LOWER GASTROINTESTINAL BLEEDING

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Introduction

Lower gastrointestinal bleeding is a common symptom. We recognize three different bleeding patterns; occult, overt and the lower GI hemorrhage (LGIH). Each of these has different presentations and implications. When patients develop bleeding per rectum, a thorough evaluation is justified in order to identify the source.

Occult or obscure GI bleeding can occur from any site between the nose and the anus. This is typically revealed by iron deficiency anemia or guaiac positive stools. Diagnostic evaluation includes upper and lower GI endoscopy and possibly examination of the small intestine if the source remains unclear. Often no specific etiology is determined and the occult bleeding ceases. When a source is identified, treatment is based on the diagnosis according to location.

Overt GI bleeding is defined as visible blood per rectum. This is typically self limiting and intermittent. Patients with this problem can have their evaluation and treatment initiated in an ambulatory setting. The bleeding frequently arises from benign sources in the anorectum. This needs to be differentiated from more proximal sources. Treating the anorectal sources of overt bleeding satisfactorily stops the bleeding if the source is correctly identified. The options available to practitioners for treating anorectal sources of overt bleeding are outlined by diagnosis in Table 4.

Lower gastrointestinal hemorrhage (LGIH) is defined as continued gross bleeding per rectum, with or without the presence of hemodynamic instability or hemorrhagic shock. When this situation is present, the patient typically notes the urge to defecate and expels a large amount of blood. This presentation is clearly different from the other two presentations. These patients have a risk of hemodynamic instability if not treated appropriately. The decision strategy for these patients will be emphasized in this chapter as patients may need surgery with a confirmed etiology or, conversely, a patient may require surgery without a definite source being previously identified. Determination of the site from which the bleeding arises is the very important factor which dictates directed therapy since treatment is often operative and failure to treat the correct bleeding site and effect cessation of the bleeding can be disastrous. A patient can be operated upon without the certainty of the predetermined bleeding site with satisfactory results if massive bleeding persists. When considering patients with LGIH, it is mandatory to ascertain that the bleeding is indeed “lower” in that bleeding from any of the sources proximal to the anal verge, including upper gastrointestinal sources, do mimic one another, particularly, when the bleeding is brisk.

Characterize

The basic scheme for the management of LGIH is outlined in Table 1. Accurate characterization of the bleeding is essential. A detailed and directed history and physical examination begins to help differentiating the causes of bleeding. Important historical facts include ascertaining bowel habits, assessing associated pain and past medical problems, evaluating the risk factors for colorectal cancer, querying regarding current medications, (specifically NSAIDs, aspirin products, anticoagulants), and performing an examination of the blood in its unhampered or “fresh state.” The character of the blood is evaluated by an experienced observer and categorized in a standard fashion according to the color, consistency, presence or absence of clots, the amount, the relationship to bowel movements and the frequency of output. Laboratory testing is essential to evaluate for the severity of blood loss, to assess for coagulopathy, and to check parameters such as BUN, creatinine and...
bicarbonate that can give clues to upper gastrointestinal bleeding or to acidemia secondary to hypovolemic shock.

**Resuscitate**

The characterization of the bleeding as acute or chronic, severe or mild helps guide the clinician regarding the urgency of treatment. Chronic bleeding allows the clinician to perform a detailed and elective workup with few time constraints. Actively bleeding patients typically require a quick and precise determination of the facts and the bleeding site. Resuscitation in intensive care settings with invasive monitoring may be necessary for optimal care. Blood should be available for transfusion and large bore IV access obtained should instability become manifest. Factors such as tachycardia, orthostatic hypotension, frank hypotension and decreased urine output are clinical signs indicating a low perfusion state and the need for invasive monitoring and aggressive resuscitation. Medications that interfere with the normal clotting mechanisms have been found to be utilized more often in patients who develop LGIH and the coagulation parameters including PT/PTT, platelets and bleeding time should be checked to evaluate for normal coagulation and platelet function. Anticoagulants should be stopped and the effects may be reversed with vitamin K, fresh frozen plasma, platelets and DDAVP administered as necessary. It is frequently wise to consult a hematologist for the patient care when the bleeding persists beyond four units of blood, to supplement the patient as necessary with cofactors, and, to be prepared in the event the patient requires operation.

