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Emergency Department Evaluation And Management Of Patients With Upper Gastrointestinal Bleeding

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Abstract

Upper gastrointestinal bleeding results from a variety of conditions that may vary in severity from merely bothersome to imminently life-threatening. While stabilization is standard for nearly all causes of bleeding, identifying whether the bleed is from variceal or nonvariceal sources is critical. Testing and treatments such as nasogastric lavage, antibiotics, somatostatin analogues, proton pump inhibitors, and emergent endoscopy may benefit some patients, depending upon the bleeding source and other clinical factors; however, some therapies that are routinely used have very little evidence demonstrating effectiveness. This issue reviews the most recent evidence regarding appropriate testing, risk stratification, and indications for gastroenterology consult in the emergency department in order to treat these patients appropriately.

CME Objectives

Upon completion of this article, you should be able to:

1. Define upper GI bleeding.
2. Describe the management of the common causes and presentations of upper GI bleeding in the emergent setting.
3. Explain risk stratification and the utility of risk scoring systems for upper GI bleeding.
4. Discuss controversies in management of upper GI bleeding.

Prior to beginning this activity, see "Physician CME Information" on the back page.

Case Presentations

Your first patient of the day is a 67-year-old woman with a history of hypertension, diabetes mellitus, and chronic constipation who presents for evaluation of abdominal cramping, diaphoresis, and near-syncope which have been present for the preceding 12 hours. She reports having multiple maroon-colored stools. She takes warfarin and recently started taking aspirin on the advice of a friend. The patient's heart rate is 125 beats/min, her blood pressure is 90/55 mm Hg, and she appears pale and diaphoretic. She reports no pain on abdominal examination, but you observe melena on rectal examination. The patient has progressive respiratory distress, and her repeat blood pressure is 80/40 mm Hg. Beyond the ABCs, you wonder what to do to save this patient's life...

Your next patient is a 45-year-old man with chronic alcoholism and cirrhosis secondary to hepatitis C who presents with 2 days of emesis. He reports that his vomit is now containing "cupfuls" of dark-red blood. His heart rate is 110 beats/min, and his blood pressure is 120/75 mm Hg. Other than the tachycardia, the patient is well-appearing; the nurse says, "He looks pretty good – does he really need an IV?"

Introduction

Upper gastrointestinal (GI) bleeding is defined as intraluminal bleeding from an intestinal source originating proximal to the ligament of Treitz. This landmark has historical significance in the surgical care of intestinal bleeding, but it is of little importance to emergency clinicians in the emergency department (ED). Due to the proximal source of bleeding, patients with potential upper GI bleeding may complain of hematemesis, melena, or hematochezia. At the bedside, these patients may closely resemble patients who are bleeding from a lower or a more distal location. A variety of clinical conditions may cause upper GI bleeding, including peptic ulcer disease, Mallory-Weiss tears, and esophageal varices. Beyond the initial evaluation and resuscitation in the ED, the treatment for upper GI bleeding varies according to the cause of the bleeding and the disease severity.

Critical Appraisal Of The Literature

A literature search was performed using PubMed using the terms *gastrointestinal, upper, bleed, variceal, hemorrhage, cirrhosis, Mallory-Weiss, transfusion, anticoagulation,* and *melena*. Given the extensive body of literature concerning GI bleeding, the search focused on the presentation and management of GI bleeding in settings relevant to emergency medicine practice. Approximately 50 systematic reviews from the Cochrane Database of Systematic Reviews were relevant. Upon reviewing these Cochrane reviews, additional references were identified that specifically related to the evaluation and treatment of a patient with an upper GI bleed in the ED. When evaluating the role that various therapeutic agents play in the setting of upper GI bleeding, a number of studies used surrogate markers (such as findings on endoscopy) to evaluate the efficacy of a particular intervention. We searched specifically for patient-oriented outcomes, such as a decreased rate of rebleeding, a change in the need for blood products, and, most importantly, a change in short-term or long-term survival.

In addition to our literature search, we reviewed available guidelines from the American College of Gastroenterology, the American College of Emergency Physicians (ACEP), and the National Institute for Health and Care Excellence (NICE). The literature involving various diagnostic and therapeutic modalities is of fairly high quality, including numerous well-run clinical trials. The level of evidence is somewhat weaker regarding guidelines or proposed treatment pathways; indeed, consensus recommendations form a majority of the recommendations made in the literature.

Etiology And Pathophysiology

The causes of upper GI bleeding are listed in **Table 1, page 3.** In patients without known cirrhosis, peptic ulcer disease is the most common cause of upper GI bleeding (50%), followed by erosive gastritis. In cirrhotic patients, variceal bleeding is the most common cause of upper GI bleeding (50%). Mortality rates vary between 3% and 14%, depending on the cause of bleeding, and the recurrence of bleeding may be as high as 15%.[1]

Risk factors for peptic ulcer disease include *Helicobacter pylori* infection; male sex; age > 50 years; genetic factors; and use of nonsteroidal anti-inflammatory drugs (NSAIDs), aspirin, tobacco, and alcohol. A recent large review of peptic ulcer disease suggests an overall declining incidence of upper GI bleeding that is likely due to improving treatments for *H pylori*. However, this reduction has been countered by the increased use of NSAIDs and aspirin.[2] The annual incidence of GI hemorrhage from peptic ulcer disease is estimated to be between 19.4 and 50 cases per 100,000 individuals annually.[2]

The biggest risk factor for the development of gastric or esophageal variceal bleeding is the presence of cirrhosis. Fibrotic changes in the liver parenchyma decreases compliance in hepatic vasculature, causing inferior venous return to bypass the hepatic circulation and dilation of collateral vessels. While the causes and prevalence of cirrhosis may vary widely, variceal bleeding is a significant source of morbidity and mortality for all cirrhotic patients. In the United States, the mortality may be as high as 20% from an acute episode of variceal bleeding.[3]

The increased use of oral anticoagulants, espe-

cially in the aging population, is contributing to an increased incidence of GI bleeding from abnormal hemostasis. Among patients with no history of cirrhosis or peptic ulcer disease, emergency clinicians must suspect the use of anticoagulants when dealing with an acute upper GI bleed.

Other important causes of upper GI bleeding include Mallory-Weiss tears, congenital arteriovenous malformations, and aortoenteric fistulae. Mallory-Weiss tears are small tears in esophageal mucosa caused by forceful retching and are rarely a cause of severe or life-threatening upper GI bleeding.[4] Aortoenteric fistulae are an unusual, but catastrophic, cause of upper GI bleeding and should be immediately considered in any patient with a history of aortic endografting presenting with major hematochezia and hematemesis.[4]

Differential Diagnosis

Emergency clinicians must consider bleeding from non-GI sources when evaluating a patient with a potential upper GI bleed. **(See Table 2.)** Bleeding from a nasopharyngeal source may result in bloody emesis. Similarly, bleeding from the urinary tract may lead to the appearance of bloody stool in a toilet bowl. In addition to bleeding from non-GI sources, various foods and artificial dyes can cause vomit and stool to appear bloody. Stool guaiac testing can differentiate between true blood in stool or emesis and discoloration from other sources.[4]

Emergency clinicians should not rely on a patient report of bleeding to identify a potential upper GI bleed. While some patients may report episodes of melena, other patients may fail to mention ongoing episodes of dark, tarry stool. The signs of a subacute upper GI bleed may be subtle, and they require a high index of suspicion.

Prehospital Care

Prehospital care of the patient with upper GI bleeding focuses on monitoring, oxygenation, and perfusion. Due to the possibility of copious bloody emesis, prehospital personnel should ensure that the patient has a patent airway. During transport, frequent suctioning, antiemetics, avoidance of sedating medications, and administration of oxygen can minimize the risk of complications. Careful assessment of circulation may identify early shock and prompt interventions before the patient becomes unstable. Establishing intravenous or intraosseous access and initiation of crystalloid fluid is an important first step in managing patients with an acute upper GI bleed. Overall, the literature is limited with regard to optimal prehospital management of patients with a potential upper GI bleed. The majority of the available recommendations come from expert opinion or are extrapolated from the available inhospital data.

