Endoscopic Treatment for Lower Gastrointestinal Bleeding

Charles B. Whitlow, M.D.¹

ABSTRACT

Lower gastrointestinal bleeding is common and can result from several colonic causes including diverticulosis, arteriovenous malformations, ischemia, inflammatory bowel disease, infectious colitis, neoplasm, postpolypectomy, and anastomotic and radiation proctitis. Following resuscitation and evaluation, colonoscopy can be used for diagnosis and treatment. Most physicians prescribe a bowel preparation for their patients. Therapeutic options include injection, coagulation (monopolar or bipolar cautery, argon plasma coagulator), and mechanical (clips, bands, detachable loops) devices.

KEYWORDS: Gastrointestinal bleeding, hemorrhage, colonoscopy, endoscopy

Objectives: On completion of this article, the reader will be familiar with endoscopic methods to manage lower gastrointestinal bleeding.

Lower gastrointestinal bleeding (LGIB) is a common cause for hospital admission accounting for 20 to 30 admissions per 100,000 adults per year.^{1,2} Its spectrum of severity ranges from mild anal outlet bleeding to life-threatening, massive hemorrhage. Typically, LGIB is defined as bleeding distal to the Ligament of Trietz; however, for the purposes of this discussion only colonic bleeding is addressed. Although there are numerous possible etiologies, the most common causes of substantial colonic bleeding are diverticulosis, arteriovenous malformations, ischemia, inflammatory bowel disease, infectious colitis, neoplasm, postpolypectomy, and anastomotic and radiation proctitis.

The initial treatment of patients with LGIB focuses on simultaneous resuscitation and evaluation. Patients who present with hemodynamic evidence of significant blood loss or ongoing bleeding should have intravenous access with two large-bore peripheral catheters or central venous access. Infusion of two liters of

crystalloid is appropriate for initial resuscitation. A complete blood count, coagulation panel (prothrombin time [PT], international normalized ratio [INR], partial thromboplastin time [PTT]) and comprehensive metabolic panel are obtained, as well as type and cross-match of 2 to 4 units of packed red blood cells for possible transfusion. A Foley catheter is placed to allow response to resuscitative measures. Unless contraindicated, a nasogastric (NG) tube should be inserted to determine a possible upper gastrointestinal (UGI) source of bleeding. An estimated 15% of massive LGIB are from UGI sources.³ Even the presence of bile in the NG aspirate does not rule out an UGI source. Visual inspection of the anus and digital rectal exam detects acute anal pathology. Rigid proctoscopy (or flexible sigmoidoscopy if readily available) is useful for evaluation of the rectal mucosa and determining that blood is coming from a source proximal to the rectum.

¹Department of Colon and Rectal Surgery, Ochsner Clinic Foundation, New Orleans, Louisiana.

Address for correspondence and reprint requests: Charles B. Whitlow, M.D., Department of Colon and Rectal Surgery, Ochsner Clinic Foundation, New Orleans, LA 70121 (e-mail: cwhitlow@ochsner.org).

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A targeted history is essential in ascertaining a likely etiology for colonic bleeding and subsequently, to direct the evaluation and treatment. A history of coagulopathy, taking anticoagulants or antiplatelet therapy should prompt correction of clotting deficiencies. Fresh frozen plasma is used to reverse elevated INR secondary to warfarin. In general, vitamin K is avoided because it will make it difficult to anticoagulate the patient once the acute bleeding event is resolved. Platelets are transfused in patients on clopidogrel or aspirin. A history of pelvic radiation in a patient with chronic, recurrent bleeding suggests radiation proctitis. Recent colonoscopy results may also point to a cause for LGIB—diverticulosis, inflammatory bowel disease, or a recent polypectomy. The use of nonsteroidal antiinflammatory drugs is associated with colonic ulcerations. Persistent abdominal pain or a history of vascular disease (especially connective tissue disease or microvascular disease) may point to ischemic colitis. Chronic kidney disease is associated with angiodysplasia.

TRADITIONAL TREATMENT

Traditionally, the treatment of LGIB has been shaped by several factors. (1) In the vast majority of cases (estimated 85%), the bleeding ceases spontaneously.⁴ (2) Detection of LGIB by nuclear medicine or angiographic tests requires ongoing bleeding at a threshold rate. (3) Severe bleeding can make visualization of the colonic mucosa difficult and therefore a low-yield undertaking. This has led many to use an approach in which colonoscopy is used only after the acute bleeding has stopped or in cases of chronic, low volume bleeding, as is seen with arteriovenous malformations or radiation proctitis. However, there is a limited body of literature that focuses on colonoscopy as the initial evaluation management tool for LGIB. The remainder of this discussion will examine the role of colonoscopy for treatment in colonic bleeding, both acute and chronic.

