Etiology of lower gastrointestinal bleeding in adults

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INTRODUCTION

Lower gastrointestinal bleeding (LGIB) refers to blood loss of recent onset originating from a site distal to the ligament of Treitz [1,2]. It is usually suspected when patients complain of hematochezia (passage of maroon or bright red blood or blood clots per rectum). This is different from the clinical presentation of upper gastrointestinal (GI) bleeding, which includes hematemesis (vomiting of blood or coffee-ground-like material) and/or melena (black, tarry stools). Although helpful, the distinctions based upon stool color are not absolute since melena can be seen with GI bleeding from the right colon (or small intestine), and hematochezia can be seen with massive upper GI bleeding [3-5]. Therefore, it is imperative to exclude a massive upper GI bleed in hemodynamically unstable patients presenting with hematochezia [6]. A nasogastric tube lavage that yields blood or coffee-ground-like material confirms the diagnosis of upper GI bleeding; however, lavage may not be positive if bleeding has ceased or arises beyond a closed pylorus. (See "Approach to acute upper gastrointestinal bleeding in adults".)

The epidemiology of GI bleeding appears to be changing. Studies indicate that the incidence of hospitalizations for LGIB is similar to that of upper GI bleeding, largely due to a decrease in upper GI events [7-9].

This topic review will focus on the major causes of LGIB originating from the colon and briefly summarize the management of some of these disorders. Although the definition of LGIB includes small bowel sources, the clinical presentation, management, and outcomes of small bowel bleeding are generally distinct from bleeding from colon sources [10]. The diagnostic approach to patients with LGIB, suspected small bowel bleeding, and occult gastrointestinal bleeding are

discussed separately. (See "Approach to acute lower gastrointestinal bleeding in adults" and "Evaluation of occult gastrointestinal bleeding" and "Evaluation of suspected small bowel bleeding (formerly obscure gastrointestinal bleeding)".)

ETIOLOGY

The causes of lower gastrointestinal bleeding (LGIB) may be grouped into several categories (table 1):

- Anatomic (diverticulosis)
- Vascular (angiodysplasia, ischemic, radiation-induced)
- Inflammatory (inflammatory bowel disease, infectious)
- Neoplastic

In most series, diverticulosis is the most common source of LGIB, accounting for approximately 15 to 55 percent of cases [11,12]. Angiodysplasia may be the most frequent cause in patients over the age of 65 years [13,14], though more recent data suggest that angiodysplasia may be a less common cause of LGIB than once thought [12]. (See "Angiodysplasia of the gastrointestinal tract".)

Hemorrhoids are the most common cause of rectal bleeding in patients under the age of 50 years [15]. However, hemorrhoidal bleeding is usually minor. Similarly, bloody diarrhea due to inflammatory causes can sometimes be distinguished from other causes of LGIB because of the clinical setting. In general, anatomic and vascular causes of bleeding present with painless, large-volume blood loss, whereas inflammatory sources are associated with diarrhea and abdominal pain [16].

In a review of several large studies that included 1559 patients with acute hematochezia, the following bleeding sources were identified [12]:

- Diverticulosis – 5 to 42 percent
- Ischemia – 6 to 18 percent
- Anorectal (hemorrhoids, anal fissures, rectal ulcers) – 6 to 16 percent
- Neoplasia (polyps and cancers) – 3 to 11 percent
- Angiodysplasia – 0 to 3 percent
- Postpolypectomy – 0 to 13 percent
- Inflammatory bowel disease – 2 to 4 percent
- Radiation colitis – 1 to 3 percent

- Other colitis (infectious, antibiotic associated, ischemic, colitis of unclear etiology) – 3 to 29 percent
- Small bowel/upper GI bleed – 3 to 13 percent
- Other causes – 1 to 9 percent
- Unknown cause – 6 to 23 percent

Diverticulosis — A diverticulum is a sac-like protrusion of the colonic wall. The prevalence of diverticular disease is age-dependent, increasing from less than 20 percent at age 40 to 60 percent by age 60. [17]. (See "Colonic diverticulosis and diverticular disease: Epidemiology, risk factors, and pathogenesis".)

