Hematemesis/Upper GI Bleed in PEDs

Background
1. Definition
   - Bleeding from GI tract proximal to ligament of Treitz
2. General information
   - Upper GI bleeding commonly presents with hematemesis (vomiting of bright red blood or "coffee ground" material [blood altered by gastric acid])
   - May also have melena (dark colored, tarry stools)
   - Massive upper GI bleed can present with hematochezia (bright red, bloody stools)
   - Bleeding not explained by hemoptysis, epistaxis, or other non-GI source

Pathophysiology
1. Pathology
   - Neonates
     - Esophagitis, gastritis, gastroduodenal ulcers
     - Mallory-Weiss tear, congenital malformations
     - Intestinal duplication, heterotopic pancreatic tissue
     - Liver failure, coagulopathy
     - Cow's milk allergy
2. Incidence/prevalence
   - GI bleeding is rare in the general pediatric population and is not well documented
   - Published data are limited to pediatric ICU patients
   - One pediatric ICU study reported an incidence of 6.4% (63 episodes in 984 pediatric ICU patients) - only 0.4% were considered life threatening
   - Another study reported an incidence of 25% among pediatric ICU patients not receiving prophylactic therapy for bleeding
3. Risk factors
   - Medications (NSAIDs, corticosteroids, anticoagulants, etc.)
   - Bleeding diathesis / disorder
   - Chronic liver disease
   - Major illness / PICU patient
   - Genetic, age, and environmental factors related to the conditions causing the bleeding
4. Morbidity/mortality
   - Mortality is low in children with upper GI bleeding
     - High potential for recovery
     - Few comorbid conditions
     - Attentive care usually given
     - In contrast to significant mortality in elderly patients despite aggressive treatment
   - Some specific fatalities reported:
     - Candida esophagitis in child with AIDS
     - Perforated ulcers
     - Sulindac-induced gastritis
     - Vascular anomalies
- Varices associated with anomalous pulmonary venous drainage or portal hypertension

**Diagnostics**

1. **History**
   - Bleeding characteristics
     - Timing and quantity?
       - Helps determine severity of bleeding
     - Site?
       - Helps determine source of bleeding (nasopharynx/oropharynx?)
     - Color?
       - "Coffee ground" emesis suggests blood altered by gastric acid
   - Exposure to ill contacts or contaminated food?
     - Consider esophagitis, gastritis
   - Recent ingestion of NSAIDs?
     - Consider gastric or duodenal ulceration
   - Vomiting, retching, or paroxysmal cough preceding hematemesis?
     - Consider Mallory-Weiss tear
   - Abdominal pain?
     - Consider ulceration, gastritis, esophagitis
   - Trauma?
     - Consider hepatic laceration resulting in hemobilia
   - Jaundice, bruising, stool pallor?
     - Consider liver disease
   - Breastfeeding?
     - Consider ingestion of bloody maternal milk
   - Ingestion of red food, red food coloring or dyes? (Tylenol, food coloring)
     - True bleeding may not be present
   - Past medical history
     - Liver or other GI disease
     - Congenital conditions such as gastrointestinal duplication or vascular malformations
   - Family history
     - Coagulopathy such as Von Willebrand disease, hemophilia

2. **Physical exam**
   - Is bleeding truly present?
     - Guaiac or Hemoccult test may be needed for confirmation
   - Vital signs with orthostatic BPs
   - Thorough exam with particular attention to:
     - Nasopharynx and oropharynx
       - Source of bleeding (mucosal lesions, swallowed blood)
       - Inflamed tonsils
       - Thrush
   - Skin
     - Capillary refill / pallor
     - Signs of liver disease (jaundice, spider angioma, palmar erythema)
     - Signs of bleeding diathesis
- Heart
  - Tachycardia

- Abdomen
  - Signs of portal hypertension (abdominal vessels or hemorrhoids)
  - Enlarged liver or spleen
  - Ascites
  - Tenderness

