

Practice guidelines

Management of the Adult Patient With Acute Lower Gastrointestinal Bleeding

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I. PREAMBLE

Guidelines for clinical practice are intended to suggest preferable approaches to particular medical problems as established by interpretation and collation of scientifically valid research, derived from extensive review of published literature. When data are not available that will withstand objective scrutiny, a recommendation may be made based on a consensus of experts. Guidelines are intended to apply to the clinical situation for all physicians without regard to specialty. Guidelines are intended to be flexible, not necessarily indicating the only acceptable approach, and should be distinguished from standards of care that are inflexible and rarely violated. Given the wide range of choices in any health care problem, the physician should select the course best suited to the individual patient and the clinical situation presented.

These guidelines are developed under the auspices of the American College of Gastroenterology and its Practice Parameters Committee. These guidelines are also approved by the governing boards of the American Gastroenterological Association and the American Society for Gastrointestinal Endoscopy. Expert opinion is solicited from the outset for the document. Guidelines are reviewed in depth by the Committee, with participation from experienced clinicians and others in related fields. The final recommendations are based on the data available at the time of the production of the document and may be updated with pertinent scientific developments at a later time.

II. DEFINITIONS

In most review articles on this topic, acute lower gastrointestinal bleeding refers to:

1. blood loss from the gastrointestinal tract of recent onset

2. emanating from a location distal to the ligament of Treitz
3. resulting in instability of vital signs, anemia, and/or need for blood transfusion

This definition is not useful for the purpose of a practice guideline. The source of acute gastrointestinal bleeding is not always apparent from initial history and physical examination. The acute onset of hematochezia is the most common clinical presentation of acute lower gastrointestinal bleeding, necessitating hospitalization and immediate evaluation and management. This guideline will focus on the evaluation of hematochezia associated with instability of vital signs, anemia, and/or need for blood transfusion. The limitations in this definition are recognized, as the source of bleeding in a subset of patients with hematochezia will be from the upper gastrointestinal tract, and melena in some patients will be due to a source distal to the ligament of Treitz.

This guideline is *not* intended for patients presenting with stool that is positive for occult blood, chronic bleeding of obscure origin, or obvious self-limited bleeding where the likelihood of a change in vital signs or anemia is low (*e.g.*, anal outlet bleeding). An algorithm outlining the approach to the adult patient with acute lower gastrointestinal bleeding is presented in Figure 1.

III. INITIAL EVALUATION

A focused history and physical examination is essential in the initial evaluation of the patient with acute lower gastrointestinal bleeding. Initial laboratory testing should include measurement of complete blood count, electrolytes, type and crossmatch, and coagulation profile.

Historical points to be recorded include:

- the nature and duration of bleeding, including stool color and frequency
- associated symptoms, including abdominal pain, recent