The high prevalence of diverticulosis explains why it is the most common cause of LGIB, even though bleeding is a rare complication of this common disease. Diverticular bleeding typically occurs in the absence of diverticulitis [18], and the risk of bleeding is not further increased if diverticulitis is present [19].

As a diverticulum forms, the penetrating vessel responsible for the wall weakness at that point becomes draped over the dome of the diverticulum, separated from the bowel lumen only by mucosa (picture 1) [18]. On histological examination, these vessels demonstrate eccentric intimal thickening and thinning of the media, presumably due to chronic injury along their luminal aspect. These changes may result in segmental weakness of the artery, predisposing to rupture into the lumen. (See "Colonic diverticular bleeding".)

In western countries, 75 percent of diverticula occur on the left side of the colon and, when right-sided diverticula do occur, they are usually associated with left-sided diverticula [20-22]. However, the right colon is the source of diverticular bleeding in 50 to 90 percent of patients [18,23,24]. The anatomic relationship between diverticula and the vasa recta is similar in both the right and left colon, but right-sided diverticula have wider necks and domes. This could expose the vasa recta to injury over a greater length, which may explain the higher incidence of right-sided hemorrhage [18].

Diverticular bleeding may be massive and life-threatening since diverticula often form at the site of arterial vascular penetration. The bleeding is usually painless except for mild abdominal discomfort and cramping due to colonic spasm from intraluminal blood. Diverticular bleeding is self-limited in 70 to 80 percent of cases. However, the long-term rebleeding rate approaches 40 percent after the initial bleeding episode in those who do not undergo surgery [25-28], and appears to be higher in patients found to have definitive diverticular bleeding at colonoscopy [29].

Risk factors for diverticular bleeding include aspirin and nonsteroidal anti-inflammatory drug (NSAID) use, advanced age, obesity, physical inactivity, hypertension, ischemic heart disease, chronic renal insufficiency, and hyperlipidemia [30-40]. Aspirin and NSAIDs may increase the risk of LGIB by a variety of mechanisms, including local erosive topical damage and platelet dysfunction [41].

The management of diverticular bleeding is discussed separately. (See "Colonic diverticular bleeding".)

Angiodysplasia — Angiodysplasia refers to dilated, tortuous submucosal vessels. The walls of these blood vessels are composed of endothelial cells that lack smooth muscle (picture 2 and picture 3). Angiodysplasia appears endoscopically as peripherally expanding dilated capillaries with a central origin typically measuring between 0.1 and 1.0 cm in diameter (picture 4). They are not visualized by barium enema or at autopsy (since blood volume is removed). (See "Angiodysplasia of the gastrointestinal tract".)

Lower gastrointestinal angiodysplasia is uncommon in the general population. A study of 964 asymptomatic patients undergoing screening colonoscopy found that less than 1 percent had angiodysplasia [42]. No cases of bleeding were identified during three years of follow-up, suggesting that treatment of asymptomatic lesions is not necessary. Nevertheless, similar to diverticulosis, the incidence of angiodysplasia increases with age, likely due to degeneration of the vascular walls [13]. In addition, several conditions have been associated with angiodysplasia [43,44], including aortic stenosis, von Willebrand disease, and chronic renal failure. (See "Angiodysplasia of the gastrointestinal tract", section on 'Conditions associated with angiodysplasia'.)

Angiodysplasia may occur throughout the colon, although bleeding most often originates from the cecum or ascending colon [45]. Similar to diverticular disease, bleeding from angiodysplasia tends to be episodic and self-limited. Blood loss can be overt, presenting with painless hematochezia or melena, but is more often occult, manifested by Hemoccult positive stools and iron deficiency anemia [45,46]. (See "Evaluation of occult gastrointestinal bleeding" and "Evaluation of suspected small bowel bleeding (formerly obscure gastrointestinal bleeding)".)

