Disorders of the digestive tract may result in gastrointestinal bleeding. The blood is not always visible in the stool or vomit; however, it may result in tarry black stools. Bleeding can be life-threatening in some cases. Identifying the source of bleeding is not always easy, especially if its origin is in the small intestines.

Definition and Background of Gastrointestinal Bleeding

Gastrointestinal bleeding is one of the common causes of hospital admissions and it is a life-threatening abdominal emergency. If the bleeding source is proximal to the ligament of Treitz, it is considered upper gastrointestinal bleeding.
Epidemiology of Gastrointestinal Bleeding

About **100,000 patients** are hospitalized every year in the United States because of upper GI bleeding. About **70,000 UGIB patients** are admitted to hospitals each year in the United Kingdom. **Males have a 2-fold higher risk** of developing upper GI bleeding than females; older patients (more than 60 years old) have a higher risk of mortality.

Etiology of Gastrointestinal Bleeding

Non-steroidal anti-inflammatory drugs (NSAIDs)

NSAIDs inhibit **cyclooxygenase**, which results in decreased synthesis of **mucosal prostaglandin** and leads to **impaired mucosal defenses**. There is a **40-fold** increase in the risk of developing a gastric ulcer (leading to gastrointestinal bleeding) in patients who use NSAIDs on a daily basis, and the risk of duodenal ulcer formation increases to **8-fold** in these patients.

Ulcers

The majority of patients presenting with upper gastrointestinal bleeding suffer from **peptic ulcers**. As the ulcer gets deeper into the mucosa, it causes **weakening** and **necrosis** of the **arterial wall**, eventually resulting in bleeding.

Vomiting

The upper **stomach** and the lower **esophagus** are inverted forcefully during vomiting, which may lead to a **mucosal tear** in one of these parts. The severity of the bleeding is determined by the **depth of the tear** in the mucosa. Sometimes, in rare cases, an **esophageal rupture** may occur, leading to a condition called **Boerhaave syndrome**.

Mallory-Weiss tears

**Mallory-Weiss** tears are tears in the mucosa of the **gastric cardia**, which results in massive upper gastrointestinal bleeding. About **15%** of acute upper GI bleeding is caused by Mallory-Weiss tears.
Acute stress gastritis

Different predisposing clinical conditions, such as **multiple trauma, shock, acute renal failure** and **respiratory distress syndrome**, may have the potential to alter the protective barriers of the mucosa.

Symptoms of Gastrointestinal Bleeding

Signs of gastrointestinal bleeding

- Melena (black stool with bad odor)
- Hematemesis
- Hematochezia (red stools)
- Presyncope
- Syncope
- Dyspepsia
- Heartburn
- Epigastric pain
- Dysphagia
- Diffuse abdominal pain
- Weight loss
- Jaundice

It is important to do a thorough physical examination in order to **evaluate for shock** or **blood loss**. **Blood pressure** and **pulse** should be checked for patients presenting with upper GI bleeding. A physical examination should also include looking for signs of **liver disease**, such as **gynecomastia, splenomegaly, ascites** and **spider angioma**; or signs of a **tumor**, such as **abdominal mass, nodular liver and enlarged lymph nodes**.

Presentation of Gastrointestinal Bleeding

A thorough **history** and **physical examination** are important in patients presenting with symptoms and signs of GI bleeding. It is important to ask about **comorbid diseases, medications use, exposure to toxins**, as well as the **course of the symptoms**.
Diagnosis of Gastrointestinal Bleeding

It is important to assess the level of blood loss in patients with gastrointestinal bleeding through a **complete blood count** with **platelet count** and **differential**. Patients should be assessed for a **hemorrhagic shock** as it has a high mortality risk up to **30%**. Hemorrhagic shock can be classified into **four classes** based on the detected signs:

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Class 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss, mL</td>
<td>Up to 750</td>
<td>750-1500</td>
<td>1500-2000</td>
</tr>
<tr>
<td>Blood loss, % blood volume</td>
<td>Up to 15%</td>
<td>15-30 %</td>
<td>30-40 %</td>
</tr>
<tr>
<td>Pulse rate, bpm</td>
<td>&lt; 100</td>
<td>&gt; 100</td>
<td>&gt; 120</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Normal or increased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Decreased</td>
</tr>
<tr>
<td>Urine output, mL/h</td>
<td>&gt; 35</td>
<td>30–40</td>
<td>20–30</td>
</tr>
<tr>
<td>CNS status</td>
<td>Slightly anxious</td>
<td>Mildly anxious</td>
<td>Anxious and confused</td>
</tr>
<tr>
<td>Fluid replacement</td>
<td>Crystalloid</td>
<td>Crystalloid</td>
<td>and blood</td>
</tr>
</tbody>
</table>

**Crossmatch**

**Blood type** and **crossmatch** should be ordered, depending on the **clinical assessment** and the **initial hemoglobin level** of the patient. Because of **hypovolemia** and **hypoperfusion**, patients with GI bleeding usually require **blood transfusions**.

**BMP and BUN**

It is essential to evaluate for **renal comorbidity** using the **basic metabolic profile (BMP)**. However, **BUN levels** may be elevated as a result of the blood in the upper intestine.

**Coagulation profile**

**Coagulopathy** should be documented by measuring the patient’s **prothrombin time**, **activated partial thromboplastin time** and **international normalized ratio**.

**Chest radiographs**

Ordering **chest x-rays** is useful in excluding several conditions, including **effusion**, **aspiration pneumonia**, as well as **esophageal perforation**. **Perforated ileus and viscus** can be excluded using **upright radiographs**.

**Endoscopy**

Using endoscopy is very useful in both the **diagnosis** and **management** of GI bleeding. It can be used to **detect the source of bleeding** and manage it.
Computed tomography scanning (CT)

Different conditions can be evaluated using CT scanning and ultrasonography, such as liver cirrhosis, cholecystitis, pancreatitis with hemorrhage and pseudocyst, aortoenteric fistula, or other uncommon causes of gastrointestinal bleeding.

Angiography

If endoscopy fails to identify the source of bleeding, then angiography can be useful in case the bleeding persists.

Nasogastric lavage

It is an important procedure used to confirm possible active bleeding or recent bleeding. The nasogastric tube can also reduce the chance of vomiting in patients.

Differential Diagnosis of Gastrointestinal Bleeding

Clinical pictures similar to gastrointestinal bleeding

- Mallory-Weiss tear
- Neoplasm
- Gastric varices
- Hemobilia
- Hemorrhagic gastritis
- Pancreatic pseudoaneurysm
- Aortoenteric fistula
- Cardiac cirrhosis
- Benign gastric tumors
- Celiac sprue
- Cholecystitis
- Cirrhosis
- Dengue fever
- Zollinger-Ellison syndrome
- Von Willebrand disease
- Abdominal aortic aneurysm
- Acute gastritis
- Esophageal cancer
- Barrett esophagus
- Esophageal varices
- Esophagitis
- Gastric outlet obstruction
- Gastrinoma
- Peptic ulcer disease

Therapy of Gastrointestinal Bleeding

Treatment of gastrointestinal bleeding

Correction of the shock and coagulation abnormalities in order to stabilize the patient is the main goal in management.
Proton pump inhibitors (PPIs)

Treatment with high doses of proton pump inhibitors helps decrease the risk of needing endoscopy as a treatment procedure. PPIs maintain the level of gastric pH above 6, which protects an ulcer clot from fibrinolysis.

Therapeutic endoscopy

It is considered the method of choice in controlling hemorrhages from active ulcers. Seven techniques can be used in therapeutic endoscopy, which are:

1. Heater-probe coagulation
2. Bipolar electrode coagulation
3. Injection of sclerosants or epinephrine
4. Laser coagulation
5. Use of banding devices
6. Argon plasma coagulation
7. Endoscopic application of clips

Surgery

Surgical intervention may be required in some patients. Indications for surgical intervention include:

- **Persistent recurrent bleeding** after the failure of medical therapy and endoscopic hemostasis.
- A hemorrhage that is severe and life-threatening and not responding to resuscitation.
- Other coexisting reasons for surgical intervention, such as obstruction, malignancy or perforation.
- If the patient is hospitalized for the second time because of peptic ulcer hemorrhage.
- Bleeding for a long time, with more than 50% loss of the patient’s blood volume.

Review Questions

The correct answers can be found below the references.

1. A 72-year-old alcoholic gentleman is hospitalized and evaluated for a hematemesis episode. He has alcoholic cirrhosis. He presented to the hospital a couple of days ago complaining of hypotension and black tarry stools. He was resuscitated and two units of blood were transfused to him. Esophageal varices were demonstrated by esophagogastroduodenoscopy (EGD) but there was no evidence of recent bleeding. Colonoscopy was performed as well and revealed old blood with no source for active bleeding. During the hospitalization time, he vomited coffee ground copious blood. On physical examination, you found that his blood pressure is 105/60 mmHg, his pulse is 100/min, and his temperature is 37.2 C (99.14 F). Laboratory studies revealed a hemoglobin level of 10.2 g/dl and INR 1.3. Which of the following is the next step in the management of this man, after resuscitation with intravenous fluid and placement of a nasogastric tube?
A. Transjugular intrahepatic portosystemic shunt (TIPS)
B. Balloon tamponade
C. Intravenous nadolol
D. Capsule endoscopy
E. Repeat esophagogastroduodenoscopy (EGD)

2. A 52-year-old man presented to the hospital because of an episode of hematemesis one hour ago, which has subsided since then. His past medical history includes cirrhosis and known esophageal varices, which have been banded previously. By physical examination, his blood pressure is 100/60 mmHg, his pulse rate is 105, respiratory rate is 15, O2 96%, and his temperature is 37 C (98.6 F). In the emergency department, as you start your examination, his blood pressure drops to 90/60, and he starts to vomit bright red blood. His mental status changes within the next few minutes. On physical examination, you find that he withdraws only when you rub his sternum, he opens his eyes, and he is saying incoherent words. What is the most appropriate step in the management of this man?

A. Intubation
B. Start with chest compressions
C. Transfer him to the operation room
D. Start intravenous octreotide
E. Endoscopic intervention

3. A 66-year-old patient comes to the emergency department because he passed a bloody stool. One of the steps in the workup of this patient is technetium-99 labeled erythrocyte scintigraphy. When is this the appropriate step in his workup?

A. He continues to bleed and a colonoscopy does not reveal the source of bleeding
B. He stops bleeding and a colonoscopy does not reveal the source of bleeding
C. The bleeding source is not revealed by colonoscopy, but it is revealed by arteriogram
D. Blood is revealed by NG tube aspiration
E. Colonoscopy reveals the source of bleeding

References

Correct answers: 1E, 2A, 3A

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