CHAPTER 21
Acute lower gastrointestinal bleeding

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KEY POINTS

1 Severe hematochezia is the most common presentation of acute lower gastrointestinal bleeding.
2 15–20% of patients hospitalized with severe hematochezia have a forgut source of the bleeding.
3 After initial resuscitation, urgent colonoscopy is the diagnostic test of choice.
4 The most common colonic cause of hemorrhage is diverticulosis, followed by internal hemorrhoids, ischemic colitis, rectal ulcers, post-polypectomy ulcers, polyps or cancer, and angiomas.
5 Therapeutic hemostasis of focal lesions includes epinephrine-saline injection, hemoclips and multipolar electrocoagulation.
6 Effective management results in improved patient outcomes such as decreased rebleeding rates as well as reduced transfusion requirements, median hospital stays and direct costs of medical care.

CAUSES OF SEVERE HEMATOCHEZIA

Colonic source
Diverticulosis
Internal hemorrhoids
Ischemic colitis
Rectal ulcers
Other colitis
Post-polypectomy ulcer
Polyp/cancer
Angiomas

UGI source
Ulcer
Varices
Angiomas

Small bowel source
Angiomas

ESSENTIALS OF DIAGNOSIS OF SEVERE HEMATOCHEZIA

- **Nasogastric lavage** to determine whether UGI bleeding is present
- If no UGI source, rapid **oral lavage** to cleanse the colon
- **Urgent colonoscopy** is the diagnostic test of choice
- If colonoscopy not diagnostic, do **anoscopy and push enteroscopy**
  If colonoscopy, anoscopy and enteroscopy are not diagnostic, then:
- **Scintigraphy** (threshold GI bleeding rate ≥0.1 mL/min)
- **Angiography** (threshold GI bleeding rate ≥0.5 mL/min)
- **Capsule endoscopy** may have a role in selected patients with recurrent hematochezia and negative diagnostic evaluation

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ESSENTIALS OF TREATMENT OF SEVERE HEMATOCHEZIA

- Initial resuscitation in a monitored care setting
- Colonoscopy to provide both diagnosis and therapeutic hemostasis of focal lesions (with epinephrine-saline injection, hemoclips, multipolar electrocoagulation), angiomas (with MPEC) and internal hemorrhoids (with band ligation)
- Angiography with transcatheter embolization
- Emergency surgery when bleeding not controlled by endoscopic hemostasis and angiography

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Introduction and epidemiology

Acute lower gastrointestinal (LGI) bleeding, defined as bleeding from a site distal to the duodenum (most commonly the colon), has an annual hospitalization rate of about 20 per 100,000 adults [1] and has been increasing substantially over the past decade. If the patient presents with severe hematochezia, clinicians cannot determine the site of the lesion clinically as foregut, midgut or colon. Even without a history of, or signs of, upper gastrointestinal (UGI) lesions, approximately 15–20% of patients hospitalized with severe hematochezia have a foregut (UGI or proximal jejunum) source of the severe hematochezia. Based upon these data, we prefer the term "severe hematochezia" instead of "acute lower GI bleeding," because the latter can confuse clinicians. In most ambulatory patients with hematochezia, the bleeding stops spontaneously (in about 80% of cases), allowing elective diagnostic evaluation. However, 10–40% of patients with colonic sources of bleeding have recurrent hemorrhage, usually within 48 hours of the initial bleed, and these patients with continued and recurrent severe hematochezia require urgent attention to minimize further bleeding and complications. Mortality rates still range between 3–5% because the incidence of LGI bleeding increases markedly in the elderly (typically >65 yrs of age) and these patients frequently have significant comorbidity [1]. A recent US study reported that the all-cause in-hospital mortality rate in LGI hemorrhage was 3.9%. The strongest predictors of mortality included advanced age, intestinal ischemia and comorbid illness [2].

What is it?

For patients who present with severe hematochezia, the diagnostic and therapeutic approach is not standardized in most medical centers. However, we have evaluated a standardized approach and found it to be effective, safe, and cost-effective. During the resuscitation of patients with severe hematochezia, we recommend nasogastric (NG) aspiration to exclude a potential UGI source. If this is negative (bile present, no blood), then a rapid oral lavage to cleanse the colon is recommended, followed by urgent colonoscopy. Urgent colonoscopy provides an accurate diagnosis and if required, an opportunity for hemostasis during the same examination. If urgent colonoscopy is not diagnostic for a bleeding site, a slotted anoscopy examination is indicated to exclude anal canal bleeding sources (such as internal hemorrhoids or anal fissures) and if that is negative, a push enteroscopy is recommended to exclude foregut lesions. This approach improves the diagnostic and therapeutic efficacy while reducing direct costs of patient care [3,4] (Figure 21.1).