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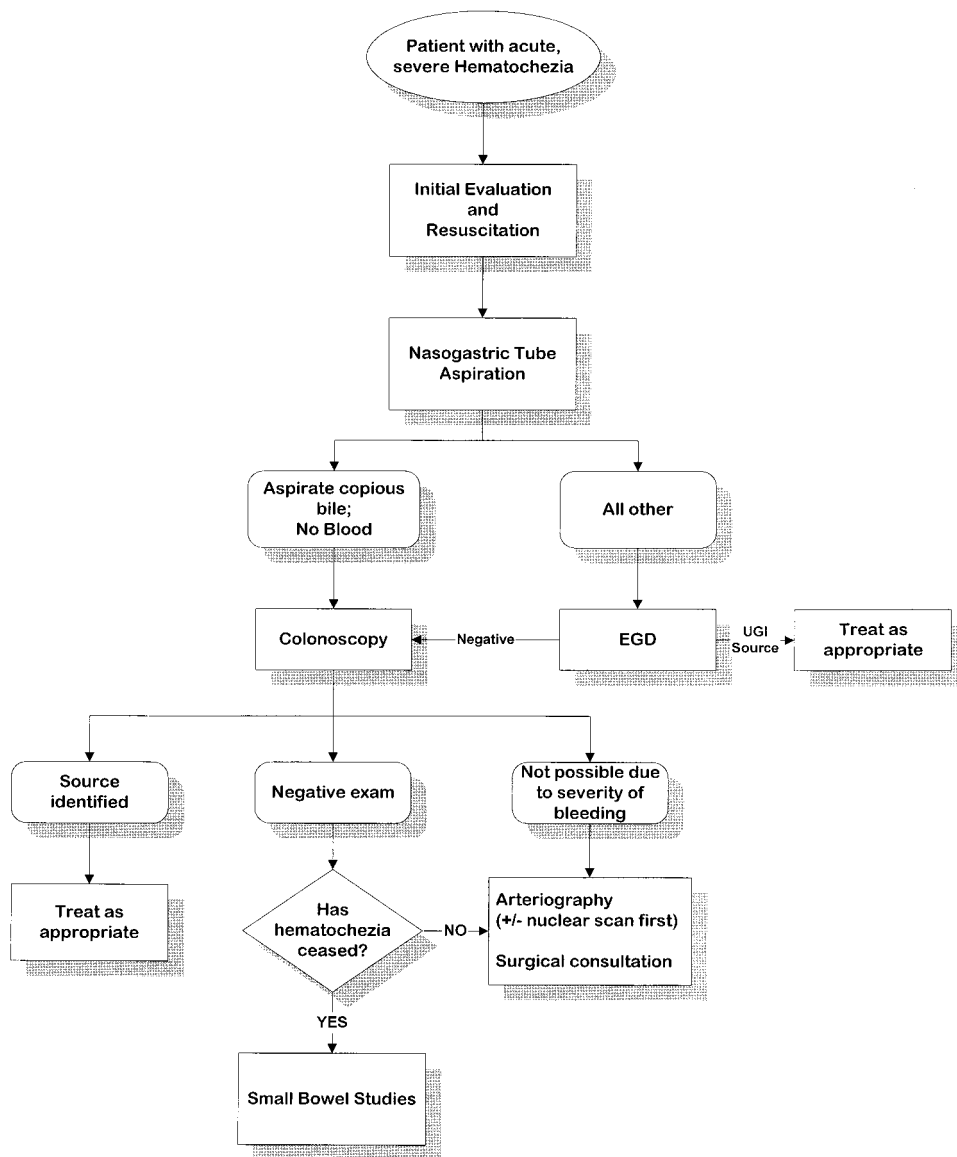


FIG. 1. Algorithm for lower GI bleeding.

change in bowel habits, fever, urgency/tenesmus, weight loss

- relevant past history, including previous bleeding episodes, trauma, past abdominal surgeries, previous peptic ulcer disease, history of inflammatory bowel disease, history of radiation therapy to the abdomen and pelvis, and prior history of major organ dysfunction (including cardiopulmonary, renal, and liver disease)
- current/recent medications (including NSAIDs, aspirin, and anticoagulants), and allergies.
- presence or absence of chest pain/palpitations, dyspnea at rest or on exertion, lightheadedness, or postural symptoms.

Physical examination should include (at a minimum):

- immediate recording of vital signs with postural changes. A drop of >10 mm Hg or an increase of >10

beats/min in pulse is indicative of acute blood loss of >800 ml (15% of total circulatory blood volume). Marked tachycardia and tachypnea, associated with hypotension and depressed mental status is indicative of a blood loss of >1500 ml (30% circulatory blood volume) (1, 2).

- cardiopulmonary, abdominal and digital rectal examination.

Initial laboratory studies should include:

- measurement of complete blood count; it should be remembered that initial hemoglobin/hematocrit value may not reflect the degree of blood loss due to volume contraction, and may fall significantly after hydration.
- serum electrolytes, blood urea nitrogen, and creatinine. In upper gastrointestinal bleeding, the serum blood urea nitrogen may rise without a commensurate rise in se-

TABLE 1
Lesions Frequently Encountered in Evaluation of Hematochezia

Lesion	Frequency (From Ref 8, 9)*	Comments
Diverticular disease	17–40%	<ul style="list-style-type: none"> ● Stops spontaneously in 80% of patients ● In one series, surgery was unlikely if <4 U red cell transfusion given in 24 h, but required in 60% of patients receiving >4 U in 24 h (10)
Colonic vascular ectasia	2–30%	<ul style="list-style-type: none"> ● Frequency of these lesions vary widely in clinical series ● Acute bleeding appears to be more frequently due to lesion in proximal colon (9)
Colitis (ischemia, infectious, inflammatory bowel disease, radiation proctopathy)	9–21%	<ul style="list-style-type: none"> ● Ischemic colitis often presents with abdominal pain and self-limited hematochezia. Colitis is segmental, most often affecting splenic flexure (11) ● Bloody diarrhea is most frequent symptom of infectious colitis and inflammatory bowel disease of the colon
Colonic neoplasia/post-polypectomy bleeding	11–14%	<ul style="list-style-type: none"> ● Postpolypectomy bleeding is frequency self-limited, and may occur ≤14 days after polypectomy (12)
Anorectal causes (including hemorrhoids, rectal varices)	4–10%	<ul style="list-style-type: none"> ● Anoscopy/proctoscopy should be included in the initial evaluation of these patients
Upper gastrointestinal sites (including duodenal/gastric ulcer, varices)	0–11%	<ul style="list-style-type: none"> ● A negative nasogastric aspirate does not exclude this possibility (see text)
Small bowel sites, including Crohn's ileitis, vascular ectasia, Meckel's diverticula, tumors	2–9%	<ul style="list-style-type: none"> ● Frequency diagnosed by radiologic studies or enteroscopy after the acute bleeding episode has resolved

