Evaluation and Management of Gastrointestinal Bleeding
Part 2: Lower and Obscure Gastrointestinal Bleeding
Edward Lung, M.D., M.P.H.

ABSTRACT

This article, the second in a 2-part series, provides information on the diagnosis and treatment of lower and obscure gastrointestinal (GI) bleeding. The data on lower tract bleeding are not as robust as for upper tract bleeding. If lower GI bleeding is suspected, upper tract and anorectal lesions should first be excluded. Once the bleeding has stopped, colonoscopy is the first test indicated. For ongoing bleeding, red blood cell nuclear scintigraphy is indicated, while the patient is prepared for colonoscopy. If the scan is negative, colonoscopy should be performed within 6 to 12 hours. Triage and length-of-stay issues are unresolved for lower GI bleeding because of the paucity of data. Obscure GI bleeding may be overt or occult, and the most common causes are small-bowel vascular ectasias. The diagnostic yield of procedures is poor. Wireless capsule endoscopy is a new technology that offers much promise for identifying bleeding sites.

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Epidemiology

There are 20 cases of lower gastrointestinal (GI) bleeding per 100,000 adults annually in the United States. The incidence rate rises substantially with age, with a 200-fold increase between the 3rd and 9th decades of life. As with upper GI bleeding, there is spontaneous cessation of bleeding in 80% of cases. The mortality rate of 3% to 5% for lower tract bleeding is substantially lower than the rate for upper tract bleeding. A definitive source of the bleeding will not be found in a substantial number of patients. Obscure GI bleeding is defined as bleeding that persists or recurs and for which there is no obvious source found during routine endoscopic evaluation. It constitutes as much as 5% of all GI bleeding, and the small intestine is the most common site. Because the presentation is variable, obscure GI bleeding can be clinically evident, as in obscure-overt bleeding (in which there is melena or hematochezia) or can present as obscure-occult bleeding, which is accompanied by recurrent iron deficiency anemia or a persistently positive fecal occult blood test. Patients with obscure GI bleeding often require multiple hospitalizations and transfusions, and they typically undergo extensive and repeated diagnostic workups.

Diagnosis and Treatment of Lower GI Bleeding

The data for lower GI bleeding are not as abundant as for upper GI bleeding. A dearth of new data has been published in recent years, probably because the incidence of lower tract bleeding is only 20% that of upper tract bleeding. In diagnosing and treating lower GI bleeding, there is a need to consider the clinical scenario and medical expertise available. A multidisciplinary approach is suggested: surgeons, gastroenterologists, and interventional radiologists should be involved early in the hospital course.

The diagnostic approach to lower GI bleeding is not standardized. Unlike with upper GI bleeding, there is substantially less certainty...
about the best initial diagnostic test for patients with lower GI bleeding. Several diagnostic and therapeutic options exist; these include colonoscopy, red blood cell (RBC) nuclear scintigraphy, angiography, computed tomography and magnetic resonance imaging scans, and contrast studies. In the appropriate clinical setting, especially for a young patient who has lower tract bleeding, the physician should consider a Meckel’s scan. Another option is enteroscopy, which involves passing an endoscope or a pediatric colonoscope as far down into the jejunum as possible.

**Etiology and Source**

Lower GI bleeds are usually colonic in nature, although a subset of cases occurs from the small bowel. There are several causes of lower GI bleeding. By far the most common cause is diverticulosis, accounting for 41% of cases. Neoplasms and ischemic colitis each represent 9% of cases while acute colitis and hemorrhoids each account for 5%. Postpolypectomy bleeding is the cause in 4% of cases, and vascular ectasia, in 3%. Other causes, in the aggregate, represent 12% of all cases and 12% of all incidents occur for unknown reasons.

The critical step in generating a differential diagnosis involves determining if the source of the bleeding is colonic. This determination can be made based on information obtained from the patient’s history, including prior upper gastrointestinal bleeding or risk factors for an upper GI source, such as a history of taking nonsteroidal anti-inflammatory drugs (NSAIDs). If there is any concern about an upper GI source, nasogastric (NG) tube placement should be performed. To rule out upper GI bleeding, the NG aspirate should be bilious and without blood. If there is still a question of whether the source is the upper or lower GI tract, an upper endoscopy should be performed. If a patient presents with hematochezia and is hypotensive, the patient should be stabilized and then an upper endoscopy performed to ensure the patient does not have a peptic ulcer. Another critical step involves anoscopy, which will determine whether the patient has an anorectal lesion such as a hemorrhoid.

**Hospitalization**

The criteria for hospitalization in a patient with lower GI bleeding are similar to those for upper GI bleeding. In general, patients who are over 60; who have ongoing shock and hemodynamic instability; who have severe comorbid conditions such as coronary artery disease, renal disease, or hepatic disease; and who have high transfusion requirements are at high clinical risk and should be hospitalized. In addition, the patient should also be hospitalized if any of the following is present: abnormal vital signs, severe anemia, fever, abdominal pain or tenderness, suspected upper tract bleeding, or previous aortic surgery.

