

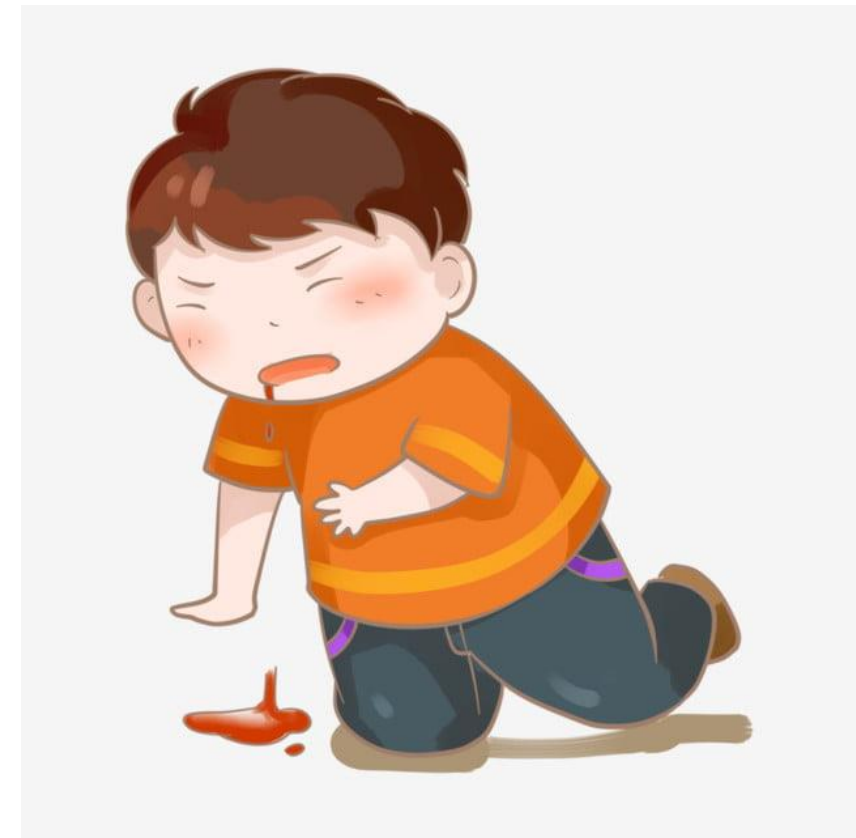
- Neonate: congenital obstruction
- Infant: intussusception, malrotation with volvulus
- Children: caustic and FB ingestion
- **GI:** GI bleeding
- **Liver:** neonatal cholestasis, FHF, hepatic encephalopathy



In the Name of God

Upper GI Bleeding in Children

Maryam Ataollahi M.D.
Pediatric gastroenterologist
SUMS
1399





UGI bleeding: above the ligament of Treitz.

- **Hematemesis:** vomiting frank red blood: a rapidly bleeding lesion.
- **Coffee ground:** 2nd to the coagulative effect of gastric acid on blood: slower, from a benign bleeding source.
- **Melena:**
 - black, tarry stools, produced by 50–100 mL blood in the stomach.
 - may persist for 3-5 days: not as an indication of ongoing bleeding.
- **Most in children: benign and stops without intervention.**

Lower gastrointestinal bleeding (LGIB): distal to the lig. of Treitz:

- **Hematochezia:**
 - Bright red blood per rectum
 - Usually: LGIB: colon or anus
 - Rarely: UGIB: rapid intestinal transit or massive.
- **Melena**
- **Occult** (hidden or unseen): not visible to the patient or physician

CASES

- نوزاد 25 روزه به دلیل چند اپی زود استفراغ خونی، جهت اندوسکوپی از شهرستان اعزام شده
- کودک 3 ساله به دلیل استفراغ با رگه های قهوه ای ارجاع شده .
- کودک 5 ساله بدون سابقه بیماری خاص به دلیل استفراغ خون روشن
- کودک 5 ساله بدون سابقه بیماری خاص به دلیل استفراغ خون قهوه ای با حجم زیاد
- کودک 7 ساله مبتلا به سیروز به دلیل دفع خون روشن از مدفوع از صبح امروز
- کودک 4 ساله به دلیل استفراغ خونی بدنبال سرفه های مکرر
- نوجوان 14 ساله با شکایت مدفوع سیاه از سه روز پیش

Important considerations in a child with suspected UGI bleeding:

- **Is It Blood?**
- **Is the Bleeding Gastrointestinal?**



Is It Blood?