* Two recent (1997) comprehensive reviews on this topic.

rum creatinine. This appears to be due to absorption of proteins from blood in the gastrointestinal tract, and from dehydration (3–5). However, the absence of a rise in blood urea nitrogen does not rule out an upper gastrointestinal source.

- coagulation profile (PT/PTT), particularly if there is any history of liver disease or if the patient has been taking anticoagulant medication
- type and crossmatch
- electrocardiogram for patients >50 yr of age, younger patients with risk factors for coronary artery disease or history of dysrhythmia, or patients with chest pain/palpitations associated with the bleeding episode

Resuscitative measures and an appropriate level of patient monitoring must be established before diagnostic testing or specific therapeutic intervention. Intensive monitoring and care is appropriate for the patient with instability of vital signs not responding to initial resuscitative measures. Initial admission to an intensive care unit is also appropriate for the patient at risk for complications from comorbid illness.

The goal of resuscitation is the restoration of euvolemia and resultant stability in vital signs. Resuscitative measures include initial fluid administration *via* large bore intravenous catheters. The amount of transfusion of red blood cells and blood products must be individualized. There are potential adverse effects of blood transfusion; the goal of transfusion should be to minimize the risk of complications due to red blood cell loss and/or correction of coagulopathy, and not to transfuse to an arbitrary level of hemoglobin/hematocrit.

The treating physician must consider several factors when

determining the immediate disposition of the patient (*i.e.*, admission to intensive care unit, monitored bed, regular hospital bed, clinical decision unit, or outpatient management). Kollef *et al.* stratified patients with acute upper or lower gastrointestinal bleeding into low risk and high risk for adverse outcomes during the hospitalization. Among the characteristics of the group at high risk for adverse outcomes were: a greater prevalence of comorbid illness (renal, hepatic, pulmonary, hematological, neurological, or cardiac), a lower serum albumin, a higher prothrombin time, and a higher serum bilirubin (6). Admission to the intensive care unit or other monitored setting is appropriate for those individuals not responding to initial resuscitation measures (*i.e.*, persistent hypotension/tachycardia and need for transfusion). Thibault *et al.* reported on a total of 2693 consecutive patients admitted to an intensive care unit. Four percent of admissions were for gastrointestinal hemorrhage. Patients remained in the intensive care unit for an average of 3 days, and in the hospital an average of 15 days. In hospital mortality for this group was 15%. The authors stress the role of the intensive care unit not only for the patient requiring acute intervention, but for monitoring and the early detection of clinical deterioration (7). Initial monitoring in an intensive setting is reasonable for the patient with significant comorbid illness, even if vital signs have stabilized with initial resuscitation.

IV. DETERMINATION OF THE SOURCE OF BLEEDING

Some of the common etiologies for acute gastrointestinal bleeding with hematochezia are listed in Table 1. In most

TABLE 2
Colonoscopy in the Evaluation of Lower GI Bleeding

Series	No. of Patients	Average Age	Colonic Purge	Diagnostic Yield (%)	Most Common Bleeding Lesion
Rossini (16)	409	NR	No	76	Ulcerated cancer
Jensen (13)	80	65	Yes	74	Vascular ectasia
Caos (17)	35	NR	Yes	69	Diverticular disease
Forde (18)	25	NR	No	80	Diverticular disease

NR = not reported.

clinical series, the majority of patients presenting with hematochezia are >60 yr. Whereas the recommendations for structural evaluation below can be applied to most clinical situations, there are circumstances in which it is appropriate to alter the order of tests to focus on a highly likely cause for bleeding. For example, for the patient in the third or fourth decade of life presenting with maroon colored stool, evaluation for a Meckel's diverticulum might be performed very early in the structural evaluation. A patient with hematochezia who had undergone colonoscopy and removal of a sigmoid colon polyp 3 days previously may require no structural evaluation if bleeding stops spontaneously.