Bleeding from angiodysplasia is venous in origin (in contrast to arterial bleeding with diverticula) and therefore tends to be less massive than diverticular bleeding. Endoscopic coagulation (with bipolar probe or heater probes), injection sclerotherapy, and argon laser coagulation can all achieve definitive hemostasis in patients with angiodysplasia, but rebleeding may occur [43,47]. (See "Angiodysplasia of the gastrointestinal tract".)

Colitis — Infectious and ischemic colitis and inflammatory bowel disease can all present initially with hematochezia. Mucosal inflammation (colitis) is the common response to acute injury, resulting in activation of the immune system and inflammatory cascade.

The clinical presentation and endoscopic appearance of the various types of colitis can be indistinguishable. Patients can present with abdominal pain, hematochezia (with or without diarrhea), fever, and dehydration. Blood loss tends to be mild. Endoscopically, colitis appears as edema, friability, erythema, and ulceration (picture 5). Histologically, there is evidence of nonspecific acute and chronic inflammation, fibrin exudates, crypt abscesses, and ulceration.

Establishing a specific diagnosis is paramount in the treatment of acute colitis since therapy depends upon the underlying disease process. The diagnosis requires an interpretation of the histologic and gross findings within its clinical context.

Infectious colitis — There are many infectious causes of colitis. A routine stool culture will identify Salmonella, Campylobacter, and Shigella, the three most common causes of bacterial diarrhea in the United States. As noted above, bleeding due to infectious causes can sometimes be distinguished from other causes of LGIB because of the clinical setting. (See "Approach to the adult with acute diarrhea in resource-abundant settings".)

Ischemic colitis — Older adults are most likely to experience ischemia-related colitis because of underlying risk factors such as relative hypotension, heart failure, and arrhythmias. However, often there is no clear precipitating event, and young patients can present with ischemic colitis, particularly those with a hypercoagulable state [48]. Patients classically have associated abdominal pain, although its absence does not preclude the diagnosis. Ischemic colitis tends to be continuous, left-sided (figure 1), and associated with mucosal friability, findings that resemble ulcerative colitis (picture 6). Distinguishing features may include a clear demarcation between involved and normal mucosa, rectal sparing, and a single longitudinal ulcer [49]. Bleeding is self-limited, and most cases (85 to 90 percent) resolve with correction of the underlying cause and volume repletion [50]. This is in contrast to acute mesenteric ischemia of the small intestine, which is often a life-threatening surgical emergency. Nonetheless, patients with LGIB from ischemic colitis tend to have worse outcomes than patients with other sources of bleeding [50]. (See "Colonic ischemia".)

Inflammatory bowel disease — Inflammatory bowel disease refers to both Crohn disease and ulcerative colitis. Hematochezia is a more common initial presentation with the latter and tends to occur in the setting of active inflammation. (See "Clinical manifestations, diagnosis, and prognosis of Crohn disease in adults" and "Clinical manifestations, diagnosis, and prognosis of ulcerative colitis in adults".)

Differentiating Crohn disease from ulcerative colitis during an episode of acute LGIB is not imperative since the acute management is similar for both conditions. However, it is important not to misdiagnosis inflammatory bowel disease as ischemic or infectious colitis since the therapy is different [51]. In older adults in particular, it can be difficult to differentiate ischemic colitis from inflammatory bowel disease [52]. (See "Overview of the medical management of mild (low risk) Crohn disease in adults" and "Management of the hospitalized adult patient with severe ulcerative colitis".)

Colon cancer — Colon cancer is a less common but serious cause of hematochezia. It is responsible for approximately 10 percent of cases of rectal bleeding in patients over age 50 years, but is rare in younger individuals [53]. Bleeding occurs as the result of overlying erosion or ulceration. The bleeding tends to be low-grade and recurrent. Bright red blood suggests left-sided lesions; right-sided lesions can present with maroon blood or melena. (See "Clinical presentation, diagnosis, and staging of colorectal cancer".)

Endoscopic therapy of colon cancer presenting with rectal bleeding is limited. There is a significant risk of inducing more bleeding or causing a perforation with endoscopic therapy due to the friability and size of the lesions. The endoscopist should biopsy suspicious masses, look for synchronous lesions, and exclude additional causes of bleeding. Endoscopically applied TC-325 (Hemospray) is a promising agent for bleeding from diffuse, friable sources such as colon cancer [54].