- Red food coloring
- Red foods: tomatoes and strawberries
- Foods: spinach and licorice
- Certain medication



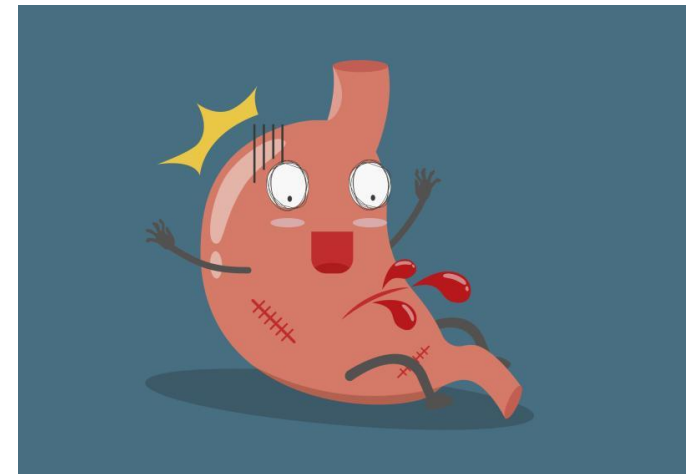
Is the Bleeding Gastrointestinal?

- Non GI sources above the ligament of Treitz:
 - Epistaxis
 - Bloody sputum
 - Oropharyngeal bleeding



Is the child hemodynamically stable?

- The initial evaluation: a brief history → rapid assessment of the physical condition:
 - Vital signs: HR, BP, presence of **orthostatic** changes
 - Capillary refill
 - Urine output
 - Level of consciousness



What are the most likely causes of the LGIB in this patient?

Newborn	Infant	Child–Adolescent
Swallowed maternal blood	Stress gastritis or ulcer	Mallory–Weiss tear
Vitamin K deficiency	Acid-peptic disease	Acid-peptic disease
Stress gastritis or ulcer	Mallory–Weiss tear	Varices
Acid-peptic disease	Vascular anomaly	Caustic ingestion
Vascular anomaly	Gastrointestinal duplications	Vasculitis (Henoch– Schönlein purpura)
Coagulopathy	Gastric/esophageal varices	Crohn disease
Milk-protein sensitivity	Duodenal/gastric webs	Bowel obstruction
	Bowel obstruction	Dieulafoy lesion, hemobilia

History

- Estimated blood loss
- Associated symptoms:
 - Dyspepsia, heartburn, abd. pain, dysphagia, wt loss, poor feeding and irritability.
 - Jaundice, easy bruising, or change in stool color
 - Recent or recurrent epistaxis
 - Easy bruising or bleeding
- PHx or FHx
- Drug Hx



Physical examination

- Rapid assessment of hemodynamic status
- Etiology:
 - Inspection of the nasopharynx
 - Skin and mucus membranes:
 - bruising, petechiae, or mucosal bleeding, vascular malformations.
 - palpable purpuras
 - Engorged vessels, spider angiomas, and jaundice
 - Abdominal examination:
 - Splenomegaly, prominent cutaneous abd. Vessels: portal HTN
 - Hepatosplenomegaly, hard liver edge, enlarged Rt liver lobe: cirrhosis.