**Differentiate and localize**

After viewing the bloody discharge, evaluation of the anorectum is performed by closely inspecting the area externally followed by digital rectal exam. This is followed by the passage of an anoscope and then a proctoscope. Infrequently local anorectal conditions cause lower GI hemorrhage and a careful rectal examination with these instruments is the optimum way to diagnose and treat them, or to effectively rule them out. Refer to Table 4 for a complete guide to therapy of anorectal hemorrhage both for massive and overt bleeding. Flexible sigmoidoscopy is the next procedure of choice. This does not require sedation and the sigmoid colon can be adequately cleansed with one or two successive phosphate enemas without the administration of an oral laxative. Using this technique, the severity of bleeding can be quickly established, and the bleeding source may be identified. In actively bleeding patients, visualization may be impaired but using irrigation and suction techniques, the site and level of origin of the bleeding is determined if the rectosigmoid is the source. Colonoscopic maneuvers to control the bleeding may be instituted if the precise source is identified. These are discussed in the treatment section. Patients with either abdominal or rectal pain are investigated using a similar approach as the pain is typically related to the source of the bleeding.

Further decisions relate to the hemodynamic stability and should take into account the capabilities and reliability of the available facilities. The available subsequent choices for proceeding are: colonoscopy, tagged red blood cell scanning, mesenteric angiography and operation. These tests are all complementary in attempting to differentiate the source but have different capabilities and drawbacks. Colonoscopy has the advantage of being both diagnostic and therapeutic and can be performed in an emergency setting if the patient can be stabilized. Evaluation of the whole colon and terminal ileum requires bowel preparation by a purge cathartic given orally usually at least three hours prior to colonoscopy. The timing of this procedure as an immediate or early interventional procedure, or as an elective examination, once the bleed has stopped, is controversial. A disadvantage to colonoscopic evaluation during aggressive bleeding is that of diminished visualization which can be difficult to overcome.

The tagged 99mTC-RBC cell scan can pick up bleeding to the extent of 0.1ml/minute. The bleeding scan is typically used as a prelude to angiography when bleeding is confirmed but its usefulness in predicting the location of the source is not optimal. Performing a segmental bowel resection should not be based solely on the results of this test. An advantage to the bleeding scan is that it can be repeated frequently over the 24-48 hour period in while the radiotracer remains active since LGIH is frequently intermittent and can be missed on a given scan.

If the bleeding scan is positive, mesenteric angiography is the next test performed to localize and treat the source of the hemorrhage. Embolization of the culprit vessel, infusion of vasopressors, or marking the site of bleeding (with methylene blue or India ink) are the options available when deciding management. If the patient has excessively high risks for surgery, the nonoperative approach is utilized until or unless the patient cannot be supported without surgery. Our threshold for operating is the requirement for ten total units of blood replacement over 48 hours, or, the requirement for six units over 24 hours with ongoing hemorrhage.
If surgery is being contemplated, evaluation of the upper gastrointestinal tract with esophagogastroduodenoscopy (EGD) is mandatory. Upper GI bleeding (UGIB) accounts for an approximate 5-15% incidence of what appears to be LGIH and its absence needs to be excluded before considering abdominal surgery. Likewise, anorectal sources of bleeding must also be ruled out definitively before considering abdominal surgery and should be performed a second or even third time and at the commencement of an operation should that become necessary.

Treatment

We recommend colonoscopy as an essential component in the workup in patients where the hemorrhage persists. Colonoscopy can identify active bleeding or the stigmata of recent bleeding. The success rate of diagnosing a bleeding source during colonoscopy ranges from 48 to 90% in clinical trials. The varied differences probably relate to the timing of the procedure and differences in study design and diagnostic criteria. A summary of retrospective studies evaluating colonoscopy in LGIH showed a low overall complication rate, reported as 1.3%.

Therapeutic colonoscopy is a procedure in evolution as endoscopic hemostasis has been reported as being successful in the treatment of colonic diverticula, but the number of patients in the literature is small. Since the majority of LGIB arise from diverticula, being able to colonoscopically correct this abnormality would be highly desirable. Diverticular bleeding is identified by active visible hemorrhage, a non-bleeding visible vessel, or an adherent clot. Mechanical methods to seal a bleeding vessel, employing a metal clip or elastic band, are being reported whereby the culprit vessel/diverticular mouth is clipped via the colonoscope. Otherwise, more commonly, 1 or 2 ml aliquots of epinephrine (dilution 1:20,000) are injected into quadrants around the site to control the bleeding by inducing spasm of the vasculature in the region, or, by tamponade via occlusion of the lumen of the diverticulum.