Ideally, transport should be directed to a center with endoscopic and critical care facilities, as these settings often provide the diagnostic and therapeutic resources needed to treat patients with the spectrum

Table 2. Mimics Of Gastrointestinal Bleeding

Causes	Clinical Clues
Urinary or vaginal bleeding	• Determined by inspection of urethra, obtaining catheterized urine, and/or vaginal examination
Oral or nasal bleeding	• Presence of oropharyngeal bleeding
Hemoptysis	• Historical differentiation
Iron, bismuth, beets	• History of use • Stool guaiac testing
Postprocedural bleeding	• History of recent oropharyngeal or upper gastrointestinal procedure

Table 1. Causes Of Upper Gastrointestinal Bleeding

Causes	Pathophysiology	Clinical Cues
Peptic ulcer disease	Erosion of gastric or intestinal mucosa by either infectious or caustic agents	• History of peptic ulcer disease or alcohol use • *Helicobacter pylori* infection • NSAID use
Arteriovenous malformation	Congenital vascular malformations that are predisposed to rupture	• Family history
Mallory-Weiss tear	Longitudinal tear in esophageal mucosa from forceful retching	• History of forceful emesis • Minor upper gastrointestinal bleeding
Aortoenteric fistula	Erosion of aortic graft into intestinal lumen	• History of aortic procedure • Presentation with sentinel bleed or massive hematochezia or hematemesis
Esophageal varices	Portal hypertension from fibrotic liver parenchyma and dilation of collaterals	• Alcoholism, liver cirrhosis stigmata, ascites, history of esophageal bleeding
Malignancy	Bleeding from vasculature	• Multiple previous episodes of bleeding, recent unexplained weight loss, history of alcohol or tobacco abuse

Abbreviation: NSAID, nonsteroidal anti-inflammatory drug.

of disease states that present with upper GI bleeding. Generally, the more acute the bleed, the higher the likelihood that the patient will need an advanced level of care. In situations where a patient is decompensating despite prehospital provider attempts at stabilization, patients should be taken to the nearest ED for stabilization.

Prehospital providers should consider several practical tips when transporting a patient with a potential upper GI bleed. Nausea and vomiting are near-universal symptoms in patients with upper GI bleeding, given the emetic effect that blood has in the stomach. Prehospital providers should always ensure that the patient has an emesis basin or other appropriate container nearby. While not specifically addressed in the literature, it is reasonable to use antiemetics in these patients, as needed.

Prehospital providers should ensure their personal safety when evaluating a patient with upper GI bleeding. Varices are present in up to 50% of patients with cirrhosis, and hepatitis remains a significant contributing factor to the development of liver disease and cirrhosis. In the setting of a possible variceal bleed, it would be prudent to assume that the patient may have hepatitis.[5] Prehospital providers should ensure that they are using adequate personal protective equipment, given the risk of exposure to blood-borne pathogens.

Emergency Department Evaluation

Initial management of the patient with upper GI bleeding focuses on rapidly identifying the patient who is unstable or potentially unstable. The unstable patient requires immediate placement of large-bore intravenous or intraosseous access and fluid resuscitation. Other patients, such as those with a history of cirrhosis and esophageal varices, may not appear critically ill initially; however, given their potential to decompensate rapidly, emergency clinicians should prepare for an emergent resuscitation even in the presence of normal vital signs.

History

The history focuses on quantifying the amount of hemorrhage and identifying risk factors for hemorrhage (eg, the use of anticoagulants, liver disease, past gastric disease, or surgeries), and identifying other comorbidities (eg, heart disease). Given the wide variety of conditions that can cause upper GI bleeding and the accompanying range of severity, obtaining a clear history may help identify the source of bleeding and plan appropriate diagnostic and therapeutic interventions. Patients may have difficulty estimating blood loss, as a small amount of blood may impressively discolor the water in the toilet. Asking patients to differentiate between normal stool that is streaked with blood and completely bloody bowel movements may help clarify the extent of bleeding that they have experienced. Asking about the duration of symptoms and number of bloody stools may also help quantify the duration and severity of the potential hemorrhage.

With hematemesis, the history can provide significant clues to the potential source of bleeding. A report of several hours of nonbloody vomiting followed by a solitary episode of hematemesis is suggestive of a Mallory-Weiss tear. Alternatively, a report of a sudden onset of copious hematemesis would be concerning for a possible variceal bleed.

Small-volume chronic GI bleeding allows for physiologic compensation for anemia and is often less symptomatic, whereas large-volume acute GI hemorrhage is always concerning for rapid decompensation. Pay attention to the change in symptoms that prompted the visit, as this may represent a transition from chronic to acute hemorrhage.

Interpreting Sources Of Bleeding By Color

Traditional teaching has emphasized the role that the color of blood can play in identifying a location of bleeding. Differentiation is often made between "bright red" and "coffee-ground" emesis, as well as hematochezia (red blood per rectum) and melena. As a general rule, darker blood from either emesis or stool tends to indicate action by the alimentary canal on the hemorrhage. However, there is some concern regarding the ability of patients to reliably identify and describe the color of their stool. Zuckerman et al found that patients' subjective descriptions of stool color were not able to reliably differentiate between upper and lower GI bleeding.[6]

Despite the limitations of a patient's subjective report, the appearance of blood may provide insight into the severity of the bleeding. Patients with brown stool that has a positive fecal occult blood test are likely to have a lower-volume bleed, while coffee-ground emesis and melena can be harbingers of hemodynamically significant bleeding. Various clinical features, including volume of hemorrhage and intestinal transit time, may cause patients with bleeding from an upper GI source to experience bright-red blood in their bowel movements. Therefore, while the appearance of blood may provide valuable clinical information, it cannot be used to reliably rule out an upper GI bleed.

Recognizing The Potential For Shock

History-taking should also focus on potential complications of GI bleeding and indications of shock. Chest pain, syncope, dizziness, shortness of breath, decreased exercise tolerance, decreased urine output, and altered mental status may all indicate worsened perfusion and suggest shock states. While young otherwise-healthy patients may be able to tolerate blood loss and impending shock for a period of time, other patients may rapidly decompensate.

Equally important are medical comorbidities and medication histories. **(See Table 3 and Table 4.)**

Physical Examination

After initial resuscitation, the physical examination should be focused, in order to identify likely sources and complications of bleeding. Abnormal vital signs can be used to identify a patient in shock from an upper GI bleed; however, normal vital signs do not rule out the presence of a life-threatening hemorrhage. While the presence of normal vital signs (specifically, the absence of tachycardia) is featured in various scoring systems, remain vigilant for scenarios where a patient's vital signs may remain normal despite significant bleeding. Tachycardia and tachypnea generally precede hypotension, but, in older patient populations and in the setting of beta blockade, paradoxical normal heart rate or bradycardia might be present. Mental status alterations might also be the first signs of hypoperfusion in elderly populations, while young patients may have a normal mental status even in the setting of profound hypovolemia and ongoing bleeding.

Skin, conjunctiva, and oral mucosa should be assessed for cyanosis, pallor, or scleral icterus, which may indicate underlying liver disease. Head, eye, ear, nose, and throat examination should assess for alternate sources of bleeding. The abdomen should be examined for surgical scars, hepatosplenomegaly, fluid wave, spider angiomas, or any other signs that indicate the possibility of liver disease and cirrhosis. Abdominal tenderness can indicate underlying peptic ulcer disease perforation or other intra-abdominal pathology; however, there is significant variability in the presentation of symptoms from peptic ulcer disease. Do not rely on the nature or location of pain to identify or rule out peptic ulcer disease. In some cases, the patient may have bleeding from peptic ulcer disease without specifically complaining of abdominal pain.

Cardiac examination may reveal atrial fibrillation or the harsh murmur of a mechanical valve, suggesting active anticoagulation. Presence of an automatic internal cardiac defibrillator may indicate ischemic heart disease, suggesting use of an antiplatelet agent.

In patients who present with a potential upper GI bleed, the rectal examination can provide clinical information that may not be apparent if providers rely solely on stool testing. One of the key benefits of performing a rectal examination is that it can help identify sources of bleeding from the distal GI tract, including hemorrhoids and fissures.

Reassessment

One of the most important parts of the physical examination in GI bleeding is reassessment of the patient. GI hemorrhage is a dynamic disease process that depends on hemostasis. Any patient with upper GI bleeding has the potential to experience hemorrhage, often without any warning signs to suggest that bleeding has started or increased in intensity. Trending vital signs, mental status, and frequent re-examinations may give clues to ongoing bleeding before hemorrhage is seen.

Diagnostic Studies

Laboratory Testing

The goals of laboratory testing in patients with upper GI bleeding are to: (1) detect the presence of bleeding, (2) localize the source of hemorrhage, (3) quantify the amount of blood loss, and (3) evaluate the risk of end-organ dysfunction. Laboratory studies may include hematocrit, lactic acid, coagulation factors, platelet counts, liver transaminases, blood urea nitrogen (BUN)/creatinine, and cardiac markers, where ap-

Table 3. Medical Conditions That Increase Risk Of Upper Gastrointestinal Bleeding

Comorbidity	Pathophysiology
Cirrhosis, hepatitis C, alcohol abuse	• Decreased hepatic synthetic function and increased portal hypertension • History of varices, previous TIPS, etc
Valve replacement, thromboembolism, cardiac disease, etc	• Indications for anticoagulation or antiplatelet therapy
Peptic ulcer disease	• Known previous upper GI bleeding is a risk factor for future hemorrhage
Recent travel or immigration	• Risk factors for *Helicobacter pylori* infections

Abbreviations: GI, gastrointestinal; TIPS, transjugular intrahepatic portosystemic shunt.