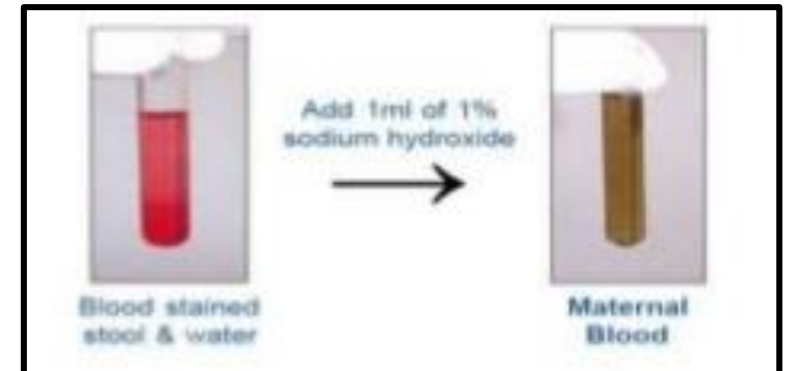
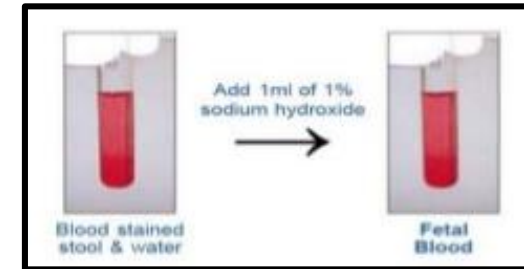
Etiologies of UGI Bleeding in Children by Age Group

Newborn	Infant	Child–Adolescent
Swallowed maternal blood	Stress gastritis or ulcer	Mallory–Weiss tear
Vitamin K deficiency	Acid-peptic disease	Acid-peptic disease
Stress gastritis or ulcer	Mallory–Weiss tear	Varices
Acid-peptic disease	Vascular anomaly	Caustic ingestion
Vascular anomaly	Gastrointestinal duplications	Vasculitis (Henoch– Schönlein purpura)
Coagulopathy	Gastric/esophageal varices	Crohn disease
Milk-protein sensitivity	Duodenal/gastric webs	Bowel obstruction
	Bowel obstruction	Dieulafoy lesion, hemobilia

Neonate:

Swallowed maternal blood:

- During vaginal delivery
- Cracked or irritated breast
- **Apt** test



Neonate :



Coagulopathy:

- **Vit k deficiency:** hemorrhagic Dx of the newborn
- Infection
- Liver failure
- fat malabsorption
- Cong. Coagul. factor def.

Medication: **indomethacin:** in neonates to correct PDA

Food allergy: dietary proteins: milk and soy: hematemesis, streaks of blood and mucus in the stool

Stress gastritis or ulcers:

- Significant UGI bleeding: critical illness: shock.
- The neonatal gut: susceptible to mucosal injury during ischemia

Etiologies of UGI Bleeding in Children by Age Group

Newborn	Infant	Child–Adolescent
Swallowed maternal blood	Stress gastritis or ulcer	Mallory–Weiss tear
Vitamin K deficiency	Acid-peptic disease	Acid-peptic disease
Stress gastritis or ulcer	Mallory–Weiss tear	Varices
Acid-peptic disease	Vascular anomaly	Caustic ingestion
Vascular anomaly	Gastrointestinal duplications	Vasculitis (Henoch– Schönlein purpura)
Coagulopathy	Gastric/esophageal varices	Crohn disease
Milk-protein sensitivity	Duodenal/gastric webs	Bowel obstruction
	Bowel obstruction	Dieulafoy lesion, hemobilia

Infant



Acid-peptic disease:

- Uncommon
- The bleeding is generally minor

Vascular anomalies:

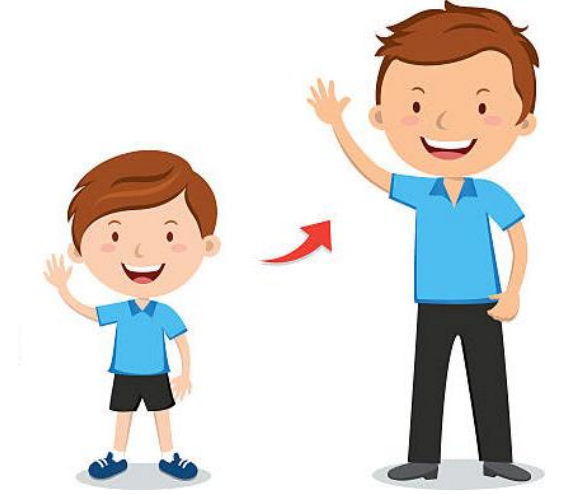
- Hemangiomas: the most common
- Most spontaneously regress with time:



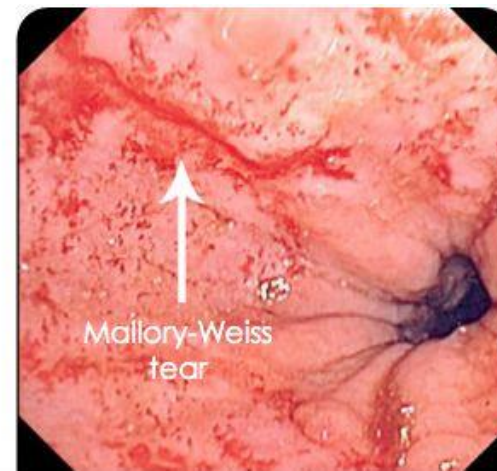
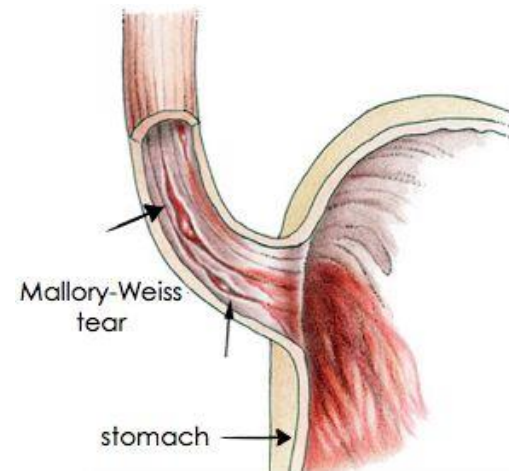
Etiologies of UGI Bleeding in Children by Age Group

Newborn	Infant	Child–Adolescent
Swallowed maternal blood	Stress gastritis or ulcer	Mallory–Weiss tear
Vitamin K deficiency	Acid-peptic disease	Acid-peptic disease
Stress gastritis or ulcer	Mallory–Weiss tear	Varices
Acid-peptic disease	Vascular anomaly	Caustic ingestion
Vascular anomaly	Gastrointestinal duplications	Vasculitis (Henoch– Schönlein purpura)
Coagulopathy	Gastric/esophageal varices	Crohn disease
Milk-protein sensitivity	Duodenal/gastric webs	Bowel obstruction
	Bowel obstruction	Dieulafoy lesion, hemobilia

Children and Adolescents



- **Mallory–Weiss tear**: the most common cause of minor UGI bleeding in children
- **Vomiting** is common in children, usually the result of infection.
 - longitudinal mucosal lacerations in the distal esophagus



Children and Adolescents

Acid peptic Dx:

- Erosive esophagitis: quite common
- Peptic ulcers and gastritis:
 - critical illness
 - NSAIDs particularly in young children
 - alcohol
 - *Helicobacter pylori*



Children and Adolescents



Esophageal Variceal Bleeding:

- The most common cause of **severe** UGI bleeding in children.
- 2nd portal HTN
- Clues: splenomegaly and/or thrombocytopenia, Hx of liver dx.
- Acute variceal bleeding in children: stops spontaneously in 50%,
- Clinical presentation: hematemesis or melena.

Children and Adolescents

Ingestion of foreign bodies and caustics:

- History
- Sharp object
- Button battery



Children and Adolescents

- **Other causes of UGI bleeding** in children:
 - Parasites: Pharyngeal **leeches**



Clinical features suggesting a severe UGI bleed

- Melena
- Hematochezia with unstable vital sign
- HR >20 beat/min above the mean for age
- Prolonged capillary refill time
- ↓in Hb of > 2 g/dL
- Need for fluid bolus
- Need for blood Tx (given if Hb <8 g/dL)
- Sources: varices



GI bleeding grading:

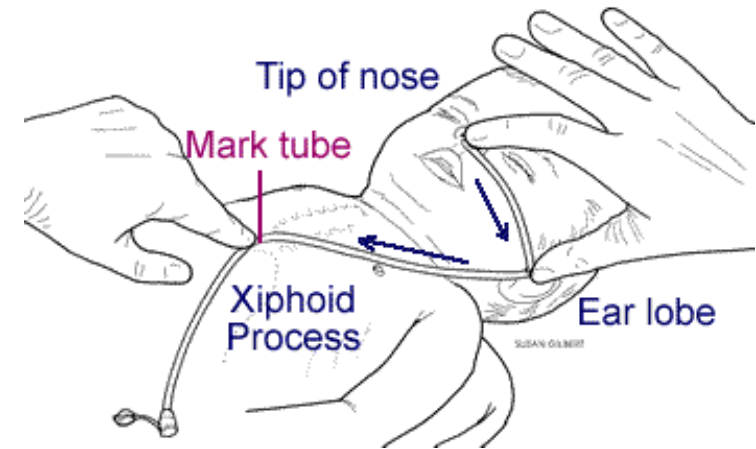
Grade	HR	Orthostatic change	Urine output	LOC	admission	Management
1	↑	-ve	NL	NL	ER	Observation, source of bleeding
2	↑	+ve	NL	NL	Admit in GI ward	IV line
3	↑	+ve	↓	NL	Admit in ICU	2 IV lines, hydration, prep pack cell, medication
4	↑	+ve	↓	↓	Admit in ICU	2 IV lines, hydration, prep pack cell, medication, pediatric surgery consult

Hemodynamic instability (shock, orthostatic hypotension):

- The initial goal: provide **hemodynamic stability**:
 - 2 IV line: access: difficult in severely volume-depleted pts: IO/CVC
 - NG tube
 - Admitted to an ICU: resuscitation & close observation
 - Stabilized prior to endoscopy
 - GI and surgery consult
 - Adequate O₂ delivery even if sat: 100%
 - Keep the patient warm
 - Head down
 - Fluid and blood resuscitation
 - Correction of any coagulopathy, metabolic or elec. Abnormality



NG tube



- Helpful if the bleeding is suspected to be a vascular bleed (variceal).
- Confirm the diagnosis
- Determine if the bleeding is ongoing.
- Remove fresh blood, and clots to facilitate endoscopy & ↓ risk of aspiration.
- Water or nl saline: room temperature
- Aspirate:
 - Fresh blood or coffee ground
 - Clear
 - Bilious fluid



- Supportive care with observation + acid suppression in:
 - Hemodynamically stable
 - With small amounts of blood in the vomitus
 - With a likely explanation (Mallory-Weiss tear)
- Thorough Hx & PE
- Further evaluation