Non-bleeding visible vessels are treated with bipolar coagulation with 10 to 15W of power until flattening of the vessel is achieved. Non-bleeding adherent clots are injected with epinephrine in four quadrants around the pedicle of the clot and the clot is then shaved down to 3-4mm above the attachment with a polypectomy snare. By cutting it off without coagulation and without pulling the clot off its attachment, one minimizes the risk of re-bleeding. Then the underlying stigmata (usually a non-bleeding visible vessel) are coagulated with a bipolar probe. After these maneuvers are performed, the mucosa adjacent to the area is marked with India ink in the event the patient re-bleeds and needs a surgical resection. Torrential bleeding from a diverticulum cannot always be stopped requires surgical management and should be localized with ink injection in preparation for segmental resection.

Endoscopy is usually successful for angiodysplasia and is reported as having an 85-90% success rate. Because angiodysplasia may bleed briskly with incomplete electrocautery, it has been recommended that larger lesions be treated around the periphery first to obliterate the feeder vessels then the central target lesion is treated. Bleeding tumors should be fulgurated to allow preparation of the patient for elective resection with bowel preparation and the appropriate staging workup.

Patients that continue to bleed or where colonoscopy cannot be adequately performed should be considered for a bleeding scan. For an optimal bleeding scan, the preferred radiotracer is 99m Tc labeled RBCs that detected 93% of active gastrointestinal bleeding cases versus 12% with 99m-technesium sulfur colloid. An average of 45% of cases were positive in a recent summation of cases. Patients with active bright blood coming per rectum at the time of the scan have a higher likelihood of testing positive. The number of units of blood transfused does not predict a positive scan neither does hemodynamic compromise at presentation. The timing of positivity of the scan (immediate vs. delayed) has been used to predict the accuracy of the scan, as delayed positive scans are more difficult to interpret. Patients have been operated upon using the bleeding scan to guide a segmental resection with success, however, this practice is quite dangerous and the results disastrous if the lesion is not appropriately removed possibly resulting in the death of the patient. If the bleeding scan is positive, we advocate mesenteric angiography to confirm the source of bleeding. In one report, when the blush was immediate, 61% of angiograms were positive. In patients who developed a blush later in the scan, 7% had positive angiograms. One must be careful in interpreting delayed positive bleeding scans, as the source for the radiotracer cannot be reliably identified.
The angiographic data pooled from 675 mesenteric angiograms showed a mean positivity rate of 47%. Intraarterial vasopressin is effective in up to 90% of patients bleeding from either diverticula or angiodysplasia. Re-bleeding occurs in up to 50% of patients and complications occurred in 5-15%. Selective arterial embolization should be reserved for patients who fail intra-arterial vasopressin therapy and are not surgical candidates. The technique involves injection of embolic agents such as Gelfoam or micro-coils into the smallest most distal artery leading to the bleeding site. This practice reduces the risk of bowel infarction, which has been reported in 5-10% of cases. Should these methods not prove helpful, if the bleeding site is localized angiographically, the area can be injected with methylene blue or India ink to serve as a guide to resection, which would be performed, in a segmental fashion. The success rate of angiography ranges from 40 to 80% at best with a complication rate reported at approximately 2%. Overall, angiography provides for very site specific and accurate information as to the source when a positive study is obtained. The number of options regarding how to proceed are maximized with angiography in that surgery, embolization, vasopressin therapy can still be instituted.

The patients that continue to bleed despite a negative workup are treated based upon their stability. Stable patients with bleeding should be considered for a repeat of the bleeding scan or colonoscopy and the algorithm in figure 1 followed. For unstable patients, preparation for operation is best when the limit of 10 units of packed red blood cells transfused within 48 hours is reached. In the operating room, exploration of the abdomen is performed to search for masses, small bowel diverticula, duplications or anything else grossly in the small or large bowel considered to be a potential source for bleeding. Segmental resection is performed if the source is localized.