Table 4. Medications That Increase Risk Of Upper Gastrointestinal Bleeding

Medication	Pathophysiology
NSAIDs (including ASA)	Increased risk of peptic ulcer disease and consequent hemorrhage.
ASA, clopidogrel, ticagrelor, prasugrel	Platelet count may be normal, but function may be reduced.
Warfarin	Vitamin K inhibition, elevated INR, and increased bleeding time.
Novel oral anticoagulants	Anti-factor Xa and thrombin time indicate active drug. No quantifiable measure.

Abbreviations: ASA, acetylsalicylic acid; INR, international normalized ratio; NSAIDs, nonsteroidal anti-inflammatory drugs.

propriate. **(See Table 5.)** Patients with any evidence of vital sign instability or who have the potential to decompensate should have a blood type and screen performed. Further testing should be driven by the patient's overall condition, the presence of comorbidities, and physical examination findings. If the patient has signs of potential end-organ damage, appropriate tests should be obtained to help risk stratify them and guide treatment. For example, in the setting of significant blood loss, a 70-year-old patient with melena and a history of coronary artery disease may need an electrocardiogram and possible cardiac biomarker testing to ensure that he is not experiencing cardiac ischemia. Alternatively, these tests are likely not necessary in a 20-year-old patient with bleeding from peptic ulcer disease secondary to excessive aspirin use. Rather than obtaining broad, overly inclusive tests on all patients who present with an upper GI bleed, use your clinical assessment in conjunction with an estimate of pretest probability of disease to order tests appropriately.

Laboratory data are important for risk stratification of patients with upper GI bleeding, but there are limitations. The complete blood count describes hematocrit as a percentage and hemoglobin as mg/dL. Neither of these is an absolute measure of red cell quantity or oxygen-carrying capacity; rather, they reflect the percentage (or concentration) of total blood volume that is red cells (or hemoglobin). Thus, patients with acute bleeds may sustain major life-threatening hemorrhage yet have no major change in their hematocrit or hemoglobin concentrations until they are fluid-resuscitated. Therefore, a single complete blood count is a poor substitute for clinical examination findings that point to large blood loss. It is important to follow serial hematocrits in patients with suspected upper GI bleeding, as they may change abruptly with resuscitation.

BUN may be elevated in the setting of a GI bleed as hemoglobin is digested and absorbed, resulting in an increased amount of urea in the bloodstream. In the setting of brisk bleeding or in patients with decreased intestinal transit time, there is less opportunity for hemoglobin digestion and, as a result, the BUN may initially be within normal limits. While an elevated BUN may be present in the setting of a significant GI bleed, a normal BUN does not provide sufficient evidence to rule out ongoing bleeding.

Table 5. Laboratory Testing For Upper Gastrointestinal Bleeding

Laboratory Test	Comments
Hematocrit/hemoglobin	Compare to previous levels and trend to identify ongoing blood loss. May be falsely normal in hyperacute phase.
Lactic acid	Marker of tissue perfusion. Elevated lactic acid suggests increased severity of bleeding and increased mortality risk.
Coagulation studies	PT/INR may be affected by vitamin K inhibition (warfarin) or decreased hepatic synthetic function, both of which complicate GI hemorrhage. Thrombin time and anti-factor Xa levels are useful for detecting the presence of novel oral anticoagulants.
BUN/creatinine	Acute kidney injury is common in shock states and is a marker for perfusion deficit. Blood within the alimentary canal is a cause for elevated BUN, and high levels may necessitate admission.
Liver transaminases	May give indication of hepatic dysfunction, if acute hepatitis. May be normal or near-normal in cirrhotic patients.
Cardiac markers	Another marker for tissue ischemia. Elevation suggests poor tissue perfusion and should be trended to guide resuscitation goals.

Abbreviations: BUN, blood urea nitrogen; GI, gastrointestinal; INR, international normalized ratio; PT, prothrombin time.

Nasogastric Lavage

Bedside tests such as nasogastric (NG) lavage and stool testing are long-standing components in the workup of patients with a potential upper GI bleed. Historically, NG lavage has been used during the evaluation and treatment of acute upper GI bleeding; however, the utility of this invasive procedure is unclear. In a retrospective review of 520 patients who had NG lavage performed, patients with a positive lavage were more likely to have a high-risk lesion on endoscopy (defined by the authors as active bleeding or a visible vessel).[7] Bloody lavage was the most predictive of a high-risk lesion, with an odds ratio (OR) of 4.82 when compared to clear aspirate and 2.8 when compared to coffee-ground aspirate. Unfortunately, the negative predictive value of a clear aspirate was not ideal; approximately 15% of patients with clear aspirate had a high-risk finding during their subsequent endoscopy. In addition, this study has notable limitations. Using a registry of 1869 patients, the authors included only the 520 patients who underwent NG lavage. The authors did not address any outcome differences between the lavage patients and the majority of the patients in the registry who did not undergo NG lavage. Additionally, the authors did not identify features that led to the lavage being performed, which suggests the possibility of selection bias or the possibility that NG lavage was performed in sicker patients who were more likely to benefit from this intervention. Given the limited utility of NG lavage, it is not routinely indicated in patients with potential upper GI bleeding.[7]

In clinical practice, there is some confusion about the utility of a simple aspirate (where stomach contents are suctioned) compared to lavage (where fluid is infused into the stomach before the entire

contents of the stomach are suctioned). In a recent review, Palamidessi et al found that, despite the procedural differences, both NG aspirations and NG lavages performed poorly when used in an attempt to rule out the presence of upper GI bleeding in patients who presented with melena or hematochezia.[8]

NG lavage is often used to aspirate a patient's stomach contents in an effort to improve the view of the anatomy during endoscopy. Intravenous erythromycin, a motilin agonist, promotes gastric emptying and can be used as a noninvasive means of improving endoscopic visualization. In a well-designed prospective study, Pateron et al compared endoscopic findings in 253 patients who received erythromycin alone to patients who received NG aspirate and to patients who received both erythromycin and aspirate. Stomach visualization was adequate in the majority of all patients, regardless of intervention, and there was no statistically significant difference in visualization or any other outcome between the treatment groups. Given the noninferiority of erythromycin, it is not necessary to rely on NG lavage to improve stomach visualization during endoscopy.[9]

A recent retrospective analysis was unable to find any significant improvement in patient outcomes when NG lavage was performed.[10] Huang et al evaluated 632 cases of upper GI bleeding. NG lavage was associated with earlier endoscopy; however, there was no associated decrease in mortality, hospital length of stay, or need for transfusions.

While NG lavage may offer some predictive value in findings on endoscopy, it has not been shown to improve any patient-oriented outcomes, and its role in the risk stratification of upper GI bleeding remains unclear. NG lavage is an invasive procedure that appears to have unclear, if any, clinical benefit, and it should not routinely be performed in the ED.[10]

Stool Guaiac Testing

The appearance of a patient's stool has moderate predictive power in differentiating an upper source of bleeding from a lower source of bleeding, so stool guaiac testing should be performed on all patients who present with potential upper GI bleeding. A patient who reports black or tarry stools has a 5 times greater risk of having an upper GI bleed; if melena is present, the risk increases to 25 times greater. Conversely, if a patient has blood clots in his stool, he is 20 times less likely to have bleeding from an upper GI source.[11] In a retrospective analysis, Witting et al found that the presence of black stools was 80% sensitive and 84% specific for an upper GI bleed.[12]

There are limited data on a patient's reliability in reporting abnormal stool color. While it may be tempting to eliminate the rectal examination or fecal occult blood testing in patients who do not report having black or tarry stools, emergency clinicians should be careful about ruling out an upper GI bleed based on a patient's subjective reporting.

Interpreting grossly normal but positive fecal occult blood testing can be problematic. Allard et al evaluated several studies involving patients with a positive fecal occult blood test who had a negative colonoscopy. Across various studies, they found that up to 20% of patients with a positive fecal occult blood test had an identifiable source of bleeding on upper endoscopy.[13] While none of the studies involved patients in the ED with acute symptoms, the results suggest that the majority of patients who have a positive fecal occult blood test do not have significant upper GI pathology.[13] However, the presence of an upper GI bleed should not be ruled out based on a negative fecal occult blood test alone. Typically, blood will take several hours to transit the digestive system. If a patient presents early in the course of an upper GI bleed, he may have a normal stool examination (including a negative fecal occult blood test) while still having significant bleeding. The accuracy of the stool examination likely increases significantly with the duration of symptoms; however, the data surrounding the interpretation of a negative stool examination is limited, and caution should be exercised when attempting to rule out bleeding.

Imaging

Imaging is rarely useful in the treatment of upper GI bleeding; however, it is important for the exclusion of other complications. Peptic ulcer disease can result in intestinal or gastric perforation in addition to hemorrhage. Plain films can be used to look for the presence of free air in a patient who presents with upper GI bleeding and severe abdominal pain. **(See Figure 1, page 8.)** When interpreting studies, emergency clinicians must consider several crucial limitations. For images to be accurate, patients must maintain an upright or lateral decubitus position for several minutes, which may not be practical when a patient is critically ill. For diagnostic accuracy, plain films have a much lower sensitivity for the presence of free air when compared to CT scan. In a critically ill patient, the presence of free air on plain film may indicate a GI perforation, but for most patients who present with upper GI bleeding, plain films are of limited utility.