**Urgent Colonoscopy**

**Diagnosis.** Since the 1980s, there has been a substantial interest in using urgent colonoscopy to evaluate patients with lower GI bleeding. Although the procedure is safe and feasible, it is important to stress that identifying the bleeding site can be difficult because of the intermittent nature of the bleeding. In general, it is desirable to perform colonoscopy after the bleeding has stopped and within 6 to 12 hours of presentation. It is assumed that the earlier the colonoscopy is performed, the better the diagnostic yield.

At one time clinicians were reluctant to perform urgent colonoscopy in patients who presented with lower GI bleeding. The patients were not appropriately purged before undergoing the procedure, which led to concerns about poor diagnostic capability and fears of perforation. In addition, clinicians were reluctant to administer bowel-cleansing preparations, fearing the preparation might worsen the bleeding. Data emerged in 1997, however, suggesting that urgent colonoscopy and bowel preparations are both safe and feasible for patients with lower GI bleeding.

**Treatment.** Not only is colonoscopy extremely valuable for helping an examiner identify a lesion, but it also facilitates treatment by allowing the physician to use some of the same therapeutic techniques that are used in upper tract bleeding. Some studies suggest endoscopic therapy is possible in 30% to 40% of cases of lower tract bleeding. The type of therapy depends on the lesion: vascular ectasias can be treated with thermal contact methods; ulcers and postpolypectomy bleeding with thermal contact, injection, or metallic clip placement; and diverticular hemorrhage can be treated with a combination of thermal therapy and an injection of epinephrine.

**The Data on Urgent Colonoscopy.** In 1997, researchers from the University of California, Los Angeles, presented their approach to diagnosing and treating patients with severe hematochezia. They also assessed the cost-effectiveness of emergency colonoscopy compared to that of other approaches. Aware that approximately 10% to 15% of patients examined by gastroenterologists have severe, ongoing hematochezia (which most physicians assume is from a lower GI source), the researchers investigated the safety and efficacy of urgent colonoscopy in the patient with severe hematochezia. Patients were prepped very quickly—with a Golytely™ lavage, up to 8 liters over a 4-hour period—and if the patients were not able to tolerate the preparation orally, it was administered via an NG tube.

The diagnostic yield was 80%. The patients underwent some mode of endoscopic therapy in 40% of cases with no complications. Angiography rates declined from 50% to 5% and surgery rates from 20% to 5%. Length of stay decreased from 10 days to
5 days; intensive care unit (ICU) stays decreased from 3 days to 1 day; and healthcare costs declined by approximately $10,000 per patient. The results of this study are impressive because diagnostic yields in practice are rarely over 30%.

Three years later, the same researchers investigated the role of urgent colonoscopy in diagnosing and treating severe diverticular hemorrhage. Patients with severe hematochezia and diverticulosis were hospitalized, received blood transfusions as needed, and a purgative to rid the colon of clots, stool, and blood. Within 6 to 12 hours after hospitalization, colonoscopy was performed. A total of 121 patients participated in the study. Of the first 73 subjects enrolled, 17 (23%) had continued diverticular hemorrhage and underwent hemicolectomy.

Among the next 48 subjects enrolled, 10 (21%) showed definite signs of diverticular hemorrhage. However, they received colonoscopic therapy, including epinephrine injections and bipolar coagulation. None of the 10 had recurrent bleeding or needed surgery after the treatment. The researchers concluded that 20% or more of patients with severe hematochezia and diverticulosis have definite diverticular hemorrhage and that treating these patients with colonoscopic therapy (as described above) may prevent recurrent bleeding and decrease the need for surgery.

RBC Nuclear Scintigraphy. For ongoing bleeding, RBC nuclear scintigraphy is indicated, while the patient is being prepped for colonoscopy. If the scan is negative, colonoscopy should be performed within 6 to 12 hours. RBC nuclear scintigraphy can localize a bleeding site with a bleeding rate as low as 0.1 cc per minute. A patient bleeding at this rate would require a 1-unit transfusion every 2 to 4 hours. The sensitivity of a red-cell scan is 5 times that of an angiogram (see Angiograms below).

The difficulty is that RBC scintigraphy alone does not establish a diagnosis and cannot be used to provide therapy. The RBC scan helps only to determine the general region of the bleeding. The diagnostic yield of the red-cell scan can be increased with an upper endoscopy, which can help rule out an upper GI source. An RBC scan frequently shows blood in the region of the hepatic or splenic flexure, yet one cannot be sure that blood is in the colon; it could be from blood pooling in the stomach or duodenum. Additionally, scans that are positive early on (within 2 hours of image acquisition) are more useful than scans that are positive later. With the later scan, it is difficult to tell if the blood originated from the spot identified as positive or if the blood has progressed through the GI tract. Technetium-labeled RBC scintigraphy is not reliable for directing specific surgical treatment.