Our primary criterion for proving (i.e., classifying as "definitive source") that a lesion caused the bleeding is to identify stigmata of recent hemorrhage – SRH – (such as active bleeding, non-bleeding visible vessel, an adherent clot or flat spots for colonic lesions) on a focal lesion. A lesion is classified as the "presumptive cause" of the bleeding when fresh blood is in that location (such as the colon) or a lesion is found there without stigmata and no other likely bleeding sites are identified on colonoscopy, anoscopy, and push enteroscopy. A lesion (such as diverticulosis found during the colonoscopy) is classified as "incidental" when more than one type of lesion is found, but another lesion is the bleeding site based upon stigmata of recent hemorrhage or other endoscopic evidence, such as its extent, ulceration, or number of lesions.

The most common colonic cause of hemorrhage was diverticulosis (either presumed or definitive) and other common causes were internal hemorrhoids, ischemic colitis, rectal ulcers, delayed bleeding from post-polypectomy ulcers, colon polyps or cancer, and colon angiomas or radiation telangiectasia [3]. The findings at urgent colonoscopy also permitted triage of patients. High risk patients were treated with colonoscopic hemostasis after a diagnosis of focal definitive lesions (with SRH) was made. This usually included combination therapy with dilute epinephrine injection (1:20,000 dilution in saline) and hemoclipping. Coagulation (usually with multipolar probe – MPEC) was used for some focal lesions or angioma syndromes causing bleeding. Low risk patients (without SRH and/or severe comorbidity) were allocated to less intensive and less expensive care, which often facilitated early discharge.

Causes
Diverticulosis

Diverticular bleeding is the most common colonic cause for patients hospitalized with severe hematochezia. It originates frequently (about 50%) from the right half of the colon (at or proximal to the splenic flexure). Actively bleeding colonic diverticula have been treated with epinephrine injection, multipolar probe coagulation (MPEC) and metallic clips. Reported rebleeding rates range from 7.1% to 38% in 30 days [5].

We treat active bleeding (Figure 21.2) or adherent clots (Figure 21.3) with a 1:20000 epinephrine/saline solution in
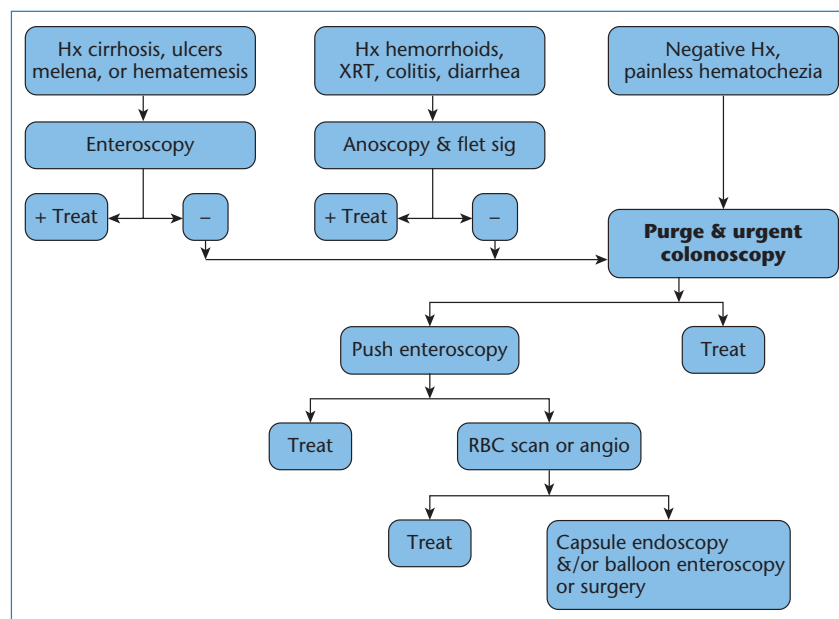

Figure 21.1 Algorithm for severe hematochezia.
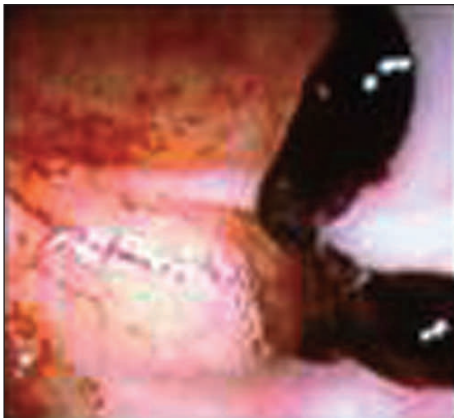
Figure 21.2 Bleeding diverticulum.