Abdominal CT is superior to plain film in its ability to identify the presence of GI perforation; however, it does not evaluate the gastric or intestinal lumen well, and it is not helpful for localizing bleeding or risk stratifying the patient for upper GI bleeding.[14] In patients who have a high pretest probability of perforation in the setting of upper GI bleeding, a CT scan may be a useful test. For patients with a low pretest probability of perforation, routine abdominal imaging is not necessary.

Ultrasound is of limited value in the assessment of gastric or intestinal lumen, but measuring inferior vena

cava respiratory variation and left ventricular ejection fraction are helpful adjuncts for establishing volume status and fluid tolerance in the critically ill patient.

Treatment

Airway management is fundamental to the care of a patient with an upper GI bleed, as these patients may be at risk of aspiration. Supine or recumbent positioning increases the risk of aspiration and should be avoided. Adequate suction is of vital importance, and it may require a second operator and suction canister.

While oxygen should be administered to all patients with shock, the use of noninvasive positive pressure ventilation is controversial. Patients with upper GI bleeding have a high risk for emesis, need preload and volume expansion, and often have variable mental status and the potential for quick decompensation. These features would suggest that the risk posed by noninvasive positive pressure ventilation may outweigh any potential benefit, though it may be considered in select cases for temporizing care prior to intubation.

Patients who have active bleeding may need to be intubated to facilitate endoscopy. NG suctioning can be used in an effort to decompress a patient's stomach and improve the view during an attempt at intubation; however, placing an NG tube may cause a patient to vomit or may exacerbate their bleeding. As noted in the "Diagnostic Studies" section (pages 5-8), there is little evidence to support the widespread use of an NG tube for this indication, and emergency clinicians should consider this on a case-by-case basis. Brisk hemorrhage may obscure the normal anatomy, making endotracheal intubation more difficult, and blood may limit the utility of video laryngoscopy, so emergency clinicians should always have a defined backup plan.

When preparing to intubate a patient with an upper GI bleed, anticipate the possibility that bleeding may make visualization of the laryngeal anatomy difficult or impossible. In this situation, "blind" insertion devices (such as the intubating laryngeal-mask airway and the Combitube®) may allow you to secure and protect an airway when direct or video visualization is not possible. As with most difficult airway situations, use a device that you are familiar with, and take the necessary steps to improve the likelihood of intubating the patient on the first attempt. Likewise, prepare for a surgical airway as the ultimate back-up.

Circulation is an equally important focus of resuscitation in upper GI bleeding. Intravenous crystalloids are indicated until blood is available. Initially, physiologic parameters are more important than the hematocrit/hemoglobin levels, which are measures of the oxygen-carrying component of blood in relation to the total volume of plasma. Before resuscitation begins, both values may be normal, since there has been no plasma expansion relative to total-body oxygen-carrying capacity. Because of this phenomenon, the 2012 American College of Gastroenterology guidelines recommend a target hemoglobin > 7 g/dL, but they allow for higher transfusion targets in patients who are at increased risk of end-organ dysfunction (eg, in cardiac ischemia).[15]

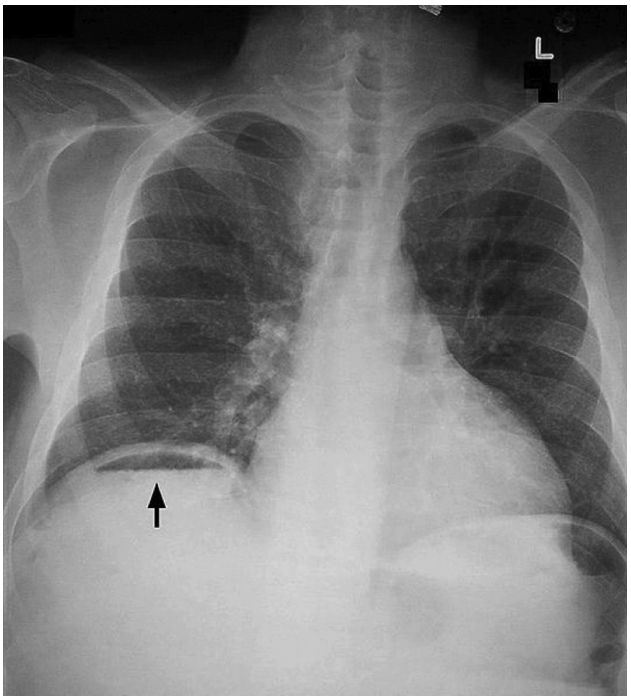
Pharmacotherapy

Proton Pump Inhibitors

Proton pump inhibitors (PPIs) are routinely used as first-line agents in patients who present with an acute GI bleed. Initially developed to treat peptic ulcers, these agents inhibit the parietal cell H+/K+ ATPase pump and decrease gastric acid production. Early research suggested that stomach acidity has an antihemostatic effect, and it was thought that increasing the pH of the stomach through the inhibition of gastric acid production might improve the stability of blood clots and decrease continued bleeding; however, this benefit is largely theoretical.[16]

Despite its widespread use, the evidence to support PPI use in upper GI bleeding has limitations. Patients who have known peptic ulcer disease are the most likely to benefit from the use of PPIs. In a meta-analysis of 21 randomized controlled trials

Figure 1. Upright Radiograph Showing Pneumoperitoneum



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involving approximately 2900 patients, Leontiadis et al found that PPIs reduced the rate of rebleeding and the need for surgery in patients who had an ulcer that was confirmed on endoscopy. Despite these benefits, there was no overall survival benefit when patients received a PPI.[17]

A recent review of this meta-analysis emphasized some important differences between various patient groups.[18] In the Asian trials that were included in the original meta-analysis, PPIs did show a significant mortality benefit, with a number needed to treat (NNT) of 34 to prevent 1 patient death. Throughout these Asian studies, PPIs also decreased the rate of rebleeding (NNT, 6) and surgical intervention (NNT, 23). These results differed dramatically from the included European trials that showed a trend towards harm in the patients who received PPIs; however, this trend was not statistically significant. The European trials showed no mortality benefit. When studies from the various regions were combined, PPIs reduced the rate of rebleeding (NNT, 15), the need for surgery (NNT, 32), and the need for repeat endoscopy (NNT, 10). There is wide speculation with regard to the outcome differences seen in the multiple Asian trials, and it appears that PPIs may have a significant survival benefit in Asian populations; however, the available literature does not provide enough data to draw any clear conclusions.[18]

While PPIs may offer questionable benefit in patients with peptic ulcers, their role in patients who present with upper GI bleeding of unknown origin is even less clear. A 2010 meta-analysis looked at 6 trials involving 2223 patients. PPIs appeared to reduce the likelihood that a patient would need an intervention during endoscopy, and they reduced the rate of rebleeding, surgery, or death.[19] The data were not sufficient to fully evaluate hospital length of stay or the need for blood transfusions. For patients who present with undifferentiated upper GI bleeding, PPIs have not been shown to improve any meaningful patient-oriented outcomes.[19]

Current guidelines recommend treating patients with an initial bolus of 80 mg, followed by a continuous infusion of 8 mg/hr for 72 hours. However, recent studies have questioned the necessity of a prolonged infusion. In a 2014 meta-analysis, Sachar et al found that intermittent PPI therapy appears to be noninferior to bolus plus continuous infusion therapy in patients who are being treated for high-risk bleeding ulcers.[20]

Somatostatin Analogues

Somatostatin analogues (most commonly, octreotide) have been widely used to treat variceal GI bleeding; however, they appear to offer very little clinical benefit. Octreotide inhibits the secretion of various gastric hormones and can reduce the portal venous blood flow, which could reduce the amount of bleeding in the setting of esophageal varices. For suspected variceal bleeding, octreotide is typically given as a 20 to 50 mcg IV bolus followed by an infusion of 25 to 50 mcg/hr.[21]

Banares et al performed a meta-analysis comparing patients who received somatostatin analogues prior to endoscopy to patients who had endoscopy alone.[22] Patients who received the combination therapy had an increased rate of early hemostasis (NNT, 8) and 5-day hemostasis (NNT, 5), yet there was no change in overall mortality. In addition, both groups had a similar rate of adverse events. In patients who present with variceal bleeding, somatostatin analogues may increase the rate of early endoscopic success and may offer a slight reduction in the need for blood products. Despite these benefits, there are no data to show that they offer any decrease in mortality.[22]

Summary Of Recommendations: Proton Pump Inhibitors And Somatostatin Analogues

When looking at patient-oriented outcomes (such as overall mortality), there is little or no evidence to support the use of PPIs or somatostatin analogues. While any benefits may be minor, the acute use of these agents does not appear to pose a significant risk to the patient. It would be reasonable to discuss the use of these agents with the gastroenterology service rather than using them as standard therapy for all patients who present with undifferentiated upper GI bleeding.