Angiograms. Angiograms are more specific but less sensitive than RBC scintigraphy. With an angiogram, the clinician can localize the bleeding site when a bleeding rate is approximately 0.5 to 1 cc per minute, which represents a 1-unit-per-hour transfusion requirement. The advantage of an angiogram is that it enables the interventional radiologist to provide therapy. While the precise role of angiographic embolization has yet to be established, generally it is useful when clinicians can identify a bleeding site during colonoscopy but cannot treat it and/or when the patient is not a good surgical candidate.

Once the bleeding site has been identified on angiogram, the vasoconstrictor vasopressin can be administered. A major limitation is that patients must be monitored in the ICU. Vasopressin can be highly effective, but does require a continuous intravenous infusion, and when the infusion is stopped, rebleeding rates can be as high as 50%. Vasopressin is associated with many contraindications and complications. Minor complications include fluid retention, hyponatremia, and hypertension; major complications include arrhythmias, pulmonary edema, and myocardial ischemia.

Embolization. More recent treatment involves using super-selective transcatheter embolization. Microcatheters, which can reach the bleeding distal vessels, can be positioned to embolize the bleeding site with microcoils, gelatin sponge pledgets, or polyvinyl alcohol. This approach has been shown to arrest bleeding in up to 71% of cases. The complication rates for both vasopressin and transcatheter embolization are as high as 20%. The major complication of embolization is intestinal infarction, but newer catheters are more effective at reaching the distal vessels, and the incidence of intestinal infarction appears to have declined. There have been no controlled trials of angiographic embolization; thus, the precise role of the procedure has not been established.

Urgent Surgery

Urgent surgery is indicated when the patient with lower GI bleeding is in shock despite resuscitation or when other therapeutic interventions are not feasible or have failed. It should also be considered for the patient with recurrent or continued bleeding, if transfusion requirements have reached more than 6 units during hospitalization, and especially if the patient has required more than 4 units on a single day. In these cases, a surgeon should be consulted immediately. Accurate preoperative localization of the area of the bleed is essential for minimizing complications, preventing rebleeding, and reducing the mortality risk. In 1 study, the rebleeding rate in the first year after surgery was 14% after segmental colectomy directed by angiography, but the rate was 42% after blind segmental colectomy. Blind subtotal colectomy for massive bleeding has been associated with significant morbidity and mortality, and it is usually viewed as a last resort.
LOWER AND OBSCURE GI BLEEDING

DIAGNOSIS AND TREATMENT OF OBSCURE GI BLEEDING

Obscure GI bleeding has traditionally been problematic because physicians lack a dependable method of evaluating the small intestine, the most common site for this form of bleeding. The most common cause of obscure bleeding in the elderly is angiodysplasia of the small bowel.16 In those between the ages of 30 and 50 years, tumors are more common, including leiomyosarcomas, adenocarcinomas, lymphomas, and carcinoid tumors.17 Other possible causes of obscure GI bleeding, some of which are very rare, include hemosuccus pancreaticus, hemobilia, aortoenteric fistula, Meckel's diverticulum, extraesophageal varices, and diverticula. NSAID enteropathy has been associated with erosions and ulcers of the small bowel and should also be considered.18

EVALUATION

Obscure bleeding may be overt with recurrent or persistent visible bleeding or occult, manifesting as recurrent iron-deficiency anemia or persistent positive fecal occult blood tests. Often patients will undergo upper endoscopy and colonoscopy, which may both yield negative results. If the bleeding is active, the physician is advised to order a red-cell scan, but these too are frequently negative, as the bleeding is intermittent or not brisk enough. When the red-cell scan yields negative results, endoscopy and colonoscopy should be repeated, because it has been shown that 35% of repeated procedures identify lesions missed on initial endoscopic evaluations.20 When the repeated procedures yield negative results, as happens frequently, it is advisable to order an enteroscopy or an enteroclysis, which is essentially a double-contrast study of the small bowel. If these are negative, and if the patient is bleeding profusely or has high transfusion requirements, a surgeon should be consulted. However, if the patient is elderly and/or not a good surgical candidate, and the bleeding is not frequent, the best course of action may be to provide transfusions as needed.

