

Project: Ghana Emergency Medicine Collaborative

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Gastrointestinal Bleeding in the Pediatric Patient



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Conference

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Objective

Review the causes of upper and lower gastrointestinal bleeding in the pediatric population. Provide some diagnostic tools and management strategies for the most common offenders.

Introduction

- Bloody emesis or bloody stools are very anxiety provoking for parents
- Gastrointestinal bleeding is common in the pediatric population.
- Fortunately, most are from non-serious causes
 - Anal fissures, infectious, milk protein allergy, oral trauma, prolapse gastropathy or esophagitis/gastritis
- Hemodynamically significant bleeding is uncommon.

Upper GI bleed

- Bleeding proximal to the ligament of Treitz.
 - Presents with:
 - Hematemesis – vomiting bright red blood or coffee-ground material.
 - Melena – black, tarry stools.
 - Time for gastric juices and bacteria degradation.
 - If massive then hematochezia.
 - Shorter transit time.
 - More blood loss than lower GI bleeding.

Ligament of Treitz



Source undetermined



Lower GI bleed

- Bleeding distal to the ligament of Treitz
 - Presents with:
 - Hematochezia – bright red blood per rectum
 - Maroon stools – profuse bleed from distal small bowel
 - The higher the bleed, the darker the stool

Is it really blood?

- Hemoccult kits
 - Used to test stool for blood.
 - Employs a peroxidase-like activity in hemoglobin to oxidize with the reagent changing the color to blue.
 - False positive: red meat, horseradish, turnips, iron, tomatoes and fresh red cherries.
 - False negatives: Vitamin C, storage for more than 4 days or outdated reagents or cards.
 - False negatives occur with emesis due to its acidic nature.

Is it really blood?

- Gastrocult kits

- Used to determine if blood is present in vomit.
- Neutralizes the gastric acid in emesis making it more accurate.

Clinical Evaluation

- Hemodynamic stability
 - Vitals
 - Tachycardia, orthostatic, hypotensive..
 - Perfusion
 - Mental status, urine output, capillary refill...
- Blood in the oropharynx?
- Hernia?
- Skin exam: bruises, petechia, telangiectasia , jaundice?
- Blood/fissures at the anus?

Causes: Neonates

Neonates (less than 1 month):

– Upper

- Hemorrhagic disease of the newborn
- Swallowed maternal blood
- Stress gastritis

– Lower

- Anal fissure
- Allergic colitis
- Hirschsprungs with enterocolitis
- Malrotation with volvulus
- Necrotizing enterocolitis

Case #1

- 5 day old ex)38 week breastfed neonate with hematemesis.

Vitals:

- Temp: 36.5
- HR: 150
- RR:35
- BP: 70/45

Sick or Not sick

Upper GI bleed: not sick

- Swallowed maternal blood from delivery or breast feeding
 - Apt test (don't do at UM)
 - APT (alum-precipitated toxoid) test
 - gastric contents of neonate mixed with 1% sodium hydroxide
 - maternal hemoglobin turns rusty brown
 - Kleihauer-Betke: sample exposed to acid to eliminate adult hemoglobin (quantitative test)
 - Mom usually gives great history of painful nursing
- Gastritis from stressful birth

Upper or Lower GI bleed

- If the baby was born at home or mom refused Vitamin K shot → Hemorrhagic disease of the newborn.
 - Vitamin K deficiency
 - Peaks 48 to 72 hours
- Other coagulopathies
 - Liver disease
 - Metabolic disease

Upper GI bleed

- If the history is unclear → it is reasonable to check:
 - CBC
 - Coags
 - Chemistry with liver enzymes

Case #2

- 5 day old ex) 36 week neonate presents with bloody stool.
- Vitals:
 - Temp:37
 - Heart rate: 190
 - Respiratory rate: 72
 - Blood pressure 76/45
 - Pulse ox: 97% on room air

Sick or Not sick?



Source undetermined



Necrotizing enterocolitis (NEC)

- Overall rate of NEC in full term infants is approximately 0.7 per 1000 live births, which is almost 10% of all cases
- Mean age to presentation for full term is 4-5 days
- Mean age to presentation for premature is 10 days

Necrotizing enterocolitis (NEC)

- Most common acquired gastrointestinal disorder
- Small (most often distal) and/or large bowel becomes injured
- Intramural air, and may progress to frank necrosis with perforation → Sepsis/Death

Necrotizing enterocolitis (NEC)

- Cause is unknown
 - Intestinal ischemia
 - Colonization by pathogenic bacteria
 - Excess protein substrate in the intestinal lumen
-
1. Santulli TV, Schullinger JN, Heird WC, et al. Acute necrotizing enterocolitis in infancy: a review of 64 cases. *Pediatrics* 1975;55(3):376–87.
 2. Kosloske AM. Pathogenesis and prevention of necrotizing enterocolitis: a hypothesis based on personal observation and a review of the literature. *Pediatrics* 1984;74(6):1086–92.

Necrotizing enterocolitis (NEC)

- Bowel rest
- Nasogastric tube decompression
- Fluid resuscitation
- Blood and platelet transfusion if needed
- Broad-spectrum antibiotics
- Pediatric Surgery Consult

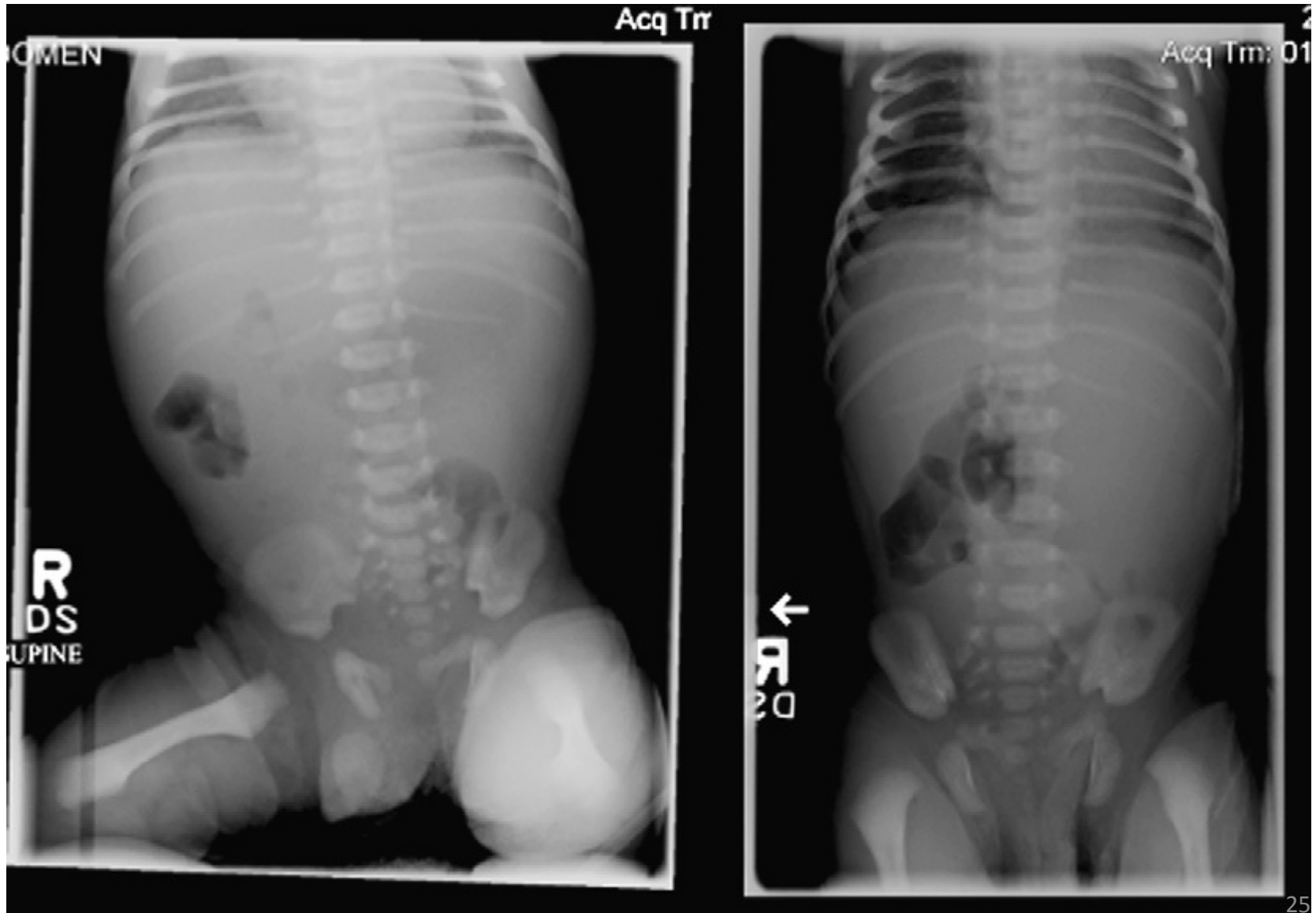
Case #3

- 4 week old male with poor feeding today presented with black stool
- Vitals:
 - Temp: 37.5
 - HR: 170
 - RR: 45
 - BP: 85/47
 - Pulse ox: 97%