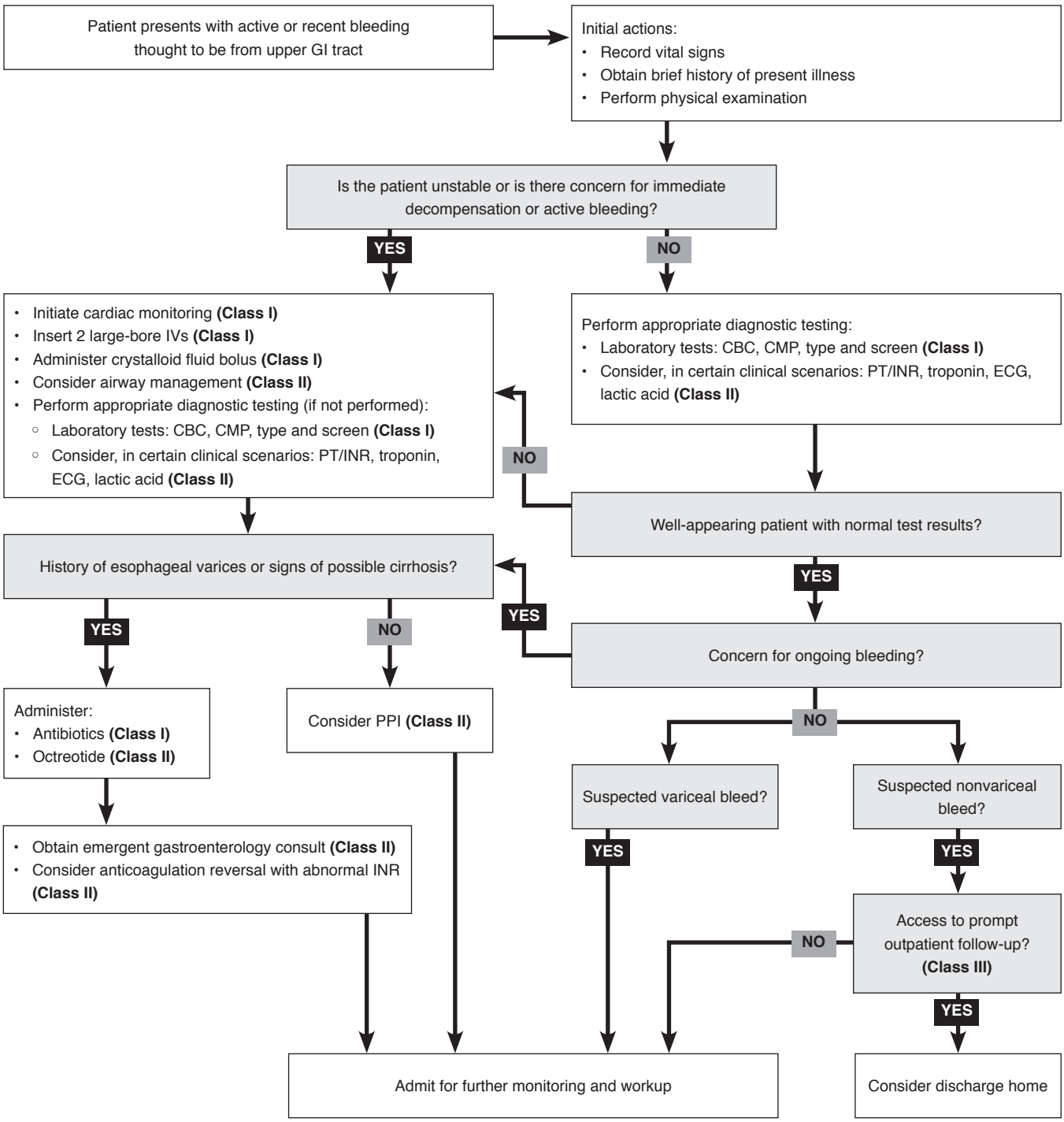
Vasopressin

The theoretical benefit of using vasopressin in the management of upper GI bleeding comes from its ability to cause vasoconstriction in the splanchnic circulation, thus reducing portal hypertension. Unfortunately, vasopressin also causes systemic vasoconstriction that can lead to myocardial and widespread vascular ischemia. While vasopressin may offer a theoretical benefit to patients who have variceal bleeding, the drug offers little other than increased risk to patients who present with bleeding from peptic ulcer, as most of this bleeding is arterial. In the ED, vasopressin may play a role as a third-line agent for patients who present in extremis from what is likely a variceal bleed; however, there are no data to suggest that the potential benefits outweigh the risks when used widely to treat upper GI bleeding from an unknown source.[23]

Antibiotics

Antibiotics offer a survival benefit to patients with variceal bleeding. Patients who have cirrhosis tend to be immunocompromised, and it is thought that infections occur due to the translocation of intestinal bacteria from the digestive system into the bloodstream. In a meta-analysis, Chavez-Tapia et al examined 12 trials that included cirrhotic patients with GI bleeds who received prophylactic antibiotics.[24] Across all the studies, the patients who re-

Clinical Pathway For Management Of Suspected Upper Gastrointestinal Bleeding



Abbreviations: CBC, complete blood count; CMP, comprehensive metabolic panel; ECG, electrocardiogram; INR, international normalized ratio; IVs, intravenous lines; GI, gastrointestinal; PPI, proton pump inhibitor; PT, prothrombin time.

For class of evidence definitions, see page 11.

ceived antibiotics had lower infection rates, with a significant reduction in rates of pneumonia, urinary tract infections, spontaneous bacterial peritonitis, and bacteremia. Overall mortality was decreased in patients who received antibiotics, with a NNT of 22 to prevent 1 death. Various antibiotic regimens were used, and no single agent appeared to be superior. Given the survival benefit provided, all patients with suspected variceal bleeds (even in the absence of obvious cirrhosis) should receive prophylactic antibiotics during their initial observation in the ED. While early studies tended to use oral quinolones, given the increasing antibiotic resistance to these agents, intravenous ceftriaxone is our recommended first-line agent.[24,25]

The Role And Timing Of Endoscopy

Early consultation with the gastroenterology service is recommended for patients with significant upper GI bleeding. For an unstable patient with ongoing bleeding, emergent endoscopy, is likely the most appropriate step, when it is available. Emergent consultation also facilitates communication, aids transitions of care, and identifies and mobilizes resources that might be needed.

The timing of endoscopy is at the discretion of the consultant. Sarin et al reviewed 502 cases of suspected upper GI bleeding where endoscopy was performed (10% with variceal bleeding) in an attempt to compare early (within 6 hr) to late (6-24 hr) endoscopy.[26] The authors found no difference in mortality, need for surgery, or rate of transfusions between the groups. Even in patients who received endoscopic hemostasis, there did not appear to be any significant difference in clinical outcomes.[26]

In 2013, Iwasaki et al attempted to determine a set of clinical criteria that would identify patients who would potentially benefit from urgent endoscopy.[27] The authors retrospectively identified 166 patients who had active bleeding seen on endoscopy and a bloody NG aspirate. A ratio of heart rate to systolic blood pressure (HR/SBP) was calculated for all patients. The findings of a bloody NG aspirate or an HR/SBP ratio of 1.4 had a sensitivity of 65% and specificity of 77% for the prediction of active bleeding. One of the limitations of this study was the criteria used to categorize patients who needed urgent endoscopy. While identifying active bleeding on endoscopy might be an appropriate indication for the need for an urgent procedure, the authors were not able to show that these patients had any improvement in patient-oriented outcomes, such as mortality or need for transfusion.[27] Further prospective evaluation is needed before clinical criteria can be reliably used to identify patients who will benefit from urgent endoscopy.

Indications For Surgical Consult

As endoscopic therapy has become more widely used, the rates of surgical intervention for upper GI bleeding have declined significantly.[28] In the 1970s, 20% of patients underwent surgical treatment for upper GI bleeding related to peptic ulcer disease; by 2007, the incidence had decreased to 2%. Historically, patients who underwent surgery for peptic ulcer disease had a mortality rate of 10% to 50%. While patients who have perforated peptic ulcer disease may require an emergent surgical intervention, endoscopic and interventional radiology management are safer and are the accepted initial options to pursue.[28]

For patients with bleeding esophageal varices, a transjugular intrahepatic portosystemic shunt (TIPS) can be performed to reduce portal pressure in an effort to stabilize the patient. Portacaval shunt (where the portal vein is shunted to the inferior vena cava) is an additional surgical technique that has been used in the management of patients with cirrhosis and bleeding esophageal varices. Orloff reviewed the available literature in an effort to compare outcomes between patients who received endoscopic sclerotherapy to those who underwent portacaval shunt or TIPS.[29] Overall, patients who underwent TIPS and portacaval shunt had lower rates of continued bleeding when compared to the endoscopic

Class Of Evidence Definitions

Each action in the clinical pathways section of *Emergency Medicine Practice* receives a score based on the following definitions.

