American College of Radiology
ACR Appropriateness Criteria®

Clinical Condition: **Radiologic Management of Lower Gastrointestinal Tract Bleeding**

Variant 1: **Lower GI tract bleeding. Active bleeding with hematochezia or melena in a hemodynamically stable patient. Next procedure/intervention.**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	5	In the hemodynamically stable patient, colonoscopy is usually preferred as the first step; if there is active bleeding, TAI would be more likely to be beneficial.
Diagnostic/therapeutic colonoscopy	8	Upper endoscopy should also be considered in patients with brisk bleeding.
Surgery	3	
Tc-99m RBC scan abdomen and pelvis	7	Use of CTA versus nuclear study varies with institutional expertise.
CTA abdomen with contrast	7	Use of CTA versus nuclear study varies with institutional expertise.
MRI abdomen without and with contrast	2	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Variant 2: **Lower GI tract bleeding. Active bleeding in a hemodynamically unstable patient or a patient who has required more than 5 units of blood. Next procedure/intervention.**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	8	
Diagnostic/therapeutic colonoscopy	4	Challenging in an unstable patient.
Surgery	5	Particularly appropriate if pathology is known. Likely best alternative if interventional radiology is not an option.
Tc-99m RBC scan abdomen and pelvis	1	
CTA abdomen with contrast	5	Most appropriate if pathology is unknown. May be used to define pathology causing the bleeding.
MRI abdomen without and with contrast	1	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Clinical Condition: **Radiologic Management of Lower Gastrointestinal Tract Bleeding**

Variant 3: **Lower GI tract bleeding. Colonoscopy localized the bleeding site and treatment was attempted. Ongoing or recurrent bleeding. Next procedure/intervention.**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	8	Depends on the type of lesion.
Diagnostic/therapeutic colonoscopy	4	Depends on the type of lesion, but if therapy has failed, repeat colonoscopy may not be beneficial.
Surgery	7	Depends on the type of lesion.
Tc-99m RBC scan abdomen and pelvis	2	
CTA abdomen with contrast	3	May be helpful for further anatomic delineation.
MRI abdomen without and with contrast	2	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Variant 4: **Lower GI tract bleeding. Intermittent or obscure nonlocalized recurrent bleeding. Next procedure/intervention (assumes prior negative endoscopy).**

Treatment/Procedure	Rating	Comments
Transcatheter arteriography/intervention (TAI)	4	Limited evidence for provocative angiography. Should only be done by expert team with experience in the technique.
Diagnostic/therapeutic colonoscopy	5	The utility of repeat colonoscopy depends largely on the character of bleeding and on the quality of the initial colonoscopy.
Surgery	3	
Tc-99m RBC scan abdomen and pelvis	7	
CTA abdomen with contrast	8	
MRI abdomen without and with contrast	2	
Capsule endoscopy	8	
Contrast small bowel radiography	2	Small-bowel follow-through is rarely helpful; enteroclysis requires an experienced provider.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Expert Panel on Interventional Radiology: Michael D. Darcy, MD[1]; Charles E. Ray, Jr, MD, PhD[2]; Jonathan M. Lorenz, MD[3]; Charles T. Burke, MD[4]; Nicholas Fidelman, MD[5]; Frederick L. Greene, MD[6]; Eric J. Hohenwalter, MD[7]; Thomas B. Kinney, MD[8]; Kenneth J. Kolbeck, MD[9]; Jon K. Kostelic, MD[10]; Brian E. Kouri, MD[11]; Ajit V. Nair, MD[12]; Charles A. Owens, MD[13]; Paul J. Rochon, MD[14]; Don C. Rockey, MD[15]; George Vatakencherry, MD.[16]

Summary of Literature Review

Introduction/Background

Acute gastrointestinal (GI) tract bleeding remains a major cause of morbidity and mortality despite advances in management. The mortality rate is around 10%, but increases to up to 40% in cases of massive bleeding associated with hemodynamic instability or the requirement for transfusion of more than four units of blood.

Acute lower gastrointestinal (LGI) tract bleeding is defined as bleeding into the small bowel distal to the ligament of Treitz, or bleeding into the large bowel. It may present as either melena or hematochezia, depending on the site. Causes of LGI bleeding include inflammatory bowel disease, neoplasms, stress ulcers, surgical anastamoses, vascular lesions such as angiodysplasia, and diverticulitis.