CBC

Retic

PT, PTT

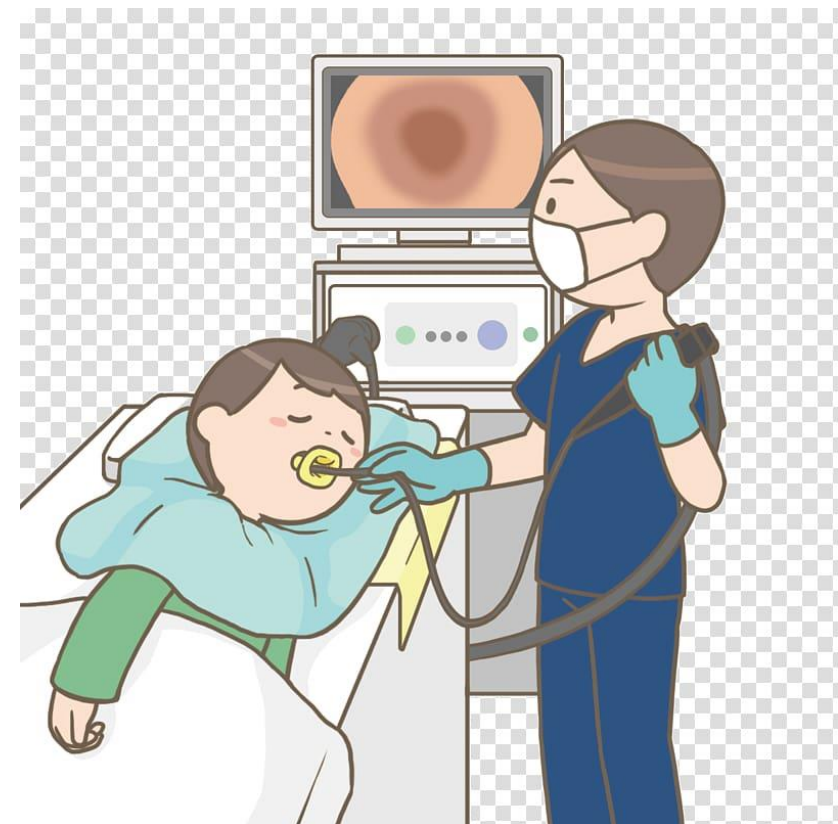
Blood type and cross match

ALT, AST, Alb

BUN, Cr

Diagnosis

- Plain X-ray: foreign bodies, bowel perforation/ obstruction.
- Abd. sonography: portal HTN & splenomegaly
- **Endoscopy:**
 - The preferred method to evaluate the UGI tract
 - Determine the source of the bleeding in 90% of cases
 - **Contraindicated** in clinically unstable patients
 - Important diagnostic tool in premature neonates



TREATMENT

© iStockphoto.com

Pharmacologic options



Endoscopic treatment



Surgical Intervention



PPI

Proton Pump Inhibitors



- **Acid suppression:**
 - Hemodynamically **unstable** or large-volume bleeding: IV [pantoprazole](#)
 - Hemodynamically **stable** with mild bleeding: PO: [omeprazole](#)
- **Vasoactive agents:**
 - [Octreotide](#): ↓ splanchnic blood flow:
 - **Variceal** and **non variceal** bleeding
 - Initial bolus: 1-2 microgr/kg (max. 100 mic.): then 1-2 microgr/kg/hr: continuous IV infusion
 - Adverse effects: bradycardia and hyperglycemia.
 - If bleeding stops: tapered over 24 hours

Variceal bleeding:



- Optimal Hb? 7-8 g/dL
- **Overexpansion of blood volume: worsen variceal bleeding**
- NG tube: safe and may be an essential:
 - rate of ongoing bleeding
 - removal of blood, a protein source: precipitate encephalopathy.
 - blood in the stomach: ↑ splanchnic blood flow: worsen portal HTN and hemorrhage.
- Platelets transfusion: if <50000
- Coagulopathy: corrected with vitamin K or FFP
- **IV antibiotic therapy: strongly considered** for all patients with **variceal hemorrhage** in light of the high risk of potentially fatal infectious complications.



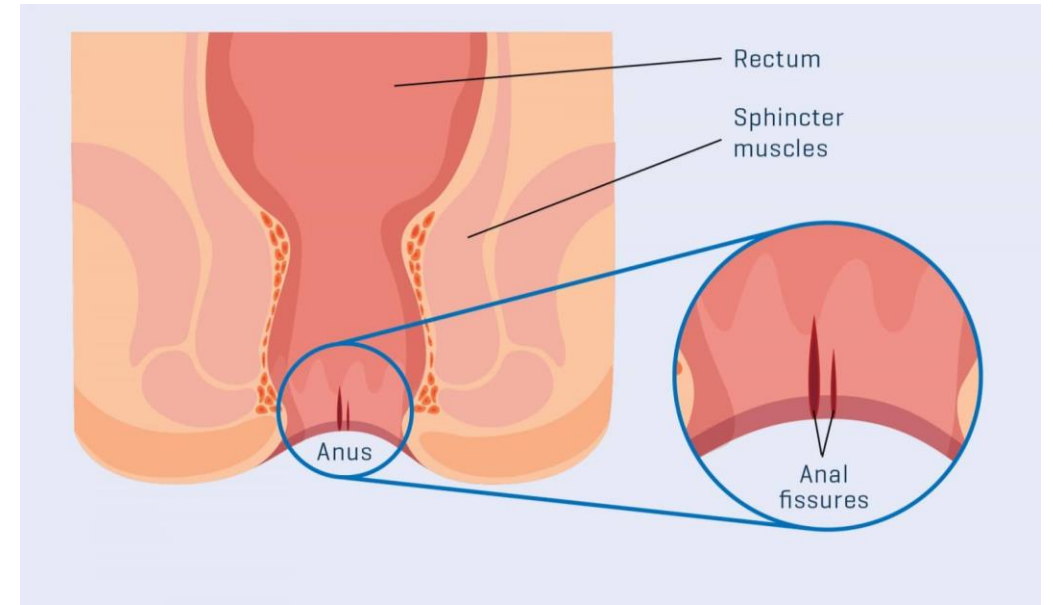
Lower GI bleeding in children: Diagnostic approach

Maryam Ataollahi
M.D.