Class I
- Always acceptable, safe
- Definitely useful
- Proven in both efficacy and effectiveness

Level of Evidence:
- One or more large prospective studies are present (with rare exceptions)
- High-quality meta-analyses
- Study results consistently positive and compelling

Class II
- Safe, acceptable
- Probably useful

Level of Evidence:
- Generally higher levels of evidence
- Nonrandomized or retrospective studies: historic, cohort, or case control studies
- Less robust randomized controlled trials
- Results consistently positive

Class III
- May be acceptable
- Possibly useful
- Considered optional or alternative treatments

Level of Evidence:
- Generally lower or intermediate levels of evidence
- Case series, animal studies, consensus panels
- Occasionally positive results

Indeterminate
- Continuing area of research
- No recommendations until further research

Level of Evidence:
- Evidence not available
- Higher studies in progress
- Results inconsistent, contradictory
- Results not compelling

group. Patients who underwent portacaval shunt had a lower rate of complications and mortality when compared to the TIPS group. Despite these results, the authors concluded that there was insufficient evidence to identify patients with acute bleed who would benefit from having these procedures performed as the initial management strategy. Emergency clinicians could consider surgical consultation in the setting of continued bleeding after endoscopic management, but there does not appear to be a role for routine surgical consultation on all patients with upper GI bleeding.[29]

The Role Of Interventional Radiology

Interventional radiology has a role in the treatment of upper GI bleeding in patients with continued bleeding after endoscopic therapy. Various embolization techniques can be used to reduce bleeding when it is thought to originate from an arterial source (as with peptic ulcer disease). Currently, there are few interventional radiology procedures that are useful in the treatment of bleeding varices. Computed tomography angiography can be used to attempt to localize the source of bleeding in patients where endoscopy has failed. Yoon et al reported a sensitivity of 91%, a specificity of 99%, and an accuracy of 98% in localizing the source of bleeding.[30] Mortality associated with various interventional radiology techniques tends to be less than with surgical procedures, making it a reasonable alternative to surgery for patients with bleeding following endoscopy.[30]

Bedside Treatment Options

In cases where a patient is bleeding from a variceal source and immediate endoscopy is not available, there are several balloon tamponade devices that can be placed at the bedside in an attempt to apply direct pressure to the source of bleeding. Devices include the Sengstaken-Blakemore tube, the Linton-Nachlas tube, and the Minnesota tube. Each device has its own particular placement requirements, and emergency clinicians should be familiar with the devices used in their institution. **(See Figure 2 and Figure 3.)** While these devices may act as a temporizing measure in a truly unstable patient, they can cause significant complications, including esophageal necrosis and rupture.[32] Balloon tamponade devices are generally reserved for the last line of therapy in unstable patients who are unable to undergo immediate endoscopy, and they do not have a role in the standard management of patients with upper GI bleeding.[33]

Special Populations

Resuscitation Of The Anticoagulated Patient

Patients on anticoagulants with upper GI bleeding pose special challenges, especially when the anticoagulant is one of the novel agents and serum monitoring is not available. The reason for anticoagulation and the risks and benefits of anticoagulation reversal must be carefully considered. Rather than immediately reversing all anticoagulated patients, emergency clinicians should consider the potential downstream complications, including increased thrombosis, volume overload, or potential reactions to various blood products. Blood products, includ-

Figure 2. Sengstaken-Blakemore Tube

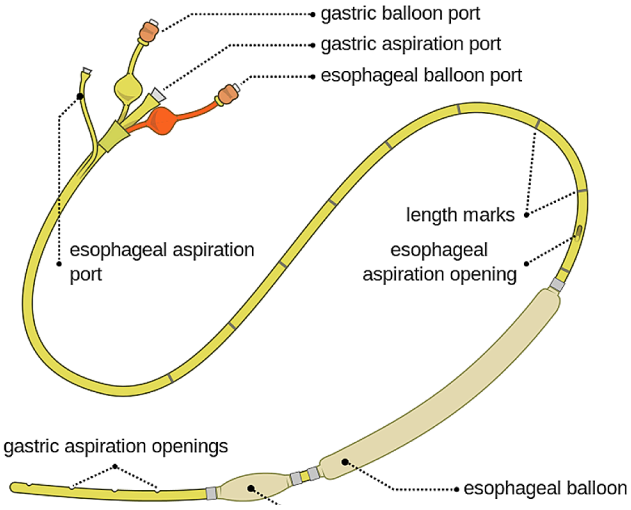


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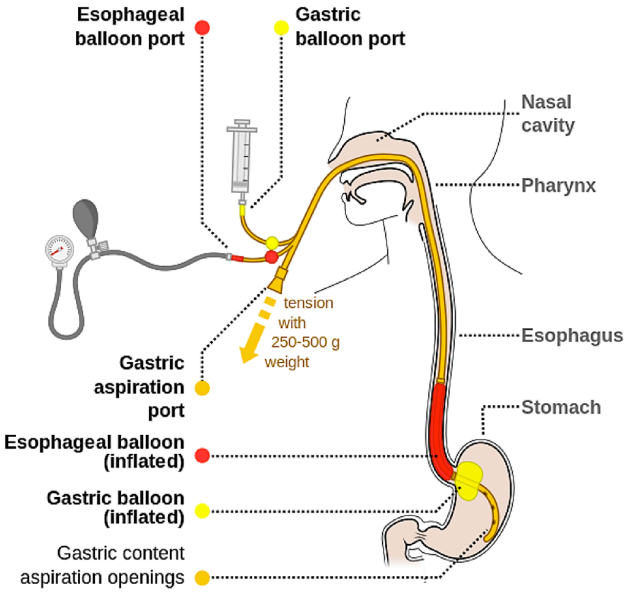
Figure 3. Sengstaken-Blakemore Tube Placement



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ing fresh-frozen plasma, platelets, whole blood, and prothrombin complex concentrate have been put forward as management options.

For more information on resuscitation of the anticoagulated patient with upper GI bleeding, see the April 2013 issue of *EM Critical Care* at www.ebmedicine.net/ResuscitationUGIB. For more information about managing patients on novel oral anticoagulants, see the October 2013 issue of *Emergency Medicine Practice* at www.ebmedicine.net/NOACS.

Controversies And Cutting Edge

Morbidity On Weekend Admissions

Some studies have shown that patients with upper GI bleeding who are admitted over a weekend have an increased mortality rate and longer hospital stays. Ananthakrishnan et al found that patients with nonvariceal upper GI bleeding had increased mortality and lower rates of endoscopy when admitted on the weekend.[34] Variceal upper GI bleeds had lower rates of endoscopy but no increase in overall mortality. The authors were unable to identify significant contributing factors to this increase in mortality, but they advised that emergency clinicians should consider the availability of resources at their facility to ensure that patients are able to receive an appropriate level of care without significant delay.[34] When this possible "weekend effect" has been studied in patients who were admitted for other diseases, the evidence is somewhat mixed, with some sources reporting increased mortality and other sources failing to find any increase in overall mortality.[35,36]

Permissive Anemia

Recent studies have attempted to determine an appropriate threshold for blood transfusion in patients with an acute upper GI bleed where there is concern for ongoing bleeding. Villanueva et al enrolled 921 patients with acute upper GI bleeding and randomized them to a restrictive versus a liberal transfusion strategy.[37] The authors used the Child-Pugh score to categorize the severity of the patient's chronic liver disease. **(See Table 6.)** Patients in the restrictive arm received a transfusion when their hemoglobin level fell to < 7 g/dL, while patients in the liberal arm were transfused when hemoglobin fell to < 9 g/dL. The restrictive transfusion group had a higher rate of survival at 6 weeks (95% vs 91%, P = .02). In addition, the rate of further bleeding was lower in the restrictive group when compared to the liberal group (10% vs 16%, P = .01). Within the restrictive group, certain subgroups of patients had significantly higher rates of survival. Patients with bleeding from peptic ulcer disease and patients with cirrhosis and Child-Pugh class A or B who were in the restrictive group had increased rates of survival. This survival benefit was not seen in the sickest subset of patients (cirrhosis and Child-Pugh class C) who were randomized to a restrictive transfusion strategy; however, this may have been due, in part, to the patient's overall disease burden rather than a result of any particular transfusion strategy.