Case #3

In the emergency department, patient's vomit was green

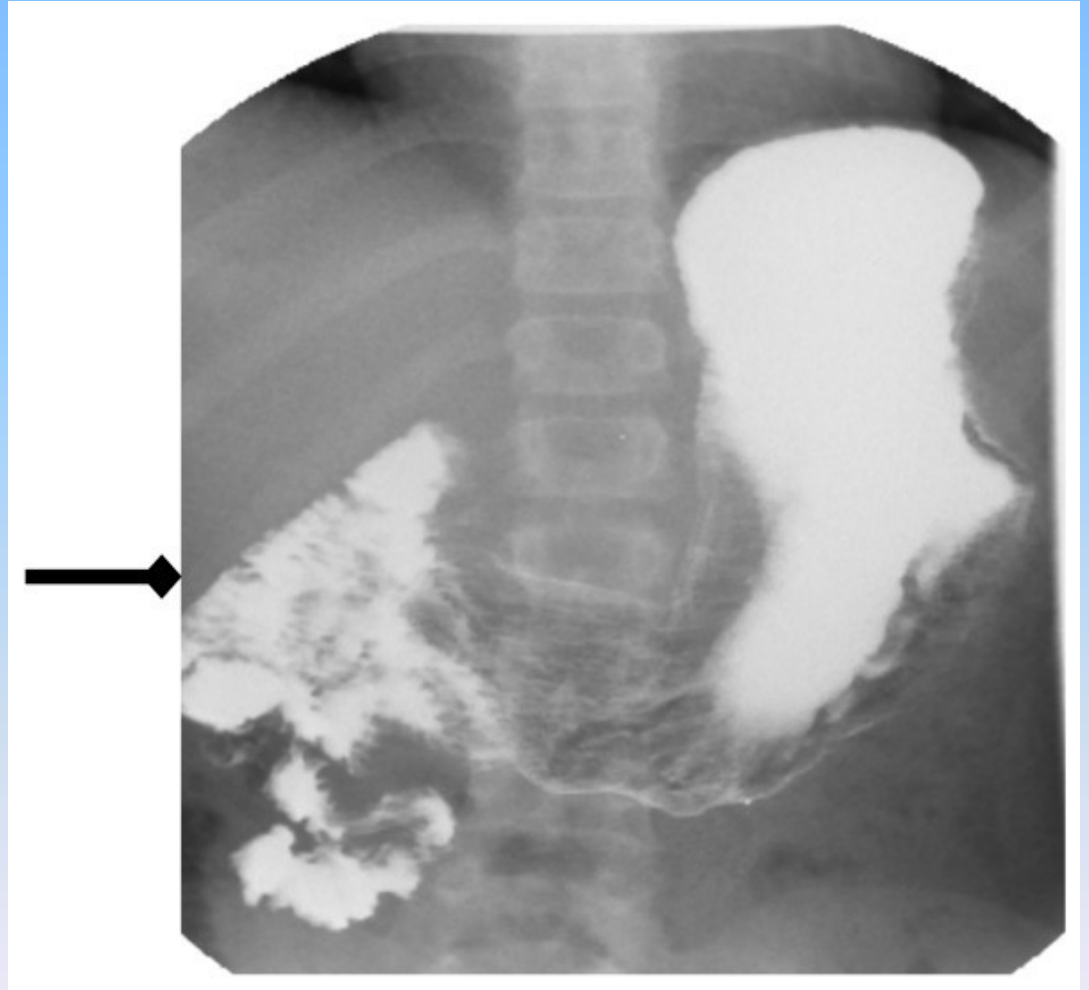
Malrotation with volvulus





Malrotation

- 14 year old boy with recurrent abdominal pain and bilious emesis



Malrotation

- Incidence of malrotation is 1 in 500 live births
- 60% of volvulus cases occur in the first month of life; 75% by 1 year of age
- Volvulus occurs in 70% of neonatal malrotation cases
- No race predilection; male:female is 3:2
- Morbidity: short-gut, TPN, SBO, recurrent volvulus
- Mortality: 3-9%