Figure 21.4 Diverticulum with non-bleeding visible vessel.

Figure 21.3 Clot on diverticulum.

Figure 21.5 Hemoclips on non-bleeding visible vessel shown in Figure 21.4.
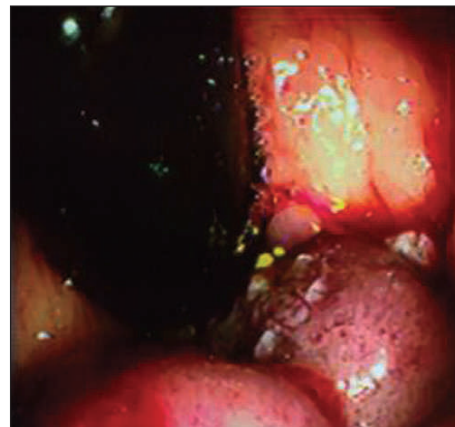
Figure 21.6 Internal hemorrhoids – post-banding.

1–2 mL aliquots [5,6]. After epinephrine injection, adherent clots can be safely guillotined off with a snare. After the bleeding stops and for non-bleeding visible vessels – NBVV – (Figure 21.4), endoclips are applied across the NBVV on either side to occlude the underlying feeding artery (Figure 21.5). This usually provides definitive hemostasis. The hemoclips may also be useful as radiologic targets for angiography if hemostasis fails or severe rebleeding occurs. We also advocate India ink labeling of the diverticulum with SRH after successful endoscopic hemostasis. This facilitates localization and follow-up of the bleeding site, endoscopic retreatment (if necessary), surgery in case of early rebleeding, and histopathologic correlation. In our series, 4.8% of patients required surgery or interventional radiology (IR) embolization.

Internal hemorrhoids

Internal hemorrhoids are the most common cause of colonic bleeding in ambulatory outpatient adults. Most internal hemorrhoid bleeding is self-limited, and manifested by bright red blood on the toilet tissue. Medical therapy consists of fiber supplementation, stool soften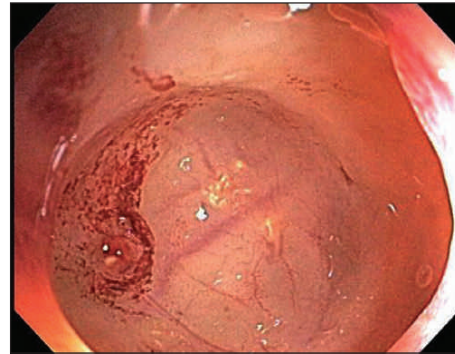ers, rectal suppositories and sitz baths. Internal hemorrhoids are also the second most common cause of severe hematochezia in patients hospitalized with presumed colonic hemorrhage (Figure 21.6) [4].

Prior to assuming that severe hematochezia is from more proximal lesions, the anal canal should always be examined by rigid slotted anoscope. If that is not diagnostic, try turnaround in the rectum with a flexible sigmoidoscope to identify internal hemorrhoids. We usually use rubberband ligation for emergency hemostasis of bleeding internal hemorrhoids (Figure 21.6) [7]. Emergency colonoscopy can be obviated in such cases, although an elective colonoscopy might still be

considered in patients at risk for concomitant polyps or color-ectal cancer. Hemorrhoidal surgery is required for patients with continued severe bleeding not responding to medical and anoscopic treatment.