**Pediatric
Gastroenterologist
SUMS
1399**



- پسر 1.5 ساله به دلیل مدفوع تیره از صبح امروز
- شیرخوار 2 ماهه به دلیل دفع رگه خون در مدفوع
- کودک 4 ساله به دلیل دفع چند قطره خون روشن به دنبال مدفوع کردن
- شیرخوار 9 ماهه به دلیل بیقراری



- Vary depending upon age
- The **most common** causes:
 - In all age group: **anal fissure**
 - In infants: cow's milk or soy protein-induced colitis
 - ≥ 12 mo: infectious GE

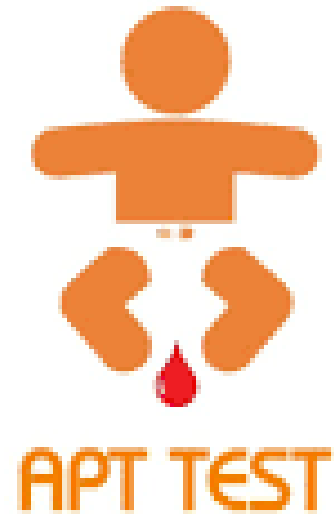
Neonatal period

- Swallowed maternal blood
- Anorectal fissures
- NEC
- Malrotation with midgut volvulus
- Hirschsprung dx with enterocolitis
- Coagulopathy



Swallowed maternal blood

- A newborn infant with rectal bleeding:
- Whether comes from the infant or mother
- Apt test



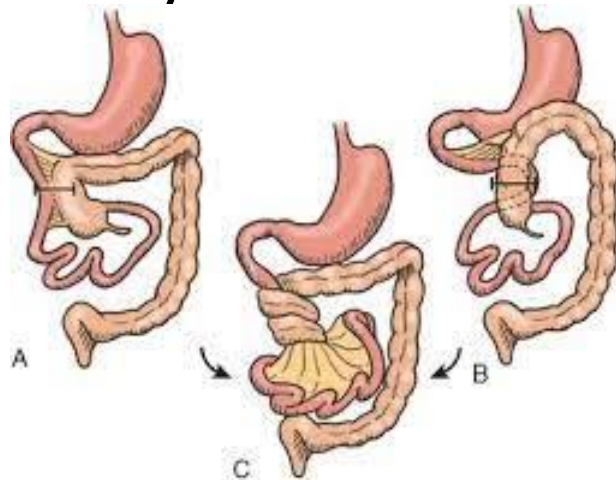
Necrotizing enterocolitis

- Abd. distention, residual milk, tenderness, vomiting, diarrhea, and **gross or occult LGIB.**
- Most: premature
- the **hallmark** in abd. X ray:
 - Pneumatosis intestinalis

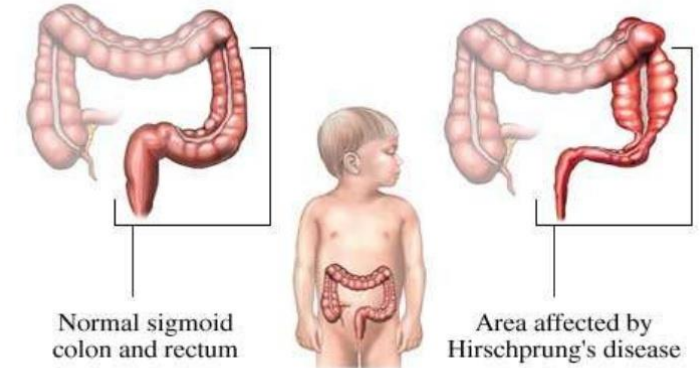


Malrotation with midgut volvulus

- Abd. distension, bilious/non bilious emesis, melena, hematochezia
- **Bilious emesis** in the neonatal period: a **surgical emergency**: obstruction until proven otherwise.
- Life-threatening: emergent evaluation and treatment.
- DX: suggested by abd. X ray



HIRSCHSPRUNG'S DISEASE:

