

## Management of Upper Gastrointestinal Bleeding

In the U.S., acute upper gastrointestinal bleeding (UGIB) is more common than lower gastrointestinal bleeding (LGIB). UGIB typically presents as hematemesis (vomiting of blood or coffee-ground appearing material) or melena (black, tarry stools). Severe cases can lead to shock and death.

### Causes

Major causes include gastric or duodenal ulcer, severe or erosive gastritis/duodenitis/esophagitis, esophagogastric varices, portal hypertensive gastropathy, angiodysplasia, arteriovenous malformation, Mallory-Weiss (esophageal tear), and upper GI polyps/cancers. The source of bleeding cannot be determined in 10-15% of patients with UGIB.

### Initial Evaluation

Rapid assessment and management of airway, breathing and circulation is the initial priority. Once the patient is stabilized, the goal is to assess the severity of the bleed, identify the potential source, and determine if there are underlying conditions that may affect the management.

- History
  - Previous episodes of upper GI bleeding; approximately 60% of patients with history of GI bleed are bleeding from the same lesion.
  - Liver disease or alcohol abuse (may cause varices or portal hypertensive gastropathy)
  - Abdominal aortic aneurysm or aortic graft (may cause aorto-enteric fistula)
  - Renal disease, aortic stenosis, or hereditary hemorrhagic telangiectasia (may cause angiodysplasia)
  - *Helicobacter pylori* (*H. pylori*) infection or smoking (can lead to peptic ulcer disease)
  - Smoking, alcohol abuse, or *H. pylori* infection (may increase risk of GI malignancy)
  - Hospitalization for a life-threatening critical illness (may cause stress ulcers, especially in patients with respiratory failure)
  - Vomiting, straining with stool or lifting, or severe coughing (may precipitate Mallory-Weiss tear)
  - Comorbid conditions that may affect management include:
    - Coronary artery disease and pulmonary disease make patients susceptible to adverse effects of anemia
    - Renal disease and heart failure predispose patients to volume overload with fluid resuscitation or blood transfusions.
    - Coagulopathies, thrombocytopenia, or liver dysfunction may make bleeding difficult to control and may require transfusion of fresh frozen plasma (FFP) or platelets. Also consider patient use of anticoagulants or antiplatelet agents.
    - Dementia or hepatic encephalopathy could cause aspiration of GI contents; endotracheal intubation may be considered in these patients.
- Medication History
  - Aspirin and non-steroidal anti-inflammatory drugs (NSAIDs) may cause peptic ulcers.
  - Antiplatelet agents and anticoagulants may contribute to GI bleeding.
  - Use of corticosteroids can cause peptic ulcer disease.
  - Serotonin reuptake inhibitors (SSRI), calcium channel blockers, and aldosterone antagonists may be associated with GI bleeding.

- Bismuth and iron can cause black stools and alter clinical presentation.
- Patient symptoms can vary due to the severity of blood loss. Symptoms include: dizziness, light-headedness, confusion, angina, severe palpitations, cold/clammy extremities, upper abdominal pain, gastroesophageal reflux, dysphagia, nausea, emesis, jaundice, abdominal distension (ascites), involuntary weight loss, cachexia.
- Physical examination and assessment for hemodynamic instability and hypovolemia
  - Tachycardia indicates less than 15% of total blood volume loss; indicates mild-moderate hypovolemia.
  - Orthostatic or supine changes in blood pressure (may suggest moderate to severe blood loss) indicate 15% total blood volume loss.
  - Hypotension (suggests life-threatening blood loss) indicates 40% of total blood volume loss.
  - Rectal exam (to assess stool color [melena, hematochezia, brown])
  - Significant abdominal tenderness with signs of involuntary guarding (suggests perforation)
  - Signs of advanced liver disease such as jaundice, ascites, and altered mental status
- Laboratory Tests
  - Type and crossmatch if patient is high-risk, hemodynamically unstable, or has severe bleeding.
  - Type and screen for hemodynamically stable patient without signs of severe bleeding.
  - Complete blood count
    - Initial hemoglobin, then every 2 to 8 hours, depending on severity of the bleed
    - Note excessive crystalloid administration can cause a falsely low hemoglobin value.
  - Serum electrolytes
  - Liver enzymes (AST, ALT)
  - Coagulation studies
  - Ratio of blood urea nitrogen to serum creatinine greater than 30
  - Serial electrocardiogram and cardiac enzymes may be indicated in patients at risk for demand ischemia or myocardial infarction.
  - Check stool for occult blood.
- Nasogastric lavage may be helpful if source of bleeding is unclear or to clean stomach prior to endoscopy. If esophagogastric varices are suspected, place gastric tubes only at discretion of gastroenterologist.

## Management

- Assessment and reassessment of airway, breathing, circulation and hemodynamics
- Closely monitor airway, vital signs, cardiac rhythm, urine output, nasogastric tube output (if nasogastric tube in place) and overall clinical status.
- Keep patient NPO.
- Provide supplemental oxygen.
- Continuously monitor pulse oximetry.
- Obtain intravenous (IV) access with either two 18 gauge or larger IV catheters and/or large bore, single-lumen central lines.
- Obtain immediate consultation with gastroenterologist.
- Obtain advanced imaging as necessary such as CT angiogram to assess for active site of bleeding.
- Volume resuscitation with packed red blood cells

- Reversal of any coagulopathies or use of anticoagulants
- Trend hemoglobin and hematocrit.
- Consult with surgical and interventional radiology:
  - If endoscopic therapy will not be successful
  - If patient is at high risk for rebleeding or complications associated with endoscopy
  - If patient may have an aorto-enteric fistula
- Minimally invasive techniques to control bleeding include sclerotherapy, embolization, and other vascular occlusion techniques.
- The 2019 International Consensus on the Management of Patients with Nonvariceal Upper Gastrointestinal Bleeding recommends a transfusion threshold of 8 g/dL for all patients except those with exsanguinating bleeding (Barkun et al., 2019). For unstable or exsanguinating patients, see the table below.

### Hemodynamically Unstable Patients

- Admit patients with hemodynamic instability or active bleeding to intensive care for resuscitation and vital sign monitoring.
- For patients with active bleeding, begin fluid resuscitation immediately; administer 500 mL of normal saline or lactated Ringer’s solution over 30 minutes.
- Administer blood products, as recommended in the table below.
- Avoid over-transfusion in patients with suspected variceal bleeding as it can worsen the condition.

<b>TRANSFUSION RECOMMENDATIONS FOR HEMODYNAMICALLY UNSTABLE PATIENTS (SALTZMAN, 2023)</b>	
<b>PATIENT STATUS</b>	<b>BLOOD PRODUCTS</b>
Severe, ongoing bleeding	Packed red blood cells (PRBCs), plasma, and platelets in 1:1:1 ratio immediately
Hemodynamic instability despite crystalloid resuscitation	1 to 2 units PRBCs
Hemoglobin less than 8 g/dL (80 g/L) in high-risk or actively bleeding patients	1 unit PRBCs
Coagulopathy or after transfusing 4 units PRBCs	Fresh frozen plasma, per facility protocol
Thrombocytopenia (platelet count less than 50,000) or platelet dysfunction or after 4 units PRBCs	Platelets, per facility protocol
Hemoglobin less than 7 g/dL (80 g/L) in low-risk patients	1 unit PRBCs

- For stable patients with hemoglobin less than 7 g/dL (70 g/L), if bleeding has stopped, the recommendation is to transfuse 1 unit PRBCs, with second unit available (Stanley, 2019).

### Medications

- For all patients with suspected or known severe bleeding:
  - Proton pump inhibitors
    - Evidence of active bleeding (i.e., hematemesis, hemodynamic instability): give esomeprazole or pantoprazole, 80 mg IV and start pantoprazole infusion at 8 mg/hr

- No evidence of active bleeding: give esomeprazole or pantoprazole, 40 mg IV every 12 hours until endoscopy is performed.
- For patients with known or suspected esophagogastric variceal bleeding and/or cirrhosis:
  - Administer somatostatin or its analogue, octreotide (Bajaj & Sanyal, 2022)
    - Octreotide 50 mcg IV bolus followed by continuous infusion at 50 mcg/ hour; not recommended in patients with acute nonvariceal UGIB.
    - Treatment continues for 3 to 5 days following cessation of bleeding.
  - Administer antibiotics (i.e., ceftriaxone or fluoroquinolone) for Spontaneous Bacterial Peritonitis (SBP) prophylaxis.
- Anticoagulants and antiplatelet agent considerations.
  - Current daily use should not delay endoscopy.
  - Should be held in patients with GI bleeding until source is identified.
  - Consider reversal agents (i.e., prothrombin complex, vitamin K), however risk of reversing anticoagulation (such as stroke) should be weighed against risk of bleeding without reversal.

## Endoscopy

- Upper endoscopy is the first choice for acute upper GI bleeding and has a high sensitivity for locating and identifying bleeding lesions in the upper GI tract.
- Once identified, therapeutic endoscopy can achieve acute hemostasis and prevent recurrent bleeding.
- Early endoscopy (within 24 hours) is recommended for most patients with acute UGIB.
- For patients with suspected variceal bleeding, endoscopy should be performed within 12 hours of presentation.
- The patient should be adequately resuscitated and stabilized prior to endoscopy.
- Risks include:
  - Pulmonary aspiration
  - Adverse reactions to conscious sedation medications
  - GI perforation
  - Increased bleeding during the procedure
- GI barium studies are contraindicated in acute UGIB as they will interfere with endoscopy, angiography, or surgery.