Most reports of urgent colonoscopy for LGIB describe the exam being performed within 12 hours of presentation, although intervals of as long as 48 hours are also reported. In general, bowel preparation is used; however, Chaudhry et al described unprepped colonoscopy in 85 patients with acute LGIB and were able to perform a complete exam in 83 patients. They report identifying the source of bleeding in 97%; there was one patient who developed free air postcolonoscopy who was managed nonoperatively.⁵ Similar results have not been published.

In the only prospective study on urgent colonoscopy for severe diverticular hemorrhage, Jensen et al describe bowel preparation with 5 to 6 L of polyethylene glycol/electrolyte solution given over 3 to 4 hours either orally or per NG tube.⁶ This is the regimen recommended by most reviews on this topic including the

guidelines for endoscopy for patients with lower-GI bleeding from the American Society for Gastrointestinal Endoscopy.⁷ A review of the most current and larger series (these series total >1,000 patients) of urgent colonoscopy for LGIB found rates of complete colonoscopy of >80% for most series, although Ohyama et al reported incomplete exams in 44% of their 345 patients.^{8,9}

In addition to bowel preparation, adequate irrigation and suction allow for optimal visualization and for definitive diagnosis of the bleeding site. Typically, the area of bleeding will be suspected by an increase in the amount of blood with a brighter red color. Clot should be washed away to uncover the bleeding source. Ongoing streaming of blood can be demonstrated in fresh irrigant.

TECHNIQUES FOR HEMOSTASIS

Injection

Submucosal injection of epinephrine via a standard sclerotherapy needle is the most commonly described endoscopic technique used for achieving hemostasis. A concentration of 1:10,000 is injected in 0.5 cc to 1.0 cc aliquots in several locations. For diverticular bleeding, injections are placed around the orifice. For bleeding from polypectomy sites or staple-lines, injections are placed in quadrants around the area of bleeding. In addition to direct vasospasm, there may be a component of tamponade in the hemostatic effects of epinephrine injection. The criticism of this modality is that it may only provide temporary control of hemorrhage. Cyanoacrylate and fibrin glues have been used in upper gastrointestinal bleeding (UGI), but have not been reported for colonic sources.^{10,11}

Coagulation

Visible vessels are coagulated with monopolar or bipolar/multipolar cautery. Moderated pressure is applied with the cautery tip and low wattage (10 to 30 W) power is applied in short (1 second) pulses. Bipolar/multipolar cautery is the method described in most of the current gastroenterology literature. In these devices, current passes between two or more electrodes at the tip of the probe, resulting in a more concentrated current at this location and therefore less thermal damage to the colon wall. I favor a simple monopolar cautery tip, which allows the current to be delivered in a small, well-controlled area and decreases the risk of thermal injury to adjacent mucosa. The heater probe and laser have also been used for coagulation of bleeding colonic vessels.

The argon plasma coagulator (APC) delivers monopolar energy through ionized argon gas and is therefore a noncontact technique for coagulation (as is the laser). The energy effect can be varied based on the

power setting, the flow rate of the argon plasma, the distance from the tissue and the duration of application. Because of the argon flow during use, repeated aspiration of the gas is required to prevent overdistention of the colon. The limitation of all of the coagulation techniques is the risk of thermal injury to the colon wall leading to perforation.

Mechanical Devices

Endoscopic hemostatic clips are used for active bleeding, but have also been suggested to prevent bleeding from polypectomy sites and for closure of mucosal defects. Though a reusable system is available, disposable clips are much more commonly used. Hemostatic clips have the advantage of durability over epinephrine injections and the lack of risk of thermal injury over coagulation techniques. There are some features that differ among the commercially available disposable clips. The QuickClip2 (Olympus America Inc., Melville, NY) is rotatable allowing the endoscopist greater control in the orientation of application of the clip. The Resolution clip (Boston Scientific Corp., Natick, MA) is not rotatable, but is able to be reopened and repositioned prior to deployment. Both are available in an 11.0 mm open-width span and QuickClip2 also comes in a smaller 9.0 mm size. Although not technically difficult to use, the endoscopist and assistant should gain familiarity with the device prior to usage in a "live" patient setting. Depending on the setting, the clip can be placed directly on the bleeding site, to either side of it, or both. The tissue to be incorporated needs to be soft and compliant and the addition of suctioning just prior to deployment may allow additional tissue to be included in the "bite." Clip retention is usually 2 to 4 weeks, but may be longer.^{12,13} (I have seen a case of clip retention in the small bowel of over 3 months.)

Endoscopic band ligation has been accepted as first-line treatment of esophageal varices. This technology has been used sparingly for the treatment of lower gastrointestinal bleeding. Because of the small number of patients this has been reported in, the risks are not known. In seven patients from two case reports there were no complications.^{14,15}

ETIOLOGY-BASED TREATMENT

Diverticular Bleeding

Diverticular bleeding is typically episodic with arterial bleeding coming from vessels at the edge of the diverticulum perforating the colonic wall. Clinically, this presents as a large passage of blood and the cathartic nature of blood ensures that if substantial bleeding is ongoing the patient will continue to have bloody bowel movements. The most common endoscopic techniques

described for controlling diverticular hemorrhage are injection, coagulation, clip application, or a combination of techniques.

Jensen et al compared a retrospective cohort (Group 1) of patients with LGI bleeds who underwent colonoscopy without endoscopic therapy to a second, prospective cohort (Group 2) who had their diverticular hemorrhage treated.⁶ In 10 patients, active bleeding was treated by epinephrine injection; nonbleeding visible vessels were coagulated; and nonbleeding adherent clots were injected with epinephrine, cold snared, and the underlying stigmata of hemorrhage coagulated. In the 17 patients in Group 1 who were identified as having a diverticular bleed, nine patients had additional bleeding and six patients had emergent hemicolectomy. None of the 10 patients who underwent endoscopic treatment rebled or required additional treatment.

Green et al randomized patient to urgent colonoscopy with injection/coagulation versus a standard care algorithm with angiographic intervention.¹⁶ The majority of definitive bleeding was diverticular. Four patients in the endoscopic treatment rebled. There were no differences between the two groups with regard to mortality, hospital stay, intensive care unit stay, transfusions, rebleeding, or surgery. The remaining data on endoscopic treatment of diverticular hemorrhage by injection/coagulation are small retrospective series or case reports.

The data on endoscopic clipping for diverticular bleeding are a few case reports, a small case series, and an abstract of a retrospective series.¹⁷⁻²⁰ Yen et al²⁰ described 11 patients who underwent endoscopic clipping for diverticular hemorrhage. There was no acute rebleeding and no morbidity. The authors made a technical note that they attempted to place one prong of one clip into the diverticulum and the other clips were placed outside the diverticulum. Overall, based on limited data, endoscopic clipping for diverticular bleeding appears to be effective with a low risk of treatment- or bleeding-related complications. Clipping has the advantage of not adding the risk of thermal injury.

Anastomotic Bleeding

Anastomotic hemorrhage is a rare and typically self-limited occurrence. Reoperation, angiographic embolization, and endoscopic therapy have all been used in cases in which bleeding continues.²¹⁻²³ Malik et al describe six cases of anastomotic bleeding which required therapy.²³ Three patients had reoperation and three were treated endoscopically. The three endoscopically treated patients bled on postoperative days 5 to 6. One patient was initially treated with epinephrine injection alone. That patient rebled and was then successfully treated with coagulation. Another patient was treated successfully

with combined injection/coagulation. The third patient was treated successfully by endoscopic clipping.

Postpolypectomy Bleeding

Bleeding is the most common complication of polypectomy. Immediate bleeding at time of polypectomy should be addressed at that setting. The residual stalks of a pedunculated polyp can be grasped with a snare and continuous pressure held for several minutes.²⁴ Alternatively, bleeding sites from sessile polyps or pedunculated polyps in which the stalk cannot be snared can be treated with injection, coagulation, or hemostatic clips.