Diagnosis

There is controversy regarding the best modality for the initial diagnosis of the cause of LGI bleeding. Radiological tests commonly used include radionuclide scans, contrast-enhanced computed tomography (CT), and transcatheter arteriography. Radionuclide scans are more sensitive than arteriography for detecting lower rates of bleeding (approximately 0.05-0.1 ml/min, compared to 0.5 to 1.0 ml/min for angiography), but radionuclide scans frequently provide inaccurate localization of the site of bleeding. CT scanning has recently been shown to have the ability to detect bleeding as low as 0.3 ml/min [1] and in some centers is replacing nuclear medicine scans for localization of bleeding. Although theoretically CT is less sensitive to bleeding than nuclear medicine scans, recent studies have shown the sensitivity of CT to be in the range of 79%-91% [2-4]. These studies also demonstrated that with CT the specificity and diagnostic accuracy are also quite good (50%-99% and 74%-98%, respectively).

CT has a number of other advantages as an initial test to localize LGI bleeding. It can often yield a diagnosis of the pathologic cause of the bleeding. In one study [5], CT identified the pathology preoperatively in 50% of cases. Defining the cause of bleeding can help determine prognosis as well as the best options for treatment. This allows patients who have lesions that are unfavorable for embolization to be triaged directly to surgery. CT can also provide information about the arterial anatomy. It can identify variant anatomy or vessel occlusions that would influence subsequent transcatheter arteriography/intervention (TAI).

Urgent colonoscopy can be used for both the diagnosis and treatment of LGI bleeding. A randomized, controlled trial of urgent colonoscopy compared to standard care (scintigraphy and angiography followed by colonoscopy when the other tests were negative) was performed in 100 patients with acute LGI bleeding. Although the bleeding source was definitively diagnosed in 42% in the colonoscopy arm versus only 22% in the standard care group, there was no difference in outcomes, including rebleeding and hospital stay [6]. Colonoscopy can be very challenging in the face of major active bleeding which can obscure the endoscopist's view. Whether to use colonoscopy or radiologic testing for initial diagnosis will depend on local expertise and availability. A recent randomized trial [7] of patients with hematochezia and a negative upper endoscopy revealed that patients undergoing urgent lower endoscopy had essentially the same clinical outcome as those who had elective colonoscopy.

Transcatheter arteriography is rarely used as the first diagnostic test except when the patients is massively bleeding and needs urgent therapy. Arteriography is more likely to identify the source of LGI bleeding in patients who have massive bleeding resulting in either hemodynamic instability or a requirement for transfusion of >5 units of blood [8]. Demonstration of the site of bleeding at arteriography enables the possibility of catheter-directed treatment.

A negative arteriogram after a positive nuclear or CT study is not uncommon. This may result just from the lower sensitivity of arteriography compared to scintigraphy or CT. However, LGI bleeding is frequently intermittent, and thus in many cases the bleeding has simply stopped by the time the arteriogram was done. If

[1]Mallinckrodt Institute of Radiology, Saint Louis, Missouri.
[2]Panel Chair, University of Colorado Denver and Health Sciences Center, Aurora, Colorado.
[3]Panel Vice-chair, University of Chicago Hospital, Chicago, Illinois.
[4]University of North Carolina Hospital, Chapel Hill, North Carolina.
[5]University of California-San Francisco, San Francisco, California.
[6]Carolinas Medical Center, Charlotte, North Carolina, American College of Surgeons.
[7]Froedtert & The Medical College of Wisconsin, Milwaukee, Wisconsin.
[8]University of California-San Diego Medical Center, San Diego, California.
[9]Oregon Health and Science University, Portland, Oregon.
[10]Central Kentucky Radiology, Lexington, Kentucky.
[11]Wake Forest University Baptist Medical Center, Winston-Salem, North Carolina.
[12]Kaiser Permanente Modesto Medical Center, Modesto, California.
[13]University of Illinois College of Medicine, Chicago, Illinois.
[14]University of Colorado-Denver, Anschutz Medical Campus, Aurora, Colorado.
[15]University of Texas Southwestern Medical School, Dallas, Texas, American Gastroenterological Association.
[16]Kaiser Permanente, Los Angeles Medical Center, Los Angeles, California.

Reprint requests to: Department of Quality & Safety, American College of Radiology, 1891 Preston White Drive, Reston, VA 20191-4397.

the patient has had multiple bleeding episodes without a diagnosis being made, provocative angiography can be used to uncover the location of the bleeding. With this technique, anticoagulants, vasodilators, or thrombolytic drugs can be infused to provoke and identify the source of bleeding. The yield of provocative angiography ranges widely from 31%-89% [9-10], probably due in part to lack of standardized technique. Despite the fact that this technique precipitates active bleeding, identification of the bleeding source allows treatment, and no patient has suffered uncontrollable hemorrhage with this technique.