Malrotation

- Malrotation with midgut volvulus is the most critical surgical emergency in the newborn period
- Usually presents within the first weeks of life
- Presents with the sudden onset of melena and bilious vomiting in a previously healthy infant

Normal

- 4th and 5th week of gestation
 - Duodenal intestinal loop comes out and twists 90 degrees. Counterclockwise.
 - Cecal loop rotates 180 degrees.
 - Total of 270 degrees
 - Ileocecal valve in right lower quadrant
 - Ligament of Treitz in the left upper quadrant.
 - Long and strong mesenteric base

Malrotation

- Duodenal intestinal loop comes out but does not rotate.
- Cecal loop rotates 90 degrees instead of 180 degrees.
- Cecum ends up in the mid-upper abdomen.
 - Fixed by Ladd's bands to the right lateral abdominal wall.
 - Causes obstruction to duodenum.

Children (> 1 month to 2 years)

- Upper
 - Esophagitis/gastritis
 - Hypertrophic pyloric stenosis
 - Peptic ulcer disease
 - Esophageal varices from portal hypertension
- Lower
 - Anal fissure
 - Milk protein allergy
 - Intussusception
 - Hernia
 - Meckel's diverticulum
 - Malrotation
 - Gastroenteritis

Upper GI bleed

- Significant bleeding regardless of the cause requires investigation
 - Gastric lavage to determine continuation of bleeding
 - Proton pump inhibitors (IV) shown to reduce the risk of rebleeding of ulcers, hospital stay and need for transfusion (adult studies)
 - H₂- receptor antagonists not found to be beneficial (adult studies)

Upper GI bleed

- Octreotide for esophageal varices *
 - Portal venous inflow and intravariceal pressure
 - 1 microgram/kg over 5 min. then 1 microgram/kg/hr
 - No great studies in pediatrics
 - Bleed from esophageal varices has a 30% mortality rate**
- Endoscopy

*Octreotide in Pediatric Patients*Janice B. Heikenen, †John F. Pohl, ‡Steven L. Werlin, and §John C. Bucuvalas
Journal of Pediatric Gastroenterology and Nutrition
35:600–609 © November 2002 Lippincott Williams & Wilkins, Inc., Philadelphia

**Management of portal hypertension in children. [Mileti E, Rosenthal P.](#)
[Curr Gastroenterol Rep.](#) 2011 Feb;13(1):10-6. University of California, San Francisco, San Francisco, CA 94143-0136, USA. MiletiE@peds.ucsf.edu

Upper GI bleed

- Resuscitation
 - If hemodynamically compromised
 - Two large bore IV
 - 20cc/kg of normal saline given
 - Packed red blood cells given 15 cc/kg maintain hematocrit near 30 g/dl
 - 5cc/kg PRBC raise Hct 5%
 - Fresh frozen plasma to correct coagulation abnormalities 15 cc/kg
 - Platelet transfusion for platelets < 50

Case #4

- 2 year old female with choking episode, now with blood streaked vomitus

Vital Signs:

Temp:36.6

HR: 135

RR:28

BP:110/60

Pulse ox: 98% on room air

Lower GI bleed

- Anal fissure
- Gastroenteritis
- Intussusception
- Milk protein allergy
- Meckel's diverticulum
- Malrotation

Case #5

15 month old female with chief complaint of lethargy.

Vital Signs:

Temp: 37.5

HR: 150

RR: 32

BP 90/54

Pulse ox: 97% room air

Intussusception

- Most common cause of bowel obstruction ages 3 months to 5 years
- 50% occur between 3 months to 1 year
- 80% occur by 2 years
- Peak incidence at 7-8 months
- 2-4 cases per 1000 live births
- Male:female is 2:1
- Mortality 1%

Intussusception: Presentation

- Severe colicky pain, legs and knees flexed
- The infant may initially be comfortable and play normally between the episodes but then progressively weaker and lethargic
- Less than 15% have the triad of pain, palpable sausage mass and currant jelly stools

Intussusception: Pathophysiology

- Telescoping of ileum into colon ⇒ ileum compressed ⇒ venous congestion ⇒ swelling ⇒ arterial compression ⇒ ischemia ⇒

Bloody stools

Intussusception: Ultrasound



Intussusception

- Crescent sign LUQ
- Target sign RUQ
- Loss of hepatic outline



Intussusception

- Study in South Africa showed that Burkitt lymphoma presented as intussusception

Intussusception as a presenting feature of Burkitt lymphoma: implications for management and outcome.