In the patient with hematochezia, an upper gastrointestinal bleeding source must be considered. A nasogastric aspirate showing copious amounts of bile and negative for blood makes an upper gastrointestinal source unlikely. Upper gastrointestinal endoscopy should be performed if the results of nasogastric aspiration shows evidence of upper gastrointestinal bleeding, or is negative for blood and bile.

Patients with hematochezia most frequently bleed from a colonic source. However, when bleeding is brisk, an upper gastrointestinal source of bleeding may present as hematochezia. In a clinical series by Jensen and Machicado, 11% of patients initially suspected of having lower gastrointestinal bleeding actually had an upper gastrointestinal source (13). Placement of a nasogastric tube should be performed in patients with hematochezia. The presence of a bloody aspirate confirms the presence of upper gastrointestinal bleeding. The absence of blood does not rule out upper gastrointestinal bleeding, as blood from a duodenal source may not reflux into the stomach. Luk *et al.* found that nasogastric aspiration was 98% accurate in detection of bleeding duodenal ulcers (14). Cuellar *et al.* performed nasogastric aspiration just before endoscopy in 62 patients with apparent upper gastrointestinal hemorrhage. One of 18 patients (6%) with a nonbloody, yellow-green aspirate had a duodenal ulcer at endoscopy (15). In the aforementioned series from Jensen and Machicado, nasogastric aspiration was diagnostic in the patients with upper gastrointestinal bleeding (13). Upper gastrointestinal endoscopy should be performed if the results of nasogastric aspiration shows evidence of upper gastrointestinal bleeding, or is negative for blood and bile. Particularly in the setting of hematochezia leading to hemodynamic compromise, it is reasonable to

perform upper endoscopy as the initial endoscopic evaluation unless a copious amount of nonbloody bile is recovered from the nasogastric tube while the patient is actively passing red blood per rectum.

Endoscopy (colonoscopy or sigmoidoscopy) is the test of choice for the structural evaluation of lower gastrointestinal bleeding. Arteriography should be reserved for those patients with massive, ongoing bleeding when endoscopy is not feasible, or with persistent/recurrent hematochezia when colonoscopy has not revealed a source. There is no role for barium enema in the evaluation of acute, severe hematochezia.

The results of the largest clinical series using colonoscopy in the evaluation of acute lower gastrointestinal bleeding are summarized in Table 2. The overall yield of colonoscopy ranged from 69–80% (13, 16–18). The standard method of evaluation in these series was to perform anoscopy or retroflexed view of the distal rectum to exclude an anorectal bleeding source, then proceeding proximally until the lesion responsible for bleeding was encountered. In the largest clinical series by Rossini *et al.*, total colonoscopy was necessary in only 133 of 409 cases (33%); a bleeding lesion distal to the cecum was encountered in the other cases. The most common site of bleeding was the left colon, and the most commonly encountered lesions were ulcerated carcinomas and diverticular disease (16). It must be remembered that visualization of a nonbleeding *potential* bleeding site (*e.g.*, nonbleeding hemorrhoids or diverticulum) does *not* exclude the presence of more proximal pathology.

Colonoscopy is generally safe in the setting of acute lower gastrointestinal bleeding, as long as the patient has been sufficiently resuscitated before the procedure. Of the 549 colonoscopic examinations summarized in Table 2, only one endoscopic complication (perforation of a diverticulum) was reported. In two of these four clinical series, a colonic purge was administered before endoscopic examination; in the other two series, colonoscopy was performed without prior preparation. The colonic purge used in these clinical series was polyethylene glycol solution over ≥ 2 h, until the effluent was clear. A nasogastric tube can be used to administer this solution if the patient is unable to tolerate it by mouth. There are no data to suggest that a colonic purge will reactivate or increase the rate of bleeding. There are no studies indicating the exact optimum timing of

TABLE 3
Arteriography in the Evaluation of Lower GI Bleeding

Series	Number of Patients	Average Age	Diagnostic Yield (%)	Complication Rate (%)	Most Common Bleeding Lesion
Colacchio (24)	98	64	41	4	Diverticular disease
Leitman (25)	68	63	40	NR	Diverticular disease
Koval (26)	63	58	78	2	Vascular ectasia
Browder (27)	50	67	72	NR	Diverticular disease
Britt (28)	40	64	58	NR	Diverticular disease

NR = not reported.

colonoscopy in the setting of acute hematochezia. In those patients who have bled and apparently stopped, it is reasonable to administer the prep and perform the examination on an elective or semielective basis. For those patients with continued hematochezia, the examination should be performed as soon as possible.