GI bleeding that persists or recurs despite negative upper and lower endoscopic evaluation is commonly referred to as obscure GI bleeding. Often obscure bleeding originates from the small bowel, but no clear consensus exists on the optimal study to interrogate the small bowel. A meta-analysis of 17 studies compared capsule endoscopy (CE) to push enteroscopy and small-bowel barium radiography. The diagnostic yield was 63%-67% for CE, 28% for push enteroscopy, and 8% for small-bowel barium studies [11]. In a more recent study, patients with obscure bleeding were randomized to CE or small-bowel barium radiography [12]. The diagnostic yield with CE was higher (30% vs 7%); however, the rate of subsequent bleeding was essentially equivalent, and thus the improvement in diagnosis did not translate into any outcome improvement. CT, in particular CT enterography, has been used recently in the setting of obscure bleeding. Although there is often concordance, CT occasionally detects lesions not seen on CE and vice versa [13-14]. There is not enough evidence to make a clear recommendation between these modalities.

Angiographic Treatment

Microcatheter technology has allowed super-selective embolization (SSE) to become the most commonly used angiographic intervention, virtually replacing vasopressin infusion as the treatment of choice. The primary situation in which vasopressin infusion is still indicated is when a diffuse source of bleeding is identified and embolization would necessitate occlusion of too much vascular territory.

Technical success rates of SSE for LGI bleeding range from 73%-100%, with an average of 93% [15-24]. In this context technical success indicates successful deposition of emboli and elimination of contrast extravasation. When technical failure does occur, it is usually the result of vessel tortuosity or spasm.

Clinical success rates for SSE are usually lower than the technical success rates due to continued bleeding or early rebleeding despite angiographic evidence of a successful embolization. Clinical success in recent series has been on average 79% (range 63%-96%) [15-24]. However, in some series TAI has provided definitive treatment for 81%-86% of patients [18,21]. The efficacy of TAI varies depending on the location of the bleeding, small-bowel versus colon. Rebleeding is more common after small-bowel embolization than when treating colonic lesions, likely because of the more robust vascular supply and greater number of potential collateral pathways in the small bowel [25]. The pathology causing the bleeding also affects success. A meta-analysis of 25 studies revealed that recurrent bleeding occurred in only 15% of cases of SSE for colonic diverticular bleeding but occurred in 45% of cases when the pathologic lesion (such as angiodysplasia or inflammatory bowel) had a more diffuse arterial blood supply [19].

Signs of minor ischemic injury to the bowel (such as self-limited abdominal pain or asymptomatic serum lactic acid elevation) are not uncommon sequela of LGI embolization. However, major ischemic complications (those requiring treatment) are uncommon. Major ischemic complications have been reported to be as high as 11%, but on average most series report a rate of 3% or less [15,17-24].

No large prospective, randomized trials have been conducted to compare TAI with surgery for LGI bleeding. However, TAI can be performed at the time of diagnostic arteriography and can be used in patients who may be too ill to tolerate surgery. Even if the underlying pathology will ultimately require surgery, stopping hemorrhage through the use of TAI can allow time to stabilize the patient and prep the bowel, both of which will contribute to a better surgical outcome. Consequently, use of TAI in patients with acute LGI bleeding, where active contrast extravasation is seen during diagnostic arteriography, is a safe and relatively effective treatment that should be considered, depending on local experience and expertise.

Summary

- In the patient in whom lower GI bleeding has stopped, colonoscopy is usually the preferred initial examination.
- For diagnosis of the cause of colonic bleeding, urgent colonoscopy is an effective technique but can be challenging in the face of ongoing bleeding.
- Nuclear scintigraphy is still the most sensitive radiologic test for determining if the patient is actively bleeding. However, CT scanning is almost as sensitive, provides better localization, and may define the pathologic cause of the bleeding.
- Arteriography is most likely to demonstrate the site of bleeding (and guide therapeutic embolization) in patients with evidence of ongoing bleeding (hemodynamically unstable patients, or those who have required transfusion of >5 units of blood).
- For obscure bleeding there is not a clear consensus whether CE or CT is more effective and they may be complimentary.
- The effectiveness of TAI varies depending on the pathology causing the bleeding. Diverticular bleeding with a focal arterial supply is more effectively treated than conditions with more diffuse blood supply such as angiodysplasias, tumors, and inflammatory conditions.
- TAI is more effective for colonic lesions, than for lesions involving the small bowel.

- Recurrence of bleeding following technically successful TAI may occur in 14%-65% of patients.
- Symptomatic bowel ischemia following TAI is uncommon.
- Many of the diagnostic, surgical, and interventional procedures described here are highly specialized. Their availability and utility vary by institutional and operator experience.

Supporting Document(s)

- ACR Appropriateness Criteria® Overview
- Evidence Table

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