Rectal bleeding is present in some women with ovarian cancer but is rarely the presenting symptom. (See "Epithelial carcinoma of the ovary, fallopian tube, and peritoneum: Clinical features and diagnosis", section on 'Clinical presentation'.)

Miscellaneous anorectal disorders — Hemorrhoids are dilated submucosal veins in the anus that are located above (internal) or below (external) the dentate line. They are usually asymptomatic but can present with hematochezia, thrombosis, strangulation, or pruritus. Hematochezia results from rupture of internal hemorrhoids, which are supplied by the superior and middle hemorrhoidal arteries. Hemorrhoidal bleeding is almost always painless. Bright red blood typically coats the stool at the end of defecation. Blood may also drip into the toilet or stain toilet paper. Occasionally, bleeding can be copious and distressing for the patient. However, significant lower GI bleeding from hemorrhoids is uncommon (ie, bleeding that causes hemodynamic instability or results in anemia). The risk of serious bleeding is increased in patients with a coagulopathy or on anticoagulant therapy [55]. While hemorrhoids are a common cause of bleeding in patients under the age of 50 years [15], LGIB in adults generally requires endoscopic evaluation to exclude a more serious source. (See "Hemorrhoids: Clinical manifestations and diagnosis".)

A variety of other lesions in the anorectum may be associated with bleeding. These include solitary rectal ulcers, anal fissures, rectal varices, and Dieulafoy's lesions. (See "Solitary rectal ulcer syndrome" and "Anal fissure: Clinical manifestations, diagnosis, prevention" and "Pathogenesis of variceal bleeding in patients with cirrhosis", section on 'Location of varices' and "Causes of upper gastrointestinal bleeding in adults", section on 'Dieulafoy's lesion'.)

Radiation telangiectasia or proctitis — Radiation therapy of abdominal and pelvic cancers (such as cervical or prostate carcinoma) can lead to lower gastrointestinal bleeding as either an early or late complication of radiation damage. Risk factors for radiation-induced damage include immobilization of the bowel in the rectosigmoid area, arteriosclerosis, and concomitant chemotherapy.

The timing of rectal bleeding relative to the administration of radiation therapy can narrow the differential diagnosis. Acute radiation injury occurs within six weeks of therapy. Symptoms include diarrhea and rectal urgency or tenesmus, and, uncommonly, bleeding. Chronic radiation proctosigmoiditis has a more delayed onset. The first signs often occur at approximately 9 to 14 months following radiation exposure, but may develop after more than two years in some patients and rarely up to 30 years after exposure. (See "Radiation proctitis: Clinical manifestations, diagnosis, and management".)

Ulceration or cancer recurrence can also be seen as late complications following radiation therapy. These entities must be excluded in patients with rectal bleeding.

Following biopsy or polypectomy — Bleeding following endoscopic biopsy or polypectomy is usually self-limited, although active arterial bleeding can occur acutely [56]. Acute bleeding is due to involvement of an underlying artery or inadequate coagulation of the polyp stalk. Delayed bleeding can occur as late as three weeks following endoscopic polypectomy, presumably due to sloughing of the coagulated eschar. (See "Management and prevention of bleeding after colonoscopy with polypectomy".)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Gastrointestinal bleeding in adults".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "Patient education: Ulcerative colitis in adults (The Basics)" and "Patient education: Crohn disease in adults (The Basics)" and "Patient education: Angiodysplasia of the GI tract (The Basics)")

- Beyond the Basics topics (see "Patient education: Ulcerative colitis (Beyond the Basics)" and "Patient education: Crohn disease (Beyond the Basics)")

SUMMARY

- Lower gastrointestinal bleeding (LGIB) refers to blood loss of recent onset originating from a site distal to the ligament of Treitz, which results in hemodynamic instability, anemia, or the need for blood transfusion.