Overall, the restrictive transfusion approach improved outcomes for a significant proportion of patients with acute GI bleeding.[37] Guidelines are beginning to reflect the increasing amount of evidence demonstrating the risks associated with transfusion. Recent NICE guidelines recommended transfusion according to local protocols, with the caveat that "overtransfusion may be as damaging as undertransfusion."[39] In the ED, having a higher threshold to transfuse blood products appears to improve outcomes in several broad subsets of patients.[40]

Capsule Endoscopy

Various authors have proposed using emergent, minimally invasive imaging as a means of evaluating and risk stratifying patients with a potential upper GI bleed. In a 2012 study, Chandran et al evaluated the use of capsule endoscopy in patients who present with suspected upper GI bleeding.[41] All patients first underwent capsule endoscopy before having a traditional endoscopy performed. Out of 83 patients, 62 (75%) had a source of bleeding seen on capsule endoscopy. When compared to traditional endoscopy, capsule endoscopy was less likely to visualize the duodenum. In the subset of patients with upper GI bleeding who had adequate duodenal visualization on capsule endoscopy, 92% of the patients had low-risk lesions that the authors thought

Table 6. The Child-Pugh Score[38]

Measure	Points Assessed		
	1 point	2 points	3 points
Total bilirubin, mmol/L (mg/dL)	< 34 (< 2)	34-50 (2-3)	> 50 (> 3)
Serum albumin, g/dL	> 3.5	2.8-3.5	< 2.8
PT/INR	< 1.7	1.71-2.30	> 2.30
Ascites	None	Mild	Moderate to severe
Hepatic encephalopathy	None	Grade 1-2 (or suppressed with medication)	Grade 3-5 (or refractory)
Total	_____	_____	_____

Scoring:
Class A: 5-6 points
Class B: 7-9 points
Class C: 10-15 points

Abbreviations: PT, prothrombin time; INR, international normalized ratio.

would have been suitable for outpatient follow-up. While further prospective trials are needed, capsule endoscopy could be a useful tool in risk stratifying patients who present with upper GI bleeding.[41]

Disposition

Risk Stratification And Inpatient Versus Outpatient Management

There is likely a subset of patients with potential upper GI bleeding who can be safely treated on an outpatient basis. Various scoring systems, emergent imaging modalities, and position statements have attempted to identify these low-risk patients. However, to date, there are no widely accepted criteria for who can be safely discharged and have their evaluation completed on an outpatient basis.

Scoring systems have been developed to help risk stratify patients who present with an upper GI bleed. Most of these systems are not applicable to patients with variceal bleeds, and they were not initially designed to identify patients suitable for outpatient management.

The Blatchford score uses clinical and laboratory data to help identify patients with an acute bleed who need an intervention before endoscopy. **(See Table 7.)** The Clinical Rockall score uses only clinical variables to predict the risk of adverse outcomes, including rebleeding and death. The Complete Rockall score uses a combination of clinical and endoscopic variables to predict adverse outcomes; however, its use of endoscopic findings limits its application in the ED. In a retrospective review of 354 patients admitted with acute upper GI bleeding, Chen at al compared the efficacy of these 3 clinical scores in identifying high-risk patients.[42] The authors considered patients "high-risk" (in terms of clinical intervention) if they required a blood transfusion or any operative or endoscopic management during their admission. Overall, 246 (70%) of patients were identified as high-risk. The Blatchford score was able to identify 245 (99.6%) of these patients, outperforming the Rockall score, which identified 224 of the patients (90.1%). The 1 patient missed by the Blatchford score did not die, have recurrent bleeding, or need a blood transfusion. The authors concluded that the Blatchford score's use of clinical and laboratory values made it a feasible and sensitive instrument to use when risk stratifying nonvariceal upper GI bleeding.[42]

Various scores exist that attempt to predict the risk of variceal bleeding in patients with chronic liver disease. Scores such as the MELD Score (Model for End-Stage Liver Disease, available at http://www.mdcalc.com/meld-score-model-for-end-stage-liver-disease-12-and-older/), the Child-Pugh Score **(see Table 6, page 13)**, and a bleeding risk score (eg, HAS-BLED (Hypertension, Abnormal liver/kidney function, Stroke, Bleeding, Labile INR, Elderly, Drugs/Alcohol), available at http://www.mdcalc.com/has-bled-score-for-major-bleeding-risk/) can help identify patients who have an increased risk of bleeding; however, they are generally not helpful for risk stratification when evaluating a patient in the ED who has an acute bleed.[43]

In addition to these scoring systems, other tests have been studied as a means of risk stratifying patients with upper GI bleeding. In a 2014 retrospective study, Shah et al reported a 6.4-fold increase in mortality rate in patients with GI bleeding and a lactic acid > 4 mmol/L.[44] In addition, the authors found a linear association between increasing lactic acid and mortality. While the exact significance is unclear, patients with elevated lactic acid in the setting of upper GI bleeding should be considered to be at a high risk of decompensating and having an adverse outcome.[44]

Determining Suitability For Outpatient Management

There are limited data for identifying ED patients with upper GI bleeding who may be appropriate for outpatient management. The American College of

Table 7. The Blatchford Score[43]

Admission Risk Marker	Score Component Value
Blood Urea Nitrogen Level (mg/dL)	
18.2 to < 22.4	2
22.4 to < 28	3
28 to < 70	4
≥ 70	6
Hemoglobin Level For Men (g/dL)	
12 to < 13	1
10 to < 12	3
< 10	6
Hemoglobin Level For Women (g/dL)	
10 to < 12	1
< 10	6
Systolic Blood Pressure (mm Hg)	
100 to < 109	1
90 to 99	2
< 90	3
Other Markers	
Pulse rate ≥ 100 beats/min	1
Presentation with melena	1
Presentation with syncope	2
Hepatic disease	2
Heart failure	2
Total	_____

Range of scores is from 0 to 23; maximum score is 23. High risk: > 0.

Gastroenterology conditionally recommends outpatient therapy for individuals with upper GI bleeding who have all of the following: BUN < 18.2; hemoglobin ≥ 13 g/dL for men and ≥ 12 g/dL for women; systolic blood pressure ≥ 110 mm Hg; pulse < 100 beats/min; and absence of congestive heart failure, syncope, melena, cardiac failure, and liver disease.[15] While age is not specifically listed, the college recommends an assessment of individualized risk beyond the parameters provided. Overall, these criteria seem to describe well-appearing patients with normal laboratory results and vital signs, with few comorbidities. While these factors may correctly identify patients at low risk, the presence of any of these features does not sufficiently rule out the risk of decompensation. In addition, these recommendations are from other specialties' professional organizations and may not be applicable to ED patients. While consultants may suggest that a patient is appropriate for outpatient follow-up, emergency clinicians do not have reliable data or pertinent recommendations to accurately identify this subset of patients. Given this lack of evidence and the risk of decompensation, exercise caution when discharging a patient with a potential upper GI bleed from the ED.

In summary, clinical scoring systems exist that can help identify high-risk patients; however, the available data are somewhat limited in their ability to accurately identify patients who are appropriate for outpatient treatment.

Intensive Care Unit Versus Acute Care Admission

The current literature is unclear in identifying patients with acute upper GI bleeding who need to be admitted to an intensive care unit setting rather than a monitored medical unit. As discussed previously, there are various clinical scoring systems that have been studied in an attempt to identify high-risk patients; however, few of these scores have looked specifically at the appropriate level of care within the hospital. Ultimately, the decision to admit a patient to the intensive care unit needs to be made based on the provider's clinical assessment in conjunction with the admitting team and resources available in the hospital. Clinical scoring systems and other indicators (such as lactic acid) can be used to help identify patients with an increased risk of having an adverse event. While not yet fully supported by the literature, these high-risk patients may benefit from admission to a higher level of care.

Summary

Patients with potential upper GI bleeding encompass a wide variety of diseases and have a similarly broad spectrum of severity when presenting to the ED. While some patients will be critically ill on arrival, other patients may be initially well appearing and then decompensate rapidly. Other patients may have an overall benign, self-limited episode of bleeding that does not require any further testing or follow-up. Unstable patients with active bleeding can typically be categorized as bleeding from variceal or nonvariceal sources. While these groups may present similarly, the treatment varies dramatically. Early gastroenterology consultation can help emergency clinicians determine an expeditious and appropriate course of treatment. For well-appearing patients with no ongoing bleeding, outpatient follow-up may be appropriate; however, this decision should be made on a case-by-case basis.

Case Conclusions

Your 67-year-old patient's presentation was consistent with a hemodynamically significant upper GI bleed. IV access was immediately obtained with 2 large-bore IVs and fluid resuscitation was begun. Due to ongoing respiratory distress, you intubated her. You transfused her initially with universal donor type and gave her vitamin K and prothrombin complex concentrate to normalize her coagulation profile. Her blood pressures increased slowly after she received several units of blood. You consulted with gastroenterology to evaluate for possible endoscopy, and the patient was admitted to the intensive care unit.

Your 45-year-old cirrhotic patient presented with signs and symptoms concerning for a variceal upper GI bleed in the setting of chronic liver disease. You established 2 large-bore IVs, and he was typed and cross-matched and given a bolus of normal saline. You ordered lab tests, including a coagulation profile. You gave him an empiric dose of antibiotics out of concern for possible variceal bleeding and consulted gastroenterology for emergent endoscopy. At the request of the consulting service, octreotide was ordered. The patient underwent endoscopy with variceal banding and, after the procedure, he was admitted to a step-down unit for monitoring and was eventually discharged after an uneventful hospital stay.