Focal ulcers or colitis

Focal ulcers proximal to the sigmoid colon are an uncommon cause of severe colonic hemorrhage. In one large series, these accounted for the bleeding site in 8% of patients [8] (Table 21.1). Bleeding colonic ulcers were caused by: recent polypectomy with ulceration (Figure 21.7), inflammatory bowel disease (IBD), ischemic ulcers (Figure 21.8), or infectious colitis (such as pseudomembranous colitis or cytomegalovirus – CMV – ulcers). In our recent experience, the most common cause was delayed bleeding from a post-polypectomy-induced ulcer. The median time to severe colonic bleeding was 8 days (range 3–10) after initial polypectomy of colonic polyps (Figure 21.7). The majority of these patients resumed taking over-the-counter (OTC) aspirin, NSAIDs, anticoagulants, or gingko after

Table 21.1 Eight most common colonic sources of severe hematochezia (486 cases)[1]

Diagnosed lesion	Frequency (%)[2]
1. Diverticulosis	31.9
2. Internal hemorrhoids	12.8
3. Ischemic colitis	11.9
4. Rectal ulcers	7.6
5. Colon angiomas or radiation telangiectasia	7.0
6. Ulcerative colitis, Crohn's disease, other colitis	6.2
7. Other LGI diagnoses	5.6
8. Post-polypectomy ulcer	4.7

[1]Personal communications DM Jensen, CURE Hemostasis Research Group 2010.
[2]Expressed as percent of colorectal sources.

polypectomy, and most cases were large sessile polyps removed by piecemeal polypectomy. For patients with severe hemato-chezia after recent polypectomy, we recommend an oral purge prior to colonoscopy.

Focal, discrete colonic ulcers secondary to infection, ischemia, or IBD are much less common causes of severe colonic hemorrhage. Urgent colonoscopy usually shows a diffuse mucosal process and patients do not usually benefit from endoscopic hemostasis (Figure 21.8).

Rectal ulcers

Rectal ulcers (Figure 21.9) may be a cause of severe lower GI hemorrhage, especially in elderly or debilitated patients with constipation, who are often confined to bed. The ulcers may be either solitary or multiple, and associated with fecal impac-tion, rectal prolapse, ischemia or trauma [9].
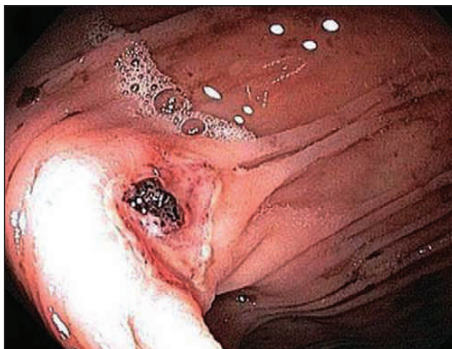
Colonic tumors

Colonic tumors, either cancer or stromal tumors, occasionally present with hematochezia and may occur anywhere in the rectum or colon. Overt bleeding suggests that the lesion has ulcerated into underlying vessels, usually an artery. Although endoscopic therapy with thermal devices, injection,

Figure 21.8 Ischemic colitis.

Figure 21.7 Clot on post-polypectomy ulcer.
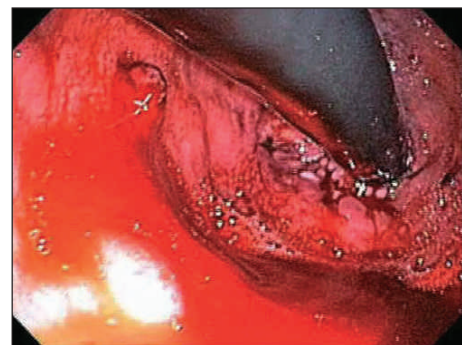
Figure 21.9 Rectal ulcer – bleeding visible vessel.

Figure 21.10 Ascending colon large angioma.

or a combination of both usually produces temporary hemostasis, surgical resection is the best long-term treatment [4,8].
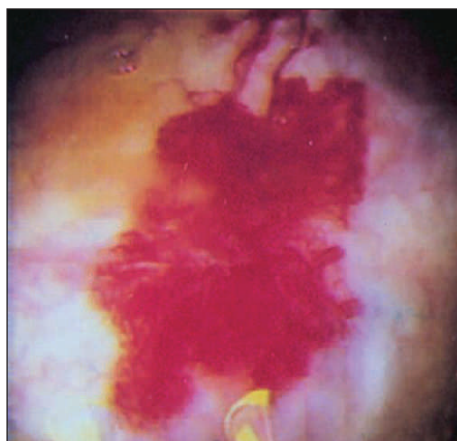
Colonic angiodysplasia

Bleeding colonic angiodysplasias most often occur in the right colon and are usually multiple or diffuse (Figure 21.10). They may be associated with advanced age and medical conditions such as chronic renal insufficiency, cirrhosis, valvular heart disease, and collagen vascular disorders. Bleeding from angiodysplasia is usually mild to moderate and is self-limited. Such bleeding is usually intermittent and usually presents with slow GI bleeding and chronic iron deficiency anemia. The main risk of endoscopic coagulation of angiodysplasia is severe, delayed bleeding and post-coagulation syndrome [10]. Perforations have been reported more often than with MPEC for hot biopsy forceps, monopolar electrocoagulation, Nd-YAG laser, or argon plasma coagulator (APC) hemostasis of right colon angiodysplasia. This relates to deeper coagulation and the potential for transmural coagulation with these non-MPEC thermal devices.