- The causes of LGIB may be grouped into several categories: anatomic (diverticulosis), vascular (angiodysplasia, ischemic, radiation-induced), inflammatory (inflammatory bowel disease, infectious), and neoplastic (table 1).

- In most series, diverticulosis accounts for approximately 15 to 55 percent of LGIB. (See 'Diverticulosis' above.)

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Topic 2546 Version 25.0

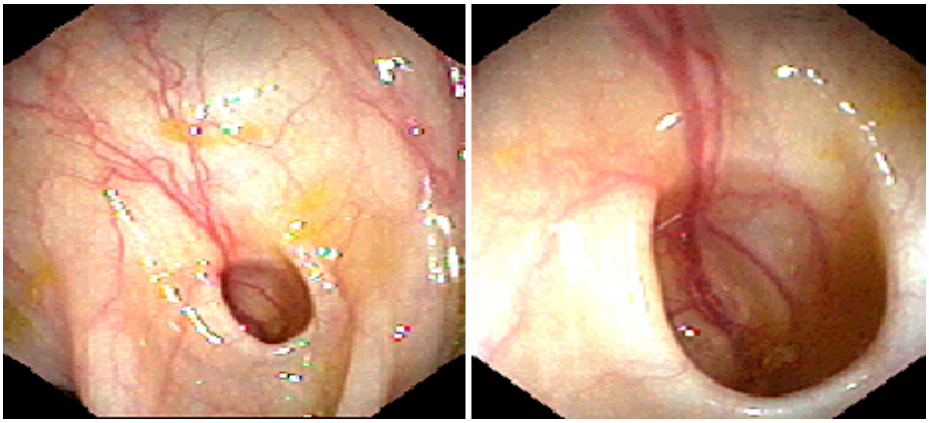
GRAPHICS

Common causes of lower gastrointestinal bleeding

Vascular
Diverticulosis
Angiodysplasia
Hemorrhoids
Ischemic
Post biopsy or polypectomy
Radiation-induced telangiectasia
Inflammatory
Infectious
Inflammatory bowel disease
Ulcer
Neoplastic
Polyp
Carcinoma

Graphic 58308 Version 5.0

Blood vessel within a colonic diverticulum

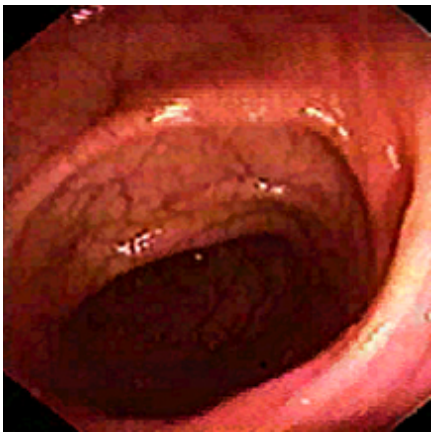


Endoscopy showing a blood vessel within a diverticulum. The blood vessel is separated from the bowel lumen only by mucosa. Over time, the vessel wall is exposed to injury along its luminal aspect, possibly leading to segmental weakness which predisposes to rupture into the lumen.

Courtesy of James B McGee, MD.