[England RJ](#), [Pillay K](#), [Davidson A](#), [Numanoglu A](#), [Millar AJ](#).

Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital, University of Cape Town, Klipfontein Road, Rondebosch, Cape Town, 7700, South Africa, r.England@doctors.org.uk.

Case # 6

- A six week old formula fed infant presents with two stools with a small amount of blood mixed with mucous

Vitals:

- Temp: 37
- HR: 130
- RR: 32
- BP: 72/49

Sick or not sick

Cows milk protein allergy

- Immunologic hypersensitivity reaction to milk proteins
- 2-6% formula fed
- 0.5% breast fed infants
- 50-60% present with gastrointestinal/skin symptoms
- 30% respiratory symptoms

Management

- Removal of cow's milk from the diet
- 30% also allergic to soy
- Need hydrolyzed protein formula

Finish Study

The study involved 40 consecutive infants (mean age: 2.7 months) with visible rectal bleeding during a 2-year period at the Tampere University Hospital Department of Pediatrics

- **18% turned out to be allergic colitis otherwise no cause was found**
- **Suggested virus played a role**

Rectal bleeding in infancy: clinical, allergological, and microbiological examination.

[Arvola T](#), [Ruuska T](#), [Keränen J](#), [Hyöty H](#), [Salminen S](#), [Isolauri E](#). Department of Paediatrics, Tampere University Hospital, Tampere, Finland.
taina.arvola@uta.fi

Case #7

11 year old male with lethargy and pale appearance.

Vital signs:

Temp: 37.7

HR:140

BP: 90/60

Pulse ox: 95% room air

Case #7

- Labs revealed: hemoglobin level of 4.8 g/dl, and a hematocrit of 14.6%

By the way...he has been having bloody stools for 2 weeks

Meckel's Diverticulum

- Acid secreting mucosa
- 2% (of the population)
- 2 feet (from the ileocecal valve)
- 2 inches (in length)
- 2% are symptomatic
- 2 types of common ectopic tissue (gastric and pancreatic)
- 2 years is the most common age at clinical presentation
- 2 times more boys are affected.

Meckel's Diverticulum

- infants and preschool children
 - slight or massive GI bleeding - painless
- incomplete obliteration of omphalomesenteric duct
 - ectopic gastric mucosa in the remnant
 - ulceration of mucosa across from the diverticulum
- Meckel Scan
 - Technetium pertechnetate has affinity for gastric mucosa

GI bleeding in Adolescents

Upper

- Peptic ulcer/gastritis
- Prolapse (traumatic) gastropathy secondary to emesis
- Mallory-Weiss syndrome
- Coagulopathy
- Esophageal varices

Lower

- Bacterial enteritis
- Inflammatory bowel disease
- Colonic polyps
- Anal fissure
- Meckel's diverticulum

Case # 8

- 2 year old male with history of asthma has ear pain for 2 days, now better after taking omnicef. Mom is concerned because she found blood in his stool.
- Vitals:
 - 37.5/122/23/97% on room air 96/63

Quiz

- 2 year old boy with bilious vomiting and bloody stools since last night. Presents today moderately ill, dehydrated with scaphoid abdomen and no bowel sounds. After ABC what is your next step?

- A. Ultrasound of abdomen
- B. Upper GI
- C. CT of the abdomen
- D. Meckel scan
- E. Upper endoscopic exam

- 12 year old boy S/P Kasai for biliary atresia presents with pruritis, mild icterus and hematemesis. Physical shows an anxious boy with normal vital signs, hepatosplenomegaly and prominent venous pattern over the abdomen. Stools are black and guaiac positive. Cause of hematemesis:

- A. Peptic Ulcer disease
- B. Esophageal varices
- C. Posterior nasal bleeding
- D. Prolapse gastropathy
- E. Thrombocytopenia

- 5 year old with intermittent, painless bright red blood per rectum associated with bowel movements for the past 3 months. Inspection of the anus shows no fissures but blood on rectal exam. Most likely cause:

- A. Intussusception
- B. Juvenile polyp
- C. Meckel diverticulum
- D. Peptic Ulcer disease
- E. Ulcerative colitis

- 5 year old girl complains of severe perianal pain on stooling. Physical shows an intensely red, warm and tender perianal tissue. Rectal shows gross blood. What organism is causing these findings?

- A. Campylobacter
- B. C. Diff
- C. Streptococcal
- D. Salmonella
- E. Shigella