he claimed to be compliant, included warfarin, furosemide, lisinopril, and lansoprazole.

On physical examination, the patient was found to be obese and appeared mildly uncomfortable. Vital signs were as follows: blood pressure, 168/74 mm Hg; pulse, 88 beats/min; respirations, 20/min; and

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temperature, 99.1°F. His chest wall was remarkable for a sternotomy scar. An apical soft systolic ejection murmur with a diastolic click was noted. The lungs were clear bilaterally and no jugular venous distension was seen. Moderate epigastric tenderness was noted with mild guarding but no other signs of peritoneal irritation. Rectal examination found no gross blood in the stool, but the sample tested weakly guaiac-positive. The remainder of the physical examination was unremarkable.

The patient was initially treated with intravenous normal saline solution and promethazine. An ECG was recorded and found similar to his previous one, showing a first-degree atrioventricular block with flipped T waves in leads I, aVR, and aVL. Blood tests showed a white blood cell count of 9800/µL; hemoglobin, 9.7 g/dL; hematocrit, 29.3%; and lactic acid level, 2.8 mmol/L. The remainder of the CBC, chemistries, hepatic function panel, and lipase measurement were normal. Cardiac enzyme levels were normal, with a troponin T level of <0.01 µg/L. Coagulation studies showed a prothrombin time of 23.7 seconds, a partial thromboplastin time of 45.2 seconds, and an international normalized ratio of 3.12, consistent with the patient's warfarin use. Chest x-ray produced no acute findings and the abdominal series showed no free air or signs of obstruction.

When reevaluated, the patient reported that his nausea had resolved but his abdominal pain had worsened, becoming diffuse throughout the abdomen in association with a large, grossly bloody bowel movement. His vital signs were not significantly changed. Intravenous morphine sulfate and more aggressive fluid resuscitation were started, and CT of the abdomen and pelvis with triple contrast was ordered. The CT revealed changes suggestive of ischemic colitis (Figures 1 and 2). The patient was taken to the operating room, where he was found to have a severely edematous and thickened right colon with early signs of ischemia and serosal discoloration. A right hemicolectomy with ileocolostomy was performed without complications and the patient was discharged on postoperative day 7.

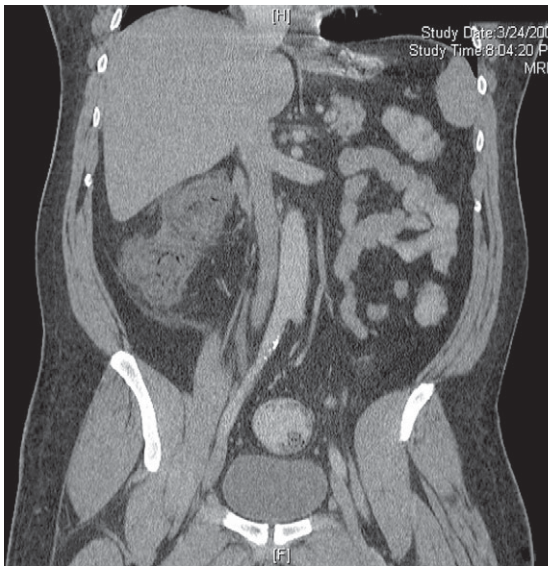

FIGURE 1. Coronal view of a CT scan of the abdomen with intravenous contrast showing extensive concentric wall thickening of the distal aspect of the terminal ileum and ascending colon.

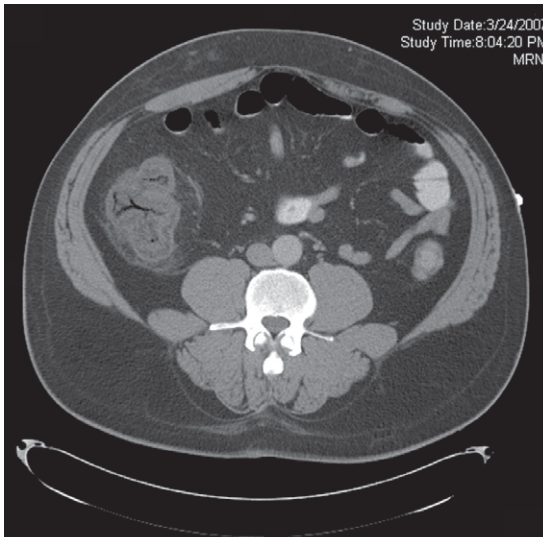

FIGURE 2. Sagittal view of CT scan of the abdomen with intravenous contrast showing evidence of colonic wall thickening and inflammatory changes in the paracolic fat.