Risk Management Pitfalls For Upper Gastrointestinal Bleeding

1. **"She looked good in triage. I am surprised she went into shock."**
   Patients with upper GI bleeding have the potential to decompensate rapidly. When seen initially in triage, these patients may appear well. Nursing staff should promptly identify patients with a potential upper GI bleed and triage them appropriately to minimize any avoidable delay between their arrival and assessment by an emergency clinician.

2. **"He had normal vital signs."**
   In the setting of an upper GI bleed, do not rely too heavily on the presence of normal vital signs when attempting to risk stratify patients. Young patients may experience significant blood loss before developing markedly abnormal vital signs. Similarly, patients taking nodal blocking agents may not develop tachycardia in response to ongoing bleeding. Recognize the risk of occult shock in young patients, and consider the potentially confounding effects of various medications when evaluating a patient's vital signs.

3. **"I didn't think that the patient needed a rectal examination."**
   Patients who complain of having blood in their vomit and stool need to have a complete physical examination performed. Obtain a stool specimen to evaluate for gross or occult blood. In addition, a rectal examination may suggest a proximal source of bleeding, such as a hemorrhoid or rectal fissure.

4. **"The patient had a normal hematocrit, so I thought that he would be fine."**
   In the early stages of bleeding, patients may have seemingly normal laboratory results, including hematocrit and hemoglobin. Consider the risk of ongoing bleeding, and repeat laboratory testing as clinically indicated.

5. **"The patient looked good when I was in the room."**
   In a busy ED, it can be difficult, at times, to re-examine patients. Patients with a potential upper GI bleed are at risk of deterioration, so monitor these patients closely to ensure that any changes in their condition are addressed in a timely fashion.

6. **"I didn't want to wake the gastroenterologist up in the middle of the night."**
   Consult the gastroenterology service early in the course of the patient's ED visit, when appropriate. Waiting for certain test results prior to discussing the case with the gastroenterology service could result in a delay in obtaining definitive care when a patient needs emergent endoscopy. While not all patients with upper GI bleeding need an emergent gastroenterology consult, given the potentially unstable nature of these patients, err on the side of discussing the case earlier in the course of the visit rather than later.

7. **"I thought that she would be fine on the floor."**
   Consider available resources when admitting a patient with a potential upper GI bleed. Decisions such as the need for intensive care unit level of monitoring and the availability of emergent endoscopy should be discussed and clearly documented during the patient's ED course.

8. **"The patient was stable; I didn't think she needed to be admitted."**
   While not all patients with upper GI bleeding need inpatient workup and monitoring, exercise caution when discharging patients from the ED. Clearly document the findings and decision process that helped make the decision to discharge the patient.

9. **"I didn't realize that the patient was on an anticoagulant."**
   Critically ill patients with ongoing bleeding who are on anticoagulants likely need rapid reversal of their anticoagulation. Rapidly assess the risk of reversing a patient's anticoagulation, and weigh this with the risk of ongoing bleeding. These decisions should be clearly documented.

10. **"I told the patient to see his primary care provider."**
    Patients discharged from the ED need clear time- and action-specific follow-up instructions. A simple approach would be to have patients return for any new or concerning symptoms or if they get worse. Specific signs that should prompt an immediate return (such as recurrent bleeding) should be discussed. Document that a patient verbalized an understanding of the return instructions.

Time- And Cost-Effective Strategies

- Imaging should not be obtained in all patients who present with a potential upper GI bleed.
- PPIs should not be ordered empirically on all patients who present with upper GI bleeding.
- Octreotide should not be ordered without a discussion with the admitting service, as it offers minimal benefit to patients.
- Antibiotics should be given to all patients who are at risk of having a variceal upper GI bleed.
- Consider a restrictive transfusion strategy using a goal hematocrit of 21 in patients who have an ongoing upper GI bleed.
- Obtain early consultation with gastroenterology on all patients with a significant upper GI bleed.
- Exercise caution when discharging a patient with a potential upper GI bleed, as available approaches to risk stratification have limitations when used in the ED.
- Given the questionable efficacy of the various pharmacologic agents discussed earlier, it would be reasonable to discuss these treatment options with the gastroenterology service rather than giving a wide range of fairly expensive medications to all patients with a potential GI bleed. Similarly judicious use of blood products is likely to be beneficial from both a patient outcome and resource utilization standpoint.
- **Risk-Management Caveat:** Exercise caution when developing cost-effective strategies to manage potential upper GI bleeding. Given the broad spectrum of severity that is seen across various causes of bleeding, it may be difficult to accurately identify ED patients who are appropriate for a less-extensive workup. For instance, a patient with a history of hepatitis C who presents with hematemesis from a Mallory-Weiss tear may, initially, be clinically indistinguishable from a patient who is bleeding from esophageal varices. In hindsight, the hepatitis C patient in the case presentation likely needs very little workup emergently, while the patient with variceal bleeding may require emergent endoscopy, esophageal banding, and an intensive care unit stay. In order to improve patient outcomes, emergency clinicians may tend to maximize workups of bleeding patients in order to avoid missing potentially ominous causes of upper GI bleeding.

References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, randomized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study will be included in bold type following the reference, where available. In addition, the most informative references cited in this paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.

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Correction

An editorial error in the March 2015 issue of *Emergency Medicine Practice* was made on page 1 in the title for the author, Dr. Woo. The correct title line should have read, "Kar-Mun C. Woo, MD." We regret the error. For an updated, corrected version of the issue, please visit our website, at: www.ebmedicine.net/DVT.

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1. Which of the following regarding patients with hepatic cirrhosis and upper GI bleeding is FALSE?
   a. Liver synthetic function plays a role in their predisposition to hemorrhage.
   b. Variceal bleeding is usually of minor importance, as it represents venous, not arterial, hemorrhage.
   c. Variceal bleeding is the most common form of upper GI bleeding seen in cirrhotic patients.
   d. Antibiotics play an important role in the management of these patients.

2. In the management of upper GI bleeding, which of the following statements is the most accurate?
   a. Surgical interventions are first-line.
   b. All life-threatening upper GI bleeding requires emergent endoscopy within 6 hours of presentation.
   c. PPIs should be considered primary pharmacotherapy.
   d. The first step in management is evaluation for airway and hemodynamic compromise.

3. A 30-year-old otherwise healthy male presents with hematemesis he reports as "cupfuls and cupfuls." His vital signs are: pulse, 85 beats/min; blood pressure, 120/80 mm Hg, respiratory rate, 18 breaths/min. Which of the following is TRUE?
   a. The normal vital signs in this patient obviate the need for a workup.
   b. Patient history of "cupfuls and cupfuls" is a red flag that necessitates a gastroenterology consult.
   c. Laboratory testing is not indicated.
   d. The most likely diagnosis is a Mallory-Weiss tear.

4. A 35-year-old man with a history of chronic epigastric pain and known peptic ulcer disease presents for evaluation of 4 hours of severe diffuse abdominal pain. He reports emesis with occasional streaking blood but denies hematochezia. His vital signs are: temperature, 38.4°C; pulse rate, 115 beats/min; blood pressure, 110/60 mm Hg; and respiratory rate, 23 breaths/min. The patient is in some distress, with evidence of peritonitis on examination, with guarding and rigidity. Which of the following studies is likely to provide a diagnosis?
   a. Hemoccult testing
   b. NG lavage
   c. Upright plain chest x-ray
   d. Serum lipase

5. Assuming hemodynamic stability and hemostasis, what should be the target hemoglobin for transfusion in the patient with upper GI bleeding?
   a. Whatever the physician feels is appropriate
   b. 5 mg/dL
   c. 7 mg/dL
   d. 10 mg/dL

6. In variceal hemorrhage, which of the following has been shown to improve mortality?
   a. Proton pump inhibitor
   b. Somatostatin analogue
   c. Lactulose
   d. Antibiotic coverage of gut flora

7. A 65-year-old patient with a mechanical aortic valve replacement presents for evaluation of a single episode of hematemesis. He is well appearing with normal vital signs and brown heme negative stool. An NG tube is placed that reveals scant blood. Laboratory evaluation shows normal lactic acid and hematocrit but an INR of 2.5. Which of the following is NOT indicated?
   a. Establishment of IV access
   b. Emergent gastroenterology consultation
   c. Hemodynamic and cardiac monitoring
   d. Emergent reversal of INR

8. Which of the following best characterizes the utility of scoring systems in upper GI bleeding?
   a. The Rockall scoring system is more sensitive than the Blatchford scoring system.
   b. A patient may be considered for discharge to outpatient therapy based on normal laboratory evaluation and vital signs alone.
   c. Both the Rockall and Blatchford scoring systems are applicable for variceal bleeding.
   d. The overall clinical picture must be considered in the disposition of any patient with a chief complaint of upper GI bleeding.

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