DIAGNOSTIC YIELD

The diagnostic yield of procedures in obscure GI bleeding is poor. Small bowel follow-through has a yield of 5%,20 Enterooclysis offers better radiographic images of the small bowel compared to small bowel follow-through examinations; however, it is also associated with substantial patient discomfort. The procedure entails passing a nasoenteric tube into the duodenojejunal junction, followed by the installation of barium, methylcellulose, and water, providing a double-contrast effect.21 In patients with a negative endoscopy, enteroscopy has a yield of 8%.22 The nuclear medicine scan may be helpful if the bleeding rate is in the range of 0.1 to 0.4 mL/min, but it can identify only a general area of bleeding and is limited in directing treatment. Data are scant, but the yield of nuclear medicine scans has ranged from 37% to 65%.23 Angiograms are very helpful when the patient is actively bleeding at a rate that exceeds 0.5 mL/min. Although less sensitive than the nuclear medicine scan, angiography is more effective at localizing the bleeding site.24 When attempting to identify a bleeding site during a workup for obscure GI bleeding, the yield of angiography has been reported to be 43%.25 For enteroscopy, the yield ranges from 40% to 65%.26,27 Exploratory surgery may identify a source in 70% of cases.28

WIRELESS CAPSULE ENDOSCOPY

The newest technology being used in the evaluation of obscure GI bleeding is wireless capsule endoscopy. It is a video capsule system that includes an 11 mm x 26 mm capsule containing a lens, 4 light-emitting diodes, a color camera, 2 batteries, a radio-frequency transmitter, and an antenna (Figure 1). The camera takes 2 images per second and transmits these to a sensor array worn on a belt around the patient's abdomen. After swallowing the capsule, patients can participate in daily activities. Images are stored in a recording device on the belt. The study usually lasts 8 hours, and when it has been completed the device is removed and images are downloaded to a computer workstation. Preparation is easy: patients do not need a bowel purge; they fast for 12 hours and they can

Key Points: Lower GI Bleeding

- Multidisciplinary approach and consensus are indicated.
- Consider the upper GI tract and anorectum.
- When bleeding has stopped, perform a colonoscopy.
- In the face of ongoing bleeding, perform an RBC scan immediately and prepare for colonoscopy over the next 6 to 12 hours.
- Triage and LOS issues remain unresolved in the literature.

RBC = red blood cell; LOS = length of stay.

Figure 1. Video Capsule and Image of Small Bowel Vascular Ectasia

*Courtesy of Given Imaging.*
begin eating 4 hours after ingesting the capsule. The exclusion criteria for wireless capsule endoscopy include a history of bowel obstruction or major abdominal surgery, because the capsule can become lodged and require surgical removal. Other contraindications include the presence of a pacemaker or defibrillator.

In a pilot study, patients with obscure GI bleeding who had undergone upper endoscopy and colonoscopy with negative results underwent both wireless capsule endoscopy and conventional enteroscopy. The average age of the patients was 61 years (range, 21 to 80 years). The capsule identified a bleeding site in 11 of 20 patients and the enteroscopy in 6 of 20. All 5 lesions missed by enteroscopy were distal to the reach of the enteroscope. More importantly, there were no complications with capsule endoscopy, and the patients preferred it to enteroscopy. The investigators concluded that capsule endoscopy provides excellent visualization of the small intestine, is well tolerated by patients, and is safe. Moreover, capsule endoscopy identifies small intestinal bleeding sites that are beyond the range of conventional enteroscopy. 

NEWEST DEVELOPMENTS

Novel endoscopic therapies include thrombin injection, fibrin glue injection, metallic clips, and argon plasma coagulation. Thrombin injection promotes the conversion of fibrinogen to fibrin to produce a local fibrin clot. In one study, thrombin injection plus epinephrine injection was more effective than epinephrine alone; however, more research is needed. There are concerns about thrombosis, viral transmission, and anaphylactic reactions with this agent. However, the potential benefits include an absence of the tissue injury that may accompany the use of thermal devices or sclerosants.

Fibrin glue injection combines fibrinogen and thrombin, producing a fibrin clot and local tamponade effects. While fibrin glue does not appear to be superior to current therapies for preventing recurrent bleeding, data are again limited. As with thrombin, the risk of thromboembolic events is a concern.

Metallic clip placement can be used to ligate a bleeding vessel (Figure 2). Precise placement can be difficult. Several trials have produced conflicting results when comparing metallic clip placement with standard therapy. The argon plasma coagulator is a noncontact, monopolar diathermy-based device that uses ionized argon gas as a medium for delivering electrical energy. One theoretical advantage of argon plasma coagulation (APC) is that it produces a more reliable depth of coagulation than does the heater probe. APC has gained popularity in the treatment of radiation proctitis and gastric antral vascular ectasias. Results of a recent randomized trial comparing APC plus epinephrine with heat probe plus epinephrine suggest that APC plus epinephrine is at least as effective.

These novel therapies are promising, but they cannot currently be recommended in place of bipolar electrocoagulation, heater probe, or injection therapy.

REFERENCES


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