If no source is identified grossly, the small bowel is assessed for the presence of lumenal blood. This can be difficult to differentiate from the serosal surface and enterotomies may be necessary. If the small bowel does not appear to be the source, sub-total colectomy is performed with either an ileoproctostomy (in stable patients) or creation of an ileostomy and sigmoid or rectosigmoid mucous fistula. If the small bowel does appear to be the source, and no identifiable source from the serosal view, we recommend intraoperative small bowel enteroscopy either per os or via an enterotomy, with passage to the cecum under direct vision and transmural illumination of the serosa. Alternatively the colonoscope may be passed via the rectum through the ileocecal valve and through the small bowel. A source may be identified by direct enteroscopic visualization or by transillumination of an angiodysplastic lesion. If no discrete small bowel source is identified, but the small bowel still appears to be the source, one should consider clamping the small bowel in segments to see which area dilates with blood and be prepared to resect the segment liberally. Immediate examination of the resected specimen by a pathologist or by the surgeon should be performed and this can be valuable in ascertaining the etiology of the bleed.

Performing a divided transverse colostomy is an outmoded treatment for LGIH when faced with significant hemorrhage without a clear-cut source. This would, out of necessity, subject the patient to rebleeding and another operation when the bleeding resumes. We favor subtotal colectomy with anastomosis of the terminal ileum to the mid or distal sigmoid colon if the rectum is ruled out as a source, and upper endoscopy is negative, and no blood is present in the small bowel. Removal of this amount of colon aggressively minimizes the chance for rebleeding from the remaining colorectum. Under circumstances of hemodynamic instability, it may be prudent to defer establishing an ileocolic anastomosis and perform an ileostomy instead. (See Figures 1 and 2).

**Discussion**

The annual incidence for LGIH is approximately 25/100,000 adult patient population at risk. The bleeding stops 80% of the time however a re-bleeding rate of 25% is reported. The incidence of bleeding increases with age with a greater than 200 fold increase in rate incidence from the third to ninth decade of life. This progressive increase reflects the increasing incidence of diverticular disease and angiodysplasia with aging. Only about one-quarter to one-fifth of patients admitted to the hospital for gastrointestinal bleeding are typically found to have a lower source as upper gastrointestinal bleeding is a much more common problem.

Because LGIH is by definition distal to the ligament of Treitz, this represents bleeding from a source whose dimension covers the surface area of the jejunum, ileum, colon and ano-rectum, forcing the clinician to consider and potentially assess all of these segments of bowel. A diagnosis of small bowel bleeding has been made when fresh blood is found in the ileum or coming through the ileocecal valve and upper endoscopy is negative. The bleeding source should always be investigated and, at most, in 50% to 80% of the time, the causative etiology is discovered.
In the remaining cases of unknown etiology, the acute management is based on the severity of the bleeding. Most cases resolve spontaneously when patients are not on antiplatelet medications, in renal failure or have aggravating causation to their bleeding. In those cases that persist, an aggressive, systematic, expeditious approach to effect the optimal treatment is mandatory. This makes the definition of the bleeding source a primary goal in effectively correcting LGIH in patients. However, when this can not be achieved, going to the operating room with a few established facts, and being able to intraoperatively ascertain some additional facts, will minimize the miss rate and allow for effective treatment to halt the bleeding diathesis.

Evaluating lower gastrointestinal bleeding is a process whereby the surgeon needs to become the lead manager to direct care and to develop a close relationship with the patient. This will allow the surgeon to quantify the degree of the bleeding, to direct the resuscitation, and to be involved with the optimization of the patient since it is ultimately the surgeon who assumes the risk of surgery when the bleeding persists. Early on in the care of patients with LGIH, it is necessary to make appropriate management decisions based on the severity of bleeding in relation to the known likeliest causation of bleeding, taking into account the patient’s medical condition.

**Conclusion**

The medical aspects of management are based on the premise of optimization of patient status, which promotes auto-resolution of the bleeding, while surgical management is geared to active intervention to eradicate the problem. Surgical management includes endoscopy, radiology, the intensive care unit and the operating room all of which can be utilized for diagnostic and therapeutic purposes. A thorough, objective, disciplined approach is mandatory to evaluate lower gastrointestinal bleeding effectively. Diagnosis directed surgery is a goal, which cannot always be achieved, in the actively bleeding patient, at which time the surgeon can be faced with performing broad based resection to alleviate the source. While it would appear that this approach carries excessive risks to the patient, effectively removing the bleeding source in a blind fashion is still a life saving event and tolerated well.