Graphic 52254 Version 3.0

Normal sigmoid colon

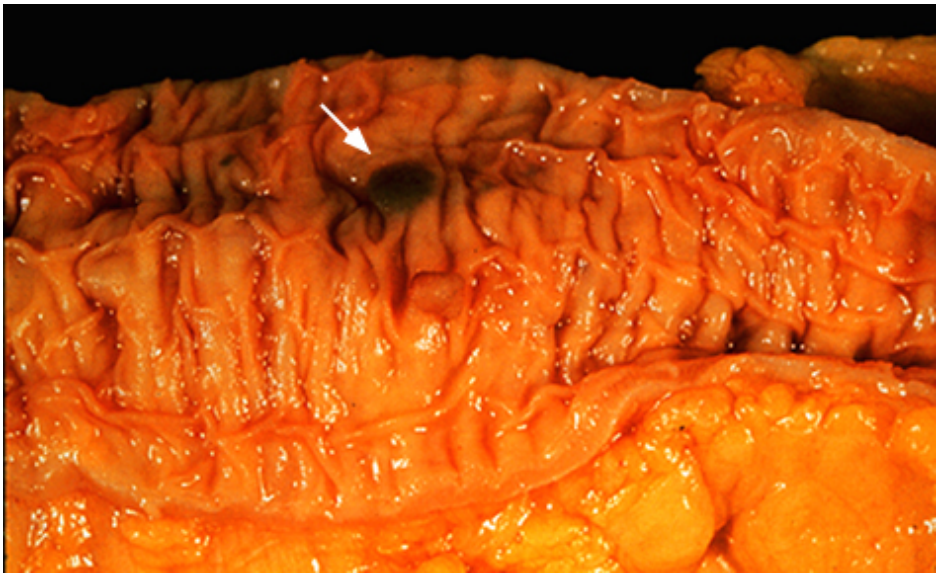


Endoscopic appearance of the normal sigmoid colonic mucosa. The fine vasculature is easily visible, and the surface is shiny and smooth. The folds are of normal thickness.

Courtesy of James B McGee, MD.

Graphic 55563 Version 1.0

Angiodysplasia of the colon

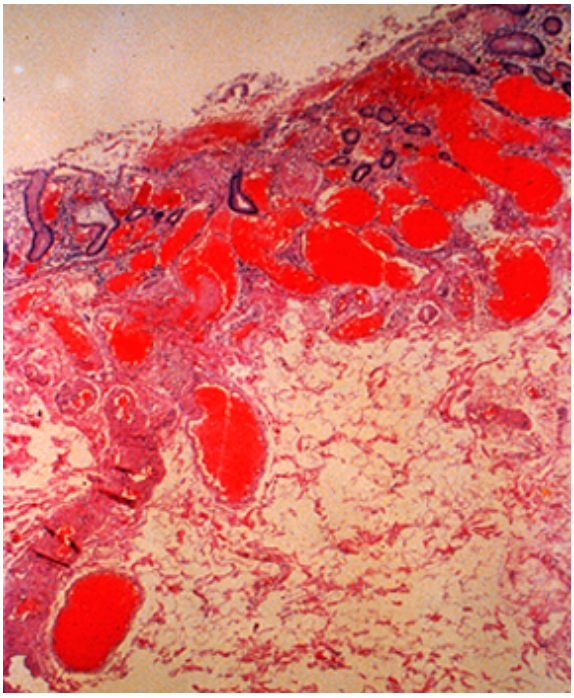


Gross specimen of the colon with angiodysplasia shows a focal mucosal hemorrhagic area.

Courtesy of Robert Odze, MD.

Graphic 61483 Version 2.0

Angiodysplasia of the colon

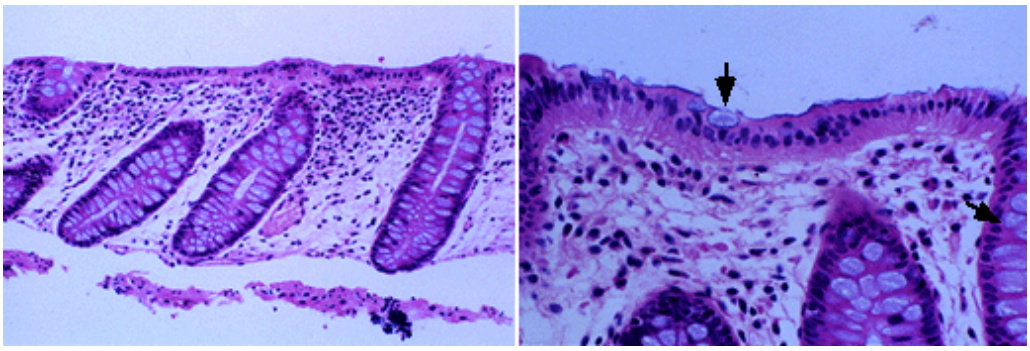


Low power view of a colonic biopsy in angiodysplasia shows mucosal and submucosal vascular dilatation and congestion.

Courtesy of Robert Odze, MD.

Graphic 74301 Version 2.0

Normal colon

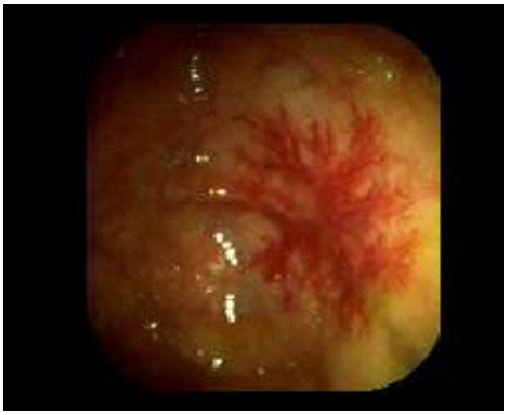


Low (left) and high (right) power views of a biopsy of a normal colon. Low power reveals straight crypts and mild lamina propria mononuclear cell infiltration. High power shows the surface enterocytes with interspersed goblet cells (arrows).

Courtesy of Robert Odze, MD

Graphic 81083 Version 6.0

Endoscopic image of colonic angiodysplasia

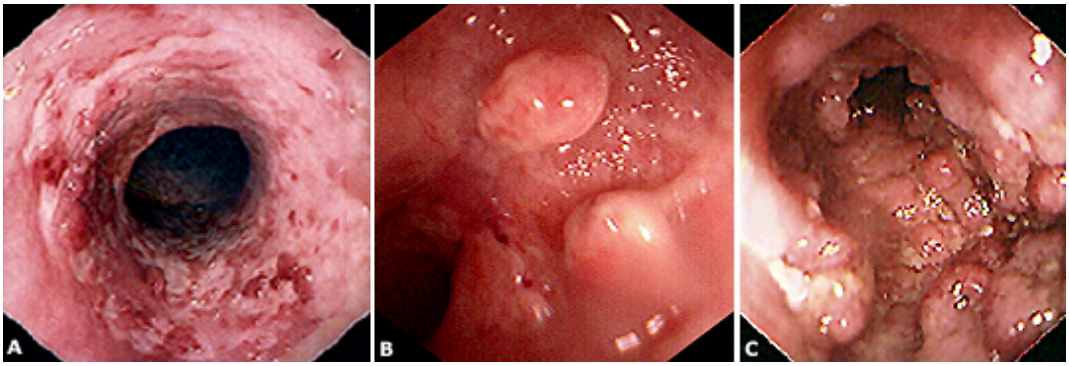


Angiodysplasia appears endoscopically as peripherally expanding dilated capillaries with a central origin measuring between 0.1 to 1.0 cm in diameter.

Courtesy of Rome Jutabha, MD.

Graphic 50137 Version 4.0

Ulcerative colitis

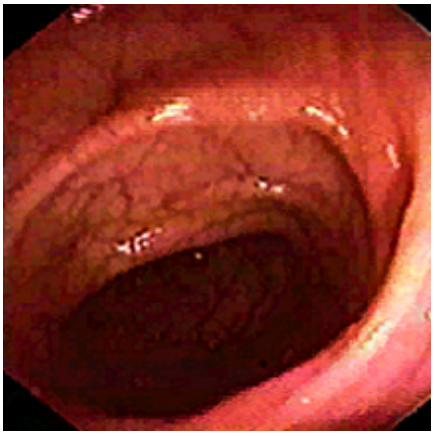


Endoscopic appearance of ulcerative colitis. Extensive ulceration of the mucosa is the most common endoscopic finding (panel A). The surface is irregular, friable, and erythematous, with loss of the normal vascular markings. Pseudopolyps may form as a reaction to inflammation (panel B); these can become quite extensive (panel C).

Courtesy of James B McGee, MD.