Radiation telangiectasia

Radiation telangiectasia can occasionally cause severe hematochezia, although these are most often associated with mild to moderate chronic rectal bleeding. Chronic radiation injury develops 6 to 18 months after radiation therapy for prostatic, gynecologic, rectal or bladder tumors. The radiation damage is caused by altered vascularity and ensuing mucosal ischemia. Rectal telangiectasia and friability are the endoscopic features of radiation proctitis. Endoscopic hemostasis with thermal treatment has been effective and safe for patients with chronic or recurrent acute bleeding despite medical therapies [10].

General measures and diagnosis

Risk factors including abnormal vital signs 1 hour after initial medical assessment (suggesting hemodynamic instability),

gross blood on initial rectal examination, (suggesting continued bleeding), initial hematocrit ≤35%, and significant comorbidity were reported to be independent predictors of severe lower GI bleeding and adverse outcomes [11,12]. Patients with these high-risk factors should have urgent diagnosis and receive focused therapy with the aim of improving outcomes.

The first concern in patients with persistent, severe hematochezia should be to start aggressive resuscitative measures in a monitored care setting [8]. A consultation with a general or GI surgeon should be obtained at an early stage to follow the patients and to consider emergency surgery, in case bleeding cannot be controlled medically, endoscopically, or angiographically. Subsequently, an orogastric or nasogastric tube is recommended to determine whether evidence of UGI bleeding (coffee grounds, blood clots) is present. If there is bile without blood or coffee grounds in the nasogastric aspirate, a lesion proximal to the ligament of Treitz is unlikely when ongoing hematochezia is documented. In patients with severe hematochezia, return of clear fluid without bile should not be considered a negative NG aspirate. Since continuity has not been established between the NG tube in the stomach and the duodenum, the patient may have a duodenal ulcer or other duodenal lesions.

Colonoscopy

Prior to preparation for emergency colonoscopy, tap water enemas are recommended to clear the distal colon and permit examination of the rectosigmoid colon and anal canal with anoscopy followed by flexible sigmoidoscopy with retroflexion in the rectum in selected patients (Figure 21.1). This is particularly indicated in patients with a history of bleeding internal hemorrhoids, anorectal disease, or distal colitis. A rigid sigmoidoscopy is not adequate because there may be lesions in the blind area of the rectum. However, with flexible sigmoidoscopy, an examination of the sigmoid and descending colon and retroflexed view of the distal colon lesions, are all feasible.

If no evidence of UGI bleeding is found and the flexible sigmoidoscopy and anoscopy do not reveal a rectosigmoid source of hemorrhage, cleansing the colon with an oral purge is recommended, followed by urgent colonoscopy in the monitored bed area or ICU when the colon is clear of stool and clots by the purge. Urgent colonoscopy is a safe diagnostic test, which also provides potential therapeutic intervention. Several factors determine the "yield" including timing of colonoscopy, thoroughness of colonic preparation, and definition of what is the source of bleeding.

A randomized controlled trial of urgent colonoscopy versus standard care (tagged red blood cell scan, followed by angiography, if positive, with elective colonoscopy) showed a significant diagnostic advantage in finding a definitive bleeding site for urgent colonoscopy but failed to reveal any other statistically significant benefit in other important outcomes [13].

Subsequently, several trials have demonstrated that urgent colonoscopy does benefit outcomes such as hospital stay and direct costs [3]. In a retrospective study comparing early colonoscopy to angiography for severe lower intestinal hemorrhage, the likelihood of post-polypectomy bleeding, and logistical factors such as admission on a weekday or late in the day, predicted early colonoscopy, while signs and symptoms of severe bleeding predicted angiography use [14].