Several studies have looked at different techniques for decreasing the risk of postpolypectomy hemorrhage. Epinephrine injection decreases immediate postpolypectomy bleeding, but not delayed bleeding. Detachable endoloops and hemoclips used alone or in combination may decrease bleeding in larger, pedunculated polyps.^{25–27}

Delayed postpolypectomy bleeding is associated with ulceration/eschar from thermal injury and can occur up to 2 weeks after polypectomy. Although this bleeding is usually self-limited, it occasionally requires treatment. Appropriate endoscopic treatment includes injection, coagulation, clipping, or a combination of these techniques.^{26–30} Because of the ulceration and acute inflammation, clipping may be technically more difficult in this setting and it is common to need multiple clips to achieve hemostasis. A single case report described the use of fibrin glue for the successful treatment of delayed postpolypectomy hemorrhage.^{30a}

Radiation Proctitis

Bleeding from radiation proctitis is rarely life-threatening. However, ongoing bleeding from this process may lead to anemia and the need for transfusion. Medical treatment is successful in some patients, but others fail conservative measures and require more aggressive treatment. Endoscopic treatment has been performed using laser and diathermy coagulation. More recently, argon plasma coagulation has been suggested to destroy the telangiectasia that characterize this disease.^{31,32} Concerns have been raised related to complications of argon plasma coagulation (APC) for this indication specifically ulceration and stricture.³³

A recent prospective study examined 56 patients with radiation proctitis treated by APC. Mild disease (within 10 cm of anal verge, less than 50% surface involved) was treated successfully in the 27 patients affected. Eighty percent of patients with severe proctitis were successfully treated. Twenty-three of twenty-nine patients with severe proctitis were successfully treated. Thirty-four (90%) of patients followed for 18 months remained asymptomatic. No strictures or persistent ulcers

occurred. The authors of this study point out that they used lower power settings than some earlier studies and this may explain the lack of complications seen. Others have suggested that using a power setting of less than 45 W and treating individual telangiectasia as opposed to “painting” the mucosa may decrease complications.³⁴

Although it is tempting to simply have patients use a cleansing enema prior to treatment of isolated proctitis, several authors have noted intraluminal explosions.^{34–36} For this reason, complete bowel prep is recommended for all episodes of treatment with the APC.

Angiodysplasias

Angiodysplasia are vascular lesions that may be related to aging, renal failure, or aortic stenosis. A 1% prevalence of these lesions has been noted in screening colonoscopy.³⁷ In some populations, they are the most common cause of LGIB with a pattern of blood loss that is most commonly chronic or occult. Their gross appearance is that of a cherry red spot with radiating vessels of varying size.

Endoscopic treatment of colonic angiodysplasia has been described using monopolar cautery, bipolar cautery, heater probe, and laser. These modalities have all shown good short-term efficacy. Treatment complications are as high as 15% with laser coagulation. Recurrent bleeding and the need for additional endoscopic treatment or surgery is common by 2 years posttreatment.³⁸

For the reasons stated immediately above, argon plasma coagulation has become the most studied modality for treating this entity. Olmos et al reported on 387 angiodysplasia in 118 procedures in 100 patients treated with APC.³⁸ The noncontact technique used included a gas flow of 1.5 to 2.5 L/min, power settings of 60 W for the rectum and 40 W for right colon lesions, and applications of 0.5 to 2 seconds. Coagulation was begun peripherally and moved centrally. Twelve patients required more than one treatment session. At 2 years posttreatment 90% of the patients had not rebled. Over the course of the entire study, 15 patients at follow-up (6 to 62 months) were treatment failures, but only one required surgery. Additional angiodysplasia in the small bowel were found and treated in seven of these patients. Complications were rare and minor—fever in one patient and asymptomatic pneumoperitoneum in another. Another author has suggested saline elevation prior to APC treatment of lesion >10 mm in diameter.

Other Etiologies

Ischemic colitis and inflammatory bowel disease also may present with LGIB. Because of the diffuse nature of the bleeding associated with these diseases, endoscopic treatment of bleeding is rarely appropriate.

However, at least one case report describes APC treatment of refractory ulcerative proctitis.³⁹

I have endoscopically treated a rectal ulceration from an indwelling bowel management system in an ICU patient. A definite site of pulsatile bleeding was seen in the base of the ulceration and a combination of epinephrine injection and hemostatic clip achieved hemostasis. No recurrent bleeding occurred during the patient's hospitalization.

CONCLUSION

Colonoscopic hemostatic techniques are being used more widely and frequently for acute LGIB. These techniques appear to be safe and effective. Future prospective randomized investigation should be aimed at patient selection and determining the optimal technique to use for the various etiologies of lower gastrointestinal hemorrhage.

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