Graphic 81755 Version 2.0

Normal sigmoid colon

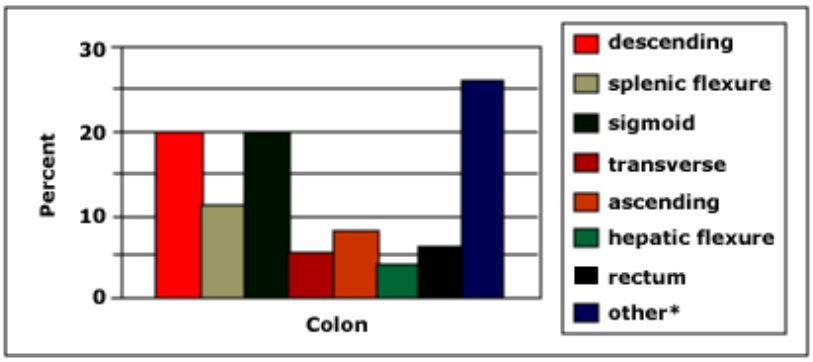


Endoscopic appearance of the normal sigmoid colonic mucosa. The fine vasculature is easily visible, and the surface is shiny and smooth. The folds are of normal thickness.

Courtesy of James B McGee, MD.

Graphic 55563 Version 1.0

Distribution of colon ischemia

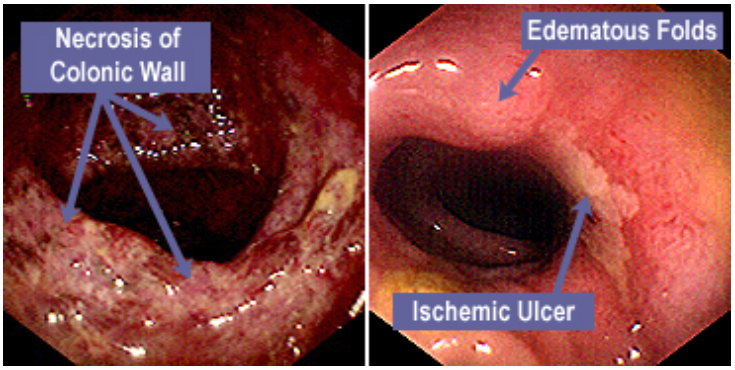


* Other areas refer to combination of different regions.

Data from: Reinus JF, Brandt LJ, Boley SJ. Ischemic diseases of the bowel. Gastroenterol Clin North Am 1990; 19:319.

Graphic 65067 Version 5.0

Ischemic colitis on colonoscopy

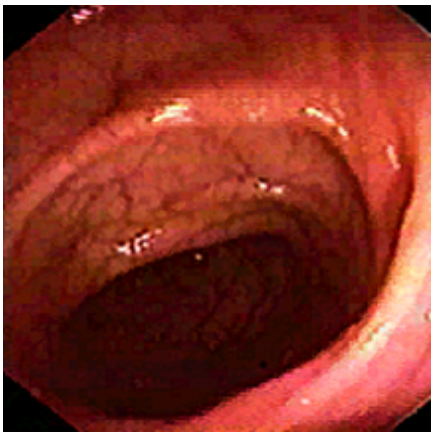


Endoscopy of ischemic colitis may reveal continuous necrosis and mucosal friability that resembles ulcerative colitis (left panel); discrete ulcers with surrounding edema may also be seen (right panel).

Courtesy of James B McGee, MD.

Graphic 59803 Version 2.0

Normal sigmoid colon



Endoscopic appearance of the normal sigmoid colonic mucosa. The fine vasculature is easily visible, and the surface is shiny and smooth. The folds are of normal thickness.

Courtesy of James B McGee, MD.

Graphic 55563 Version 1.0

Contributor Disclosures

Lisa Strate, MD, MPH Consultant/Advisory Boards: Medtronic [Nexpowder data safety monitoring board]. All of the relevant financial relationships listed have been mitigated. **J Thomas Lamont, MD** Equity Ownership/Stock Options: Allurion [Weight loss]. Consultant/Advisory Boards: Teledoc [Gastrointestinal diseases]. All of the relevant financial relationships listed have been mitigated. **Shilpa Grover, MD, MPH, AGAF** No relevant financial relationship(s) with ineligible companies to disclose.

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