**Selected Readings**


Table 1. Management of LGIH:
1. Characterize
2. Resuscitate
3. Differentiate
4. Localize
5. Treat

Table 2 Diagnostic Hints for LGIH

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Possible Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain and bleeding</td>
<td>Ischemic bowel disease, inflammatory bowel disease, ruptured abdominal aortic aneurysm</td>
</tr>
<tr>
<td>Painless bleeding</td>
<td>Diverticular disease, angiodysplasias, hemorrhoids, benign and malignant neoplasms, proctitis</td>
</tr>
<tr>
<td>Bloody diarrhea</td>
<td>Infectious colitis, inflammatory bowel disease, ischemic bowel disease</td>
</tr>
<tr>
<td>Rectal pain and bleeding</td>
<td>Anal fissures, hemorrhoids</td>
</tr>
<tr>
<td>Constipation and bleeding</td>
<td>Colorectal malignancy, hemorrhoids, diverticular disease</td>
</tr>
</tbody>
</table>

Table 3 Commonest Causes of LGIH by age

<table>
<thead>
<tr>
<th>Adolescents and children</th>
<th>Adults to age 60</th>
<th>Greater than 60 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meckel’s diverticulum</td>
<td>Diverticula</td>
<td>Diverticula</td>
</tr>
<tr>
<td>Inflammatory Bowel Disease</td>
<td>Neoplasm</td>
<td>Angiodysplasia</td>
</tr>
<tr>
<td>Polyps</td>
<td>Inflammatory bowel disease</td>
<td>Neoplasms</td>
</tr>
<tr>
<td>Source</td>
<td>Overt bleeding</td>
<td>Massive bleeding</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>All Hemorrhoids</td>
<td>Stool softeners, bulking agents, avoidance of aspirin like products and NSAIDS if possible.</td>
<td>Electrocoagulation, Suture ligation, Rubber band ligation (RBL), Hemorrhoidectomy</td>
</tr>
<tr>
<td>Internal hemorrhoids</td>
<td>Injection sclerotherapy</td>
<td>Hemorrhoidectomy</td>
</tr>
<tr>
<td></td>
<td>Rubber band ligation</td>
<td>RBL</td>
</tr>
<tr>
<td></td>
<td>Doppler Guided Hemorrhoid Artery Ligation (DGHAL)</td>
<td>DGHAL</td>
</tr>
<tr>
<td>External hemorrhoids</td>
<td>Hemorrhoidectomy</td>
<td>Electrocoagulation, Suture ligation, Hemorrhoidectomy</td>
</tr>
<tr>
<td>Combined internal/external</td>
<td>DGHAL</td>
<td>Hemorrhoidectomy</td>
</tr>
<tr>
<td>Anal Fissures</td>
<td>First line therapy: Topical anesthetics, lubricant suppositories, stool softeners, bulking agents, warm baths</td>
<td>Electrocoagulation, Suture ligation</td>
</tr>
<tr>
<td></td>
<td>Second line therapy balloon dilation</td>
<td></td>
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<tr>
<td></td>
<td>Repeat dilation if fissure persists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Third line therapy: lateral internal sphincterotomy</td>
<td></td>
</tr>
<tr>
<td>Proctitis or Colitis</td>
<td>Radiation-topical 4-10% formalin</td>
<td>Electrocoagulation, Laser photocoagulation, Resection</td>
</tr>
</tbody>
</table>
Figure I. Management of Lower Gastrointestinal Hemorrhage

- Acute, Severe LGIB
  - History, Physical and Clinical Exam
  - Resuscitate
  - Anorectal/Endoscopy

  - Unstable
    - EGD/DNG
    - Bleeding Scan
    - Mesenteric Angiogram
    - Vasopressin or Embolization
    - Laparotomy
    - Observe for Necrosis
    - Laparotomy with Enteroscopy
    - Segmental Resection
    - Subtotal Colectomy

  - Stable
    - Colonoscopy
    - Observation off Aspirin and Blood Thinners
    - If bleeding persists

Figure II. Management of Small Intestinal Hemorrhage

- Lower GI Bleeding
  - Negative Colonoscopy & EGD
  - GI & Small Bowel Xray

  - Small Bowel Enteroscopy
  - Tumors, Cysts, Duplications
  - Small Bowel Resection

  - Mesenteric Angiography
  - Observe for Rebleeding
  - Angiodysplasia
  - Redic Workup
  - Bleeding Scan & Angiography
  - Embolization with Contrast Marking
  - Laparotomy & Intraoperative Endoscopy
  - Resection for Rebleed
  - Observe