VULNERABLE CIRCULATION

The colon is perfused mainly by the superior mesenteric artery (SMA), which supplies blood to the right colon and the right half of the transverse colon, and the inferior mesenteric artery (IMA), which supplies blood to the left half of the transverse colon, the descending colon, and the proximal rectum.[5,6] The

distal rectum is supplied by branches of the internal iliac artery that communicate with the IMA, so the rectum has a dual blood supply that makes it relatively resistant to ischemia.[7]

Compared with the rest of the gastrointestinal tract, the colon has a low blood flow, making this region more susceptible to the stresses of motor activity, straining, and increased intraluminal pressure (distension).[8-10] During a gradual occlusion of the SMA or the IMA the blood supply is protected by an extensive mesenteric collateral circulation, but it may not respond as efficiently in an acute ischemic event. The right colon in particular is at risk for ischemic injuries in low blood flow conditions because the distal vessels that perfuse its wall are of a smaller caliber than those in the rest of the colon.[11] This distal vasculature is prone to spasm, possibly as a reaction to hypotension, which can trigger reflex mesenteric vasoconstriction and lead to ischemia in an already vulnerable circulation.

Acute mesenteric ischemia involving the IMA compromises the left side of the transverse colon and the descending colon, a complication often associated with iatrogenic ligation or intraoperative hypotension during aortic or cardiac surgery.[12] The incidence of ischemic colitis associated with cardiac surgery is estimated to be 0.2% to 0.4%; and the mortality rate, 70% to 100%.[13] One study has shown that patients who developed gastrointestinal complications following cardiac surgery were significantly older and had increased comorbidities (such as renal failure and peripheral vascular disease), longer cardiopulmonary bypass times, and higher valvular surgery rates.[14] The estimated incidence of ischemic colitis after open repair of a ruptured abdominal aortic aneurysm has been reported as high as 42% and is associated with high mortality rates.[15] Multivariate analyses have identified valve surgery as an independent predictor of gastrointestinal ischemic complications, with an odds ratio of 3.2.[14]

>>FAST TRACK<<

In the presence of diagnosed coagulopathies, abdominal pain must raise the suspicion for colonic ischemia.

NONSURGICAL CAUSES

A baseline vascular disease, including primary vasculitis, associated with a systemic condition such as diabetes mellitus, sickle cell anemia, or atherosclerosis, may be the underlying cause of marginal colonic circulation. This can lead to abnormal susceptibility to ischemia when a precipitating event such as systemic hypotension occurs.

Cardiac insufficiency may be associated with slowing of the circulation, creating a mismatch between supply and demand in the colonic circulation, favoring thrombus formation, as does shock from any origin. On the other hand, the heart's pumping function may be impaired as well by any dysrhythmia (most commonly atrial fibrillation), becoming an associated precipitant of ischemic colitis.

Hypercoagulable states such as protein C and S deficiencies, antithrombin III deficiency, and anticardiolipin syndrome are reported in up to 74% of cases of ischemic colitis. In the presence of diagnosed coagulopathies, abdominal pain must raise the suspicion for colonic ischemia.[12]

Drugs that may predispose patients to ischemic colitis include nonsteroidal anti-inflammatory agents, vasoactive drugs, oral contraceptives, sumatriptans, and cocaine. There have been cases attributed to physical activity (presumably due to physiologic shunting and volume depletion), as well as to peritoneal dialysis in chronic renal failure.[2,16,17]

DIAGNOSIS AND TREATMENT

A high level of suspicion based on the presence of risk factors is essential to making a correct diagnosis of ischemic colitis. In mild cases, ischemic colitis symptoms such as anorexia, nausea, and vomiting with absent peritoneal signs or abnormal laboratory studies can be misleading and challenging, especially in patients presenting in states of mental impairment.

Most patients present with an acute onset of crampy abdominal pain frequently associated with fecal urgency and localized tenderness at the area of compromise, followed by the passage of bright red blood per rectum. This common presentation is most likely to be accompanied by evidence of metabolic acidosis, leukocytosis, and lactic acidosis. Peritoneal signs due to infarction and necrosis are present in only 15% of cases.[18]

Ischemic colitis cannot be ruled out based on the absence of abnormal laboratory markers of ischemia (lactate, lactate dehydrogenase, alkaline phosphate, or metabolic acidosis) since elevations of these may not occur until late in the course. In the presence

of risk factors and suggestive history, imaging tests must be considered. Barium enema, colonoscopy, and angiography (considered the gold-standard diagnostic test by some) have been used as diagnostic modalities for ischemic colitis but are rarely viable options in the emergency department. Note that bowel ischemia occurring as a complication of aortic repair almost always compromises the left colon, making colonoscopy especially dangerous in these patients.[19]

Computed tomography with triple contrast is often used in the evaluation of patients with nonspecific abdominal pain and may yield suggestive findings in up to 89% of patients with ischemic colitis.[4] Segments of circumferential wall thickness are the most common finding (see Figures 1 and 2). Pneumatosis, suggesting transmural infarction, may be seen.

Overall clinical condition and the severity of the ischemia dictate how the patient should be managed. In the absence of bowel perforation or gangrene, most patients will respond to supportive care—intravenous fluids, optimization of cardiac output, and avoidance of vasoconstrictive drugs. Bowel rest, empiric antibiotics, and early surgical consultation are mandatory. Most medically managed presentations of ischemic colitis show clinical signs of improvement in the first 48 hours and resolution of radiologic abnormalities within weeks. Around 20% of patients, however, will require surgical resection due to peritonitis or clinical deterioration.[4] In cases of perforation or necrosis, the mortality rate can exceed 50% despite surgical treatment.[20]

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