Should the colonoscopy, anoscopy and push enteroscopy not be diagnostic, then scintigraphy and angiography are warranted in patients with recurrent hematochezia. For those patients who stop bleeding or present with less severe bleeding, colonoscopy within 24 hours of presentation should still be considered the initial diagnostic and therapeutic procedure of choice (Table 21.1).

Scintigraphy

The threshold rate of GI bleeding for localization with radioisotope scanning is about 0.1 mL/min or more. Scintigraphy may be particularly useful for identification of small bowel or colonic bleeding sites that are actively bleeding and at least moderately severe [3]. Two different types of scintigrams are available: (a) sulfur colloid with technetium and (b) autologous red blood cells (RBCs) tagged with technetium. Sulfur colloid is rapidly cleared from the circulation after intravenous (IV) injection but tagged RBCs stay in the vascular space for about 24 hours. Technetium-tagged RBC scans are more commonly used than sulfur colloid scans. Injection of labeled RBCs and early scanning (at least 30 minutes, 60 minutes, and 4 hours) is recommended to identify and localize actively bleeding sites. Since specific localization and etiologic diagnosis are not possible with RBC scanning, confirmatory examinations such as angiography and/or endoscopy or enteroscopy are recommended prior to surgical exploration. Delayed scans (12 to 24 hours) are not reliable for localization in the gut, particularly as a guide for surgical exploration, because blood in the gut (with the radionucleotide) moves between scans and localization on delayed scans can be misleading.

Angiography, magnetic resonance imaging (MRI), computed tomography (CT) and barium X-rays

If the rate of ongoing arterial bleeding is at least 0.5 mL/min, selective visceral angiography may show extravasation of contrast into the lumen to identify a bleeding site [8]. Emergency visceral angiography can be useful for diagnosis and treatment of colonic, small bowel, or UGI lesions.

If extravasation of contrast into the gut lumen was identified, angiographic therapy was often effective, with relatively low rebleeding (20%) and ischemic complication (10%) rates [15]. However, in one study, 65% of patients with LGI hemorrhage who had failed endoscopic therapy had a negative angiographic study [15]; only 47% of patients with LGI bleeding

had angiography showing a source of hemorrhage; and 57% of patients continued to bleed after angiography.

Major advancements in radiology, such as helical computed tomography (CT) or magnetic resonance imaging (MRI) angiography, are being used in some centers instead of standard visceral angiography in the diagnosis of patients with severe hematochezia.

Barium studies (barium enema or small bowel follow-through) have no role in the emergency assessment of severe hematochezia since they cannot demonstrate active bleeding or SRH. Barium also takes several days to clear the colon or small bowel and this interferes with subsequent evaluation or treatment by colonoscopy, angiography, or surgery.

Small bowel evaluation

As an emergency examination, a small bowel evaluation with push enteroscopy is indicated for those patients with negative colonoscopy and upper endoscopy. Standard push enteroscopy provides examination of the proximal 60–80 cm of the jejunum [8]. Capsule endoscopy may have a role in selected patients with recurrent hematochezia, and when no diagnosis or localization has been made by urgent colonoscopy, anoscopy, push enteroscopy, or RBC scanning. Deep enteroscopy is now possible with newer techniques such as balloon enteroscopy or overtubes. This may be indicated in selected patients with small bowel lesions, documented or suspected after positive RBC scan or capsule endoscopy.

Emergency surgery

Emergency surgery should be considered for patients with: (1) hypotension or shock, despite resuscitative efforts; (2) continued bleeding with transfusion of six or more units of blood and no diagnosis by emergency endoscopy (push enteroscopy, colonoscopy, and anoscopy); and (3) when severe active bleeding cannot be controlled by colonoscopy or angiography. Segmental resection after the bleeding site has been identified is the definitive treatment with mortality rates of about 7%. "Blind" segmental resection or subtotal colectomy is associated with much higher mortality rates, ranging from 25–57%.

Summary

Severe hematochezia remains a challenging medical, surgical, and interventional radiology problem. There are at present insufficient prognostic criteria to identify patients with severe hematochezia; we would need better clinical prognostic criteria to predict who is at high and low risk of recurrent bleeding. For patients whose bleeding persists, identification of the cause and localization of the bleeding are essential for patient management. Urgent colonoscopy should be performed by experienced endoscopists skilled in the recognition of stigmata of hemorrhage and use of hemostasis techniques in the colon. With this approach, patients can be effectively managed with

decreased rebleeding rates as well as reduced transfusion requirements, median hospital stays, and direct costs of medical care.

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