Endoscopic therapy includes the use of thermal coagulation (including heater probe, bipolar/multipolar coagulation, and laser therapy), and injection of vasoconstrictors and/or sclerosants. All of these methods appear effective in controlling bleeding. In the absence of comparative studies, no specific recommendations can be offered as to which endoscopic treatment method is preferable. Laser therapy is the least practical, as these examinations are frequently performed at the patient's bedside, making the Nd-YAG laser unavailable. In addition, complications of treatment of vascular ectasia with Nd-YAG laser may be more frequent than with other methods of therapy; Rutgeerts *et al.* reported a 10% complication rate in their series (19). Endoscopic treatment can clearly be provided for vascular lesions, bleeding from polypectomy sites, and some colonic ulcers (20–23). Recently techniques of coagulation of arteries within bleeding diverticula have been described (23).

Arteriography may also be performed in the patient with acute lower gastrointestinal hemorrhage. The results of the largest clinical series using arteriography in the evaluation of acute lower gastrointestinal bleeding are summarized in Table 3. The overall yield of arteriography was 40–78% (24–28). When a source of active bleeding is identified, surgery may be performed, or arteriographic techniques to provide hemostasis (including injection of intraarterial vasopressin, or superselective embolization with materials such as gelatins or oxidized cellulose) employed. Gomes *et al.* compared vasopressin to embolization with gelatin-sponge particles in patients with active bleeding, and found initial success rates of approximately 70% in both categories. Four of 16 patients treated with vasopressin rebled during or after the infusion (29). Guy *et al.* report a success rate of 90% in controlling acute bleeding with use of superselective embolization with polyvinyl alcohol particles (30).

As noted in Table 3, the reported complication rate for diagnostic arteriography in acute gastrointestinal bleeding is approximately 2–4%. Potential complications of this tech-

nique include contrast allergy, contrast induced renal failure, bleeding from arterial puncture, or embolism from dislodged thrombus. There are additional potential complications of arteriographic therapy for acute bleeding. In the previously mentioned series from Gomes *et al.*, complications of vasopressin occurred in eight of 23 patients (35%), and in four of 24 (17%) of patients treated with embolization. Many of these complications were minor and self-limited, but major complications included gangrene of the toes in one patient, infarction of bowel in one patient, and formation of a duodenocolic fistula in one patient (29). Myocardial ischemia is another potential side effect of intraarterial vasopressin infusion. Given the overall lower diagnostic yield of arteriography compared with colonoscopy, the need to transport the patient to the radiology suite, and the apparently larger complication rate of arteriography compared with colonoscopy, it is reasonable to recommend colonoscopy over arteriography as the test of choice for structural evaluation of the patient with acute lower gastrointestinal bleeding. Arteriography should be reserved for those patients with massive, ongoing bleeding where endoscopy is not feasible, or with persistent/recurrent hematochezia where colonoscopy has not revealed a source.

There are a variety of nuclear medicine scans that can be used for the evaluation of the patient with gastrointestinal bleeding. A commonly utilized scan currently is the ^{99m}Tc-pertechnetate labeled RBC scan. Although during arteriography the rate of bleeding necessary to detect extravasation into the bowel from the bleeding site is estimated to be 1–1.5 ml/min, bleeding rates as low as 0.1 to 0.4 ml/min are reportedly detectable with this technique (31). In a number of clinical series, the likelihood of a positive scan performed in the evaluation of acute lower gastrointestinal bleeding ranges from 26% to 72% (32–37). There is considerable discrepancy in the literature with respect to the accuracy of a positive scan in detecting the true anatomic site of bleeding. Suzman *et al.* found that of 37 patients undergoing surgery for persistent lower gastrointestinal bleeding with a positive nuclear medicine scan preoperatively, 36/37 (97%) bleeding sites were accurately localized by the scan (32). However, Hunter and Pezim found a localization error of 25% in patients undergoing technetium 99m-labeled red cell scans in the evaluation of lower gastrointestinal bleeding (37). Given the overall lower diagnostic yield of nuclear