## Factors Associated with Rebleeding

- Hemodynamic instability (systolic blood pressure less than 100 mm Hg, heart rate greater than 100 beats per minute)
- Hemoglobin less than 10 g/L
- Active bleeding at the time of endoscopy
- Large ulcer size (greater than 1 to 3 cm)
- Ulcer location (posterior duodenal bulb or high lesser gastric curvature)

## Endoscopic Therapy

- For bleeding peptic ulcers
  - Local injection of epinephrine
  - Clipping of actively bleeding ulcers or Mallory-Weiss tears
  - Thermal probe coagulation, often in conjunction with epinephrine injection

- For bleeding esophageal varices:
  - Endoscopic variceal ligation (EVL) is the initial treatment of choice.
    - Similar to hemorrhoidal banding; small elastic bands are placed around varices in the distal 5 cm of the esophagus.
  - Endoscopic sclerotherapy (ES)
    - Injection of sclerosant solution into the varices using an injection needle that is passed through the accessory channel of the endoscope
    - Potential complications
      - Local: ulceration, bleeding, dysmotility, stricture formation, and portal hypertensive gastropathy
      - Regional: esophageal perforation and mediastinitis
      - Systemic: sepsis and aspiration with ventilation/perfusion mismatch and hypoxemia

### Emergent transjugular intrahepatic portosystemic shunt (TIPS)

The transjugular intrahepatic portosystemic shunt (TIPS) procedure is used for variceal bleeding after medical treatment and endoscopic fail. Transfer to a tertiary facility is often required. This interventional radiology procedure involves placement of a stent between the hepatic veins and the portal veins, relieving the high portal pressure that is causing the hemorrhage.

### Balloon Tamponade

Balloon tamponade may be performed as a temporary measure for patients with uncontrollable hemorrhage due to varices while a definitive treatment (endoscopy or TIPS) is being arranged.

- Devices for balloon tamponade include Sengstaken-Blakemore tube, Minnesota tube, and the Linton-Nachlas tube.
- Endotracheal intubation is necessary when using these devices to prevent aspiration.
- Equipment includes a tamponade tube kit (tube and clamps), a manometer (not needed for Linton tubes), large-volume syringes, traction/pulley system to maintain constant tension on the tube, and adequate suction.
- Before tube placement, inflate the balloons with air and hold underwater to assess for leakage.
- Place patient in supine or left-lateral position, lubricate tube and insert through mouth or nostril until at least 50 cm of the tube has been advanced.
- Ports are suctioned to remove all air and then gastric balloon is inflated with 100 mL of air.
- Radiograph should be obtained to confirm placement below the diaphragm prior to full inflation to avoid esophageal rupture; once confirmed, the balloon can be filled with an additional 350 to 400 mL of air, then clamp the air inlet.
- The tube is pulled until resistance is felt; the tube is then securely fastened to a pulley device or taped to a football helmet to maintain tension.
- If bleeding continues after inflation of the gastric balloon, the esophageal balloon can be inflated 30 to 45 mm Hg; pressure of this balloon should be checked at least hourly.
- Do not overinflate the esophageal balloon as this can cause esophageal necrosis or rupture.
- Once bleeding is controlled, pressure in the esophageal balloon can be reduced by 5 mm Hg to goal pressure of 25 mm Hg.
- Tube can be left in place for 24 to 48 hours; the gastric and esophageal balloons should be deflated every 12 hours to check for rebleeding.
- There is a high risk for rebleeding following balloon deflation.

- Use with caution in patients with respiratory failure, cardiac arrhythmias, or hiatal hernia.

### Uncontrolled Bleeding

- Massive uncontrolled upper GI bleeding is a medical emergency.
- All bedside caregivers should wear full personal protective gear, including eye protection.
- Immediate priorities include controlling the airway and resuscitation with blood products in hemodynamically unstable patients.
- Reverse any anticoagulants the patient has been taking.
- Give fresh frozen plasma to patients with known or presumed coagulopathy.
- For esophageal varices, if bleeding cannot be controlled endoscopically, treatment options include transjugular intrahepatic portosystemic shunt (TIPS) placement or surgical shunting.
- As a last resort, resuscitative endovascular balloon occlusion of the aorta (REBOA) can be used to limit blood loss and support perfusion of vital organs until bleeding sources can be directly controlled.

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