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:
    - Pt has severe persistent underlying condition, such as:
        - Liver disease with portal hypertension
        - Coagulopathy
        - Congenital vascular malformation
    - 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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