- Rectal
  - Evidence of bleeding - rectal exam and stool guaiac

3. Diagnostic testing
   - Laboratory evaluation
     - CBC - may need to do serial hemoglobins
     - Coagulation studies, including PT/PTT, platelets, DIC panel
     - Guaiac or hemoccult testing - emesis (or NG aspirate) and stool
       - See Stool color & guaiac testing
     - Liver function tests
     - BUN, creatinine - upper GI bleeding usually presents with an elevated BUN level, while a distal lower GI bleed typically presents with a normal BUN level
     - Apt test - distinguishes swallowed maternal blood vs. upper GI bleed in newborn
     - Type and cross-match blood

4. Diagnostic imaging
   - Chest & abdominal x-ray
     - Rule out radioopaque foreign body (disc battery), perforation, etc
   - Angiography (if needed to isolate and/or treat source)
   - Tagged red cell scan (Tc-99m)
     - Need 0.1 cc/min active bleeding
     - May indicate intraluminal pools of blood <5 cc
       - Pool location may not correlate with bleeding site
     - Delayed view (24 hrs) if initially neg
   - Upper GI barium studies contraindicated in acute upper GI bleeding

5. Other studies
   - Nasogastric tube
     - Positive aspirate
     - Site of bleeding is likely proximal to the ligament of Treitz
     - Negative aspirate
     - Does not exclude upper GI bleeding site beyond pylorus
   - Endoscopy
     - Dx test of choice for upper GI bleed
     - Done only after acute volume resuscitation has been initiated
     - Diagnostic upper endoscopy indicated:
       - For active, persistent, or recurrent bleeding
       - For hemodynamically significant hemorrhage
       - To distinguish between variceal and non-variceal bleeding
       - When sampling of tissue/fluid is indicated
- For clarification of imaging studies of the upper GI tract
- For unexplained iron deficiency anemia with guaiac-positive stools
  - Contraindicated for perforated GI tract

**Differential Diagnosis**

1. Neonates (birth - 1 month)
   - Swallowed maternal blood
   - Gastritis
   - Coagulopathy
   - Esophagitis
   - Gastroduodenal ulcer
   - Vascular anomaly / malformation
   - Hemorrhagic disease of the newborn (vitamin K deficiency)
   - Varices
   - Leiomyoma

2. Infants - Adolescents (1 month - 18 years old)
   - Nasopharyngeal bleeding
   - Gastritis
   - Esophagitis
   - Mallory-Weiss tear
   - Gastroduodenal ulcer
   - Esophageal varices
   - Allergic disease
   - Gastrointestinal duplication
   - Vascular anomaly / malformation
   - Coagulopathy / thrombocytopenia
   - Medication-induced (salicylates, other NSAIDs, steroids, etc.)
   - Hemobilia
   - Mucosal erosion (foreign body/caustic)
   - Red food coloring or dyes (Tylenol, food coloring)

**Acute Treatment**

1. ABCs, assess hemodynamic stability
2. Rehydration with NS prn
   - If hypotensive, 20 ml/kg bolus until BP improves
   - May repeat x2
   - If still low BP, consider transfusion
3. Resuscitation
   - Volume expansion
   - Oxygen
   - Foley catheter
   - Central venous line
   - Blood transfusion
   - Replacement of clotting components as needed / indicated (platelets, vitamin K, coagulation factors, FFP, etc)
- Intubation and ventilator support
  - Considered in patients with inadequate gag reflex
  - If obtunded or unconscious

4. Pass NG tube (size)
- Lavage with 0.9% NS until clear
  - 50 ml aliquots for infants
  - 100-200 ml aliquots for children
  - Assists in assessment of source, severity, and ongoing rate of bleeding
  - Aids in endoscopic evaluation
  - Prevents hyperammonemia in patients with liver disease
  - Helps stop bleeding

5. Medical therapy
- H2 blockers
  - Ranitidine
    - Neonates: 2 mg/kg/d div q8hr IV
    - Infants/children: 2-4 mg/kg/d IV div q6-8h
    - Continuous infusion: give daily IV dose over 24 h
  - Cimetidine
    - Neonates (<28 do): 5-20 mg/kg/d div q8-12hr IV/IM/PO
    - Infants/children: 10-20 mg/kg/d div q6-12hr IV/IM/PO
  - Famotidine
    - 0.25 mg/kg IV q12hr OR
    - 0.5 mg/kg PO qHS OR
    - 0.5 mg/kg/d div q12hr PO
    - May prevent secretion of acid, though it may not be helpful in controlling ulcer bleeding
- PPIs
  - Omeprazole
  - May reduce rebleeding rate, hospitalization stay, and need for blood transfusion
  - Less frequent acid-suppression failure than H2 blockers
- Vasoconstrictors
  - Vasopressin
    - Initial dose: 0.002-0.005 U/kg/min (titrate prn)
    - Max dose: 0.01 U/kg/min
  - Octreotide
    - 1 mcg/kg IV bolus, then 1 mcg/kg/hr infusion
    - Dilute in 50-100 mL NS or D5W

6. Endoscopy
- Therapeutic upper endoscopy indicated:
  - For sclerotherapy or banding of esophageal varices during or following bleeding episode
  - Treatment of persistent bleeding unresponsive to medical therapy
  - For removal of esophageal or sharp foreign bodies
- Prophylactic therapeutic upper endoscopy (for sclerotherapy or banding) not indicated for esophageal varices prior to first documented bleed
7. **Interventional radiology**
   - Arteriographic embolization
     - Potentially useful to control bleeding from ulcers or vascular anomalies
   - Transjugular intrahepatic portosystemic shunt (TIPS)
     - For patients with intrahepatic causes of portal hypertension
     - May not be feasible in some children because of small size or unfavorable vascular anatomy

8. **Surgical intervention**
   - For uncontrollable bleed

**Further Management**
1. If hospitalized, pt can be discharged when hemodynamically stable
   - Especially considering vital, Hgb, Hct; and cause of bleeding is treated or controlled
2. Consider iron replacement if iron deficiency present
   - May need to follow hemoglobin/hematocrit and iron studies to monitor stability

**Long-term Care**
1. Pt and family should be instructed on signs of repeat bleeding
   - See History and Physical exam
   - Family should call if symptoms present
   - Emergency services may be required
     - Especially if pt is having symptoms of impending shock or respiratory distress
2. Risk of rebleeding may be increased:
   - If underlying condition is persistently present - such as coagulopathy, liver disease, and congenital abnormalities
   - With certain medication use - such as NSAIDs or warfarin

**Follow Up**
1. Return to office
   - After discharge from the hospital to reassess patient's stability
   - More regular follow up may be needed for chronic conditions
   - May need to follow up with a specialist
2. Refer to specialist
   - Gastroenterology
     - Follow up for procedures - such as endoscopy, banding, TIPS, etc
     - To help manage chronic GI conditions
   - Hematology
     - To help manage chronic bleeding conditions/coagulopathies
   - Surgery
     - For follow up if surgery was required
3. Admit to hospital
   - If known bleeding recurs
   - Hemodynamic instability
   - May need to be admitted for work-up if repeat bleeding is suspected
Prognosis
1. In most cases prognosis is good if follow-up and preventative measures are in place
2. Prognosis may be worse if:
   o Pt has severe persistent underlying condition, such as:
     ▪ Liver disease with portal hypertension
     ▪ Coagulopathy
     ▪ Congenital vascular malformation
   o Cause of bleeding has left damage that increases risk for future complications, such as:
     ▪ Caustic ingestion
     ▪ Pill esophagitis or ulcers

Prevention
1. Related to patient's underlying condition and cause for bleeding
2. Avoid risk factors for bleeding including medications, when possible

References

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