medicine scanning compared with colonoscopy, the need to transport the patient to the radiology suite, and the possible inaccurate localization of the site of bleeding, it is reasonable to recommend colonoscopy over nuclear medicine scanning as the test of choice for structural evaluation of the patient with acute lower gastrointestinal bleeding. One possible role for this technique is as a screening test immediately before arteriography, as patients with a negative bleeding scan will generally have a negative arteriogram at that point in time (37). However, a potential limitation to this approach is that in the time required to perform the nuclear medicine scan, the patient may stop actively bleeding, eliminating the opportunity for arteriography to have definitively localized the bleeding source. No randomized trials compare the efficacy of arteriography alone to arteriography preceded by nuclear medicine scanning in the patient with active lower gastrointestinal bleeding.

Patients with persistent or recurrent lower gastrointestinal bleeding may require surgery. Accurate presurgical localization of the bleeding site improves postoperative morbidity and mortality.

In a review by McGuire, 82 of 108 episodes (76%) of acute lower gastrointestinal bleeding due to diverticular disease stopped spontaneously. Virtually all patients requiring <4 U of blood transfusion in a 24-h period spontaneously stopped bleeding. However, for patients requiring >4 U of blood in that time period, the likelihood of surgery was 60%. In those patients in whom the bleeding site was identified preoperatively, only 4% of patients subsequently experienced recurrent bleeding from another colonic diverticulum. However, in seven patients without preoperative localization undergoing colectomy and ileoproctostomy, four developed anastomotic leaks, with a mortality of 29% (10). Other series have noted significant morbidity and mortality with subtotal "blind" colectomy for treatment of massive bleeding where preoperative localization of the bleeding site was unsuccessful (38, 39). Uden *et al.* also found that preoperative studies localizing the site of colonic bleeding allowed limited resection, with reduced mortality (40). Use of endoscopic and radiologic studies in an attempt to localize the site of bleeding should be performed in all cases of lower gastrointestinal bleeding, with the very rare exception of exsanguinating colonic bleeding, where immediate surgery (and usually subtotal colectomy) must be performed.

In cases of lower gastrointestinal bleeding where no plausible colonic source is identified, evaluation of the small bowel may be necessary. Evaluation for a Meckel's diverticulum should be performed in younger patients with acute lower gastrointestinal bleeding. Enteroscopy and small bowel radiography may also be performed in the patient in whom active bleeding has ceased.

There are circumstances in which an upper gastrointestinal source of bleeding has been ruled out, and colonoscopy

reveals no plausible source of bleeding from the colon. A small bowel bleeding source should be sought. Further evaluation depends upon the clinical situation. In circumstances of continued or recurrent hematochezia, arteriography (with or without antecedent nuclear medicine scanning) may localize the bleeding site. In some circumstances in which bleeding is ongoing and the aforementioned studies are negative, laparotomy and intraoperative endoscopy may be indicated.

In circumstances where hematochezia has ceased and vital signs have clearly stabilized, other structural studies of the small intestine may be undertaken. Endoscopic evaluation of the small intestine is frequently accomplished with "push" enteroscopy, where a long colonoscope or dedicated endoscope (insertion tube length 160–300 cm) is advanced per os into the small intestine. Push enteroscopy confers the advantage of biopsy of mass lesions or therapy for bleeding. In a clinical series by Foutch *et al.*, 38% of patients with *obscure* bleeding had a lesion identified in the distal duodenum or proximal jejunum on push enteroscopy. Vascular ectasias were most common (41). There are no data on the use of this technique in the evaluation of acute, hemodynamically significant lower gastrointestinal bleeding. Sonde enteroscopy involves passive migration of a small diameter endoscope through the small intestine; examination occurs as the endoscope is withdrawn. A sonde endoscope may migrate further into the small intestine; however, this technique offers a limited view of the luminal surface due to a lack of tip deflection, and no therapy or biopsy can be performed. Again, most clinical experience with this technique is for the evaluation of *obscure* bleeding.

Meckel's diverticulum should always be considered in younger patients with lower gastrointestinal bleeding. The reported sensitivity and specificity rates for nuclear medicine scanning for Meckel's diverticulum are 85% and 95% respectively (42–44). These lesions, as well as some other structural lesions of the small intestine including mass lesions, ulcers, and Crohn's disease, may be detected by barium contrast studies of the small intestine. The literature suggests that small bowel enema techniques (enteroclysis) may have an increased diagnostic yield over standard small bowel follow-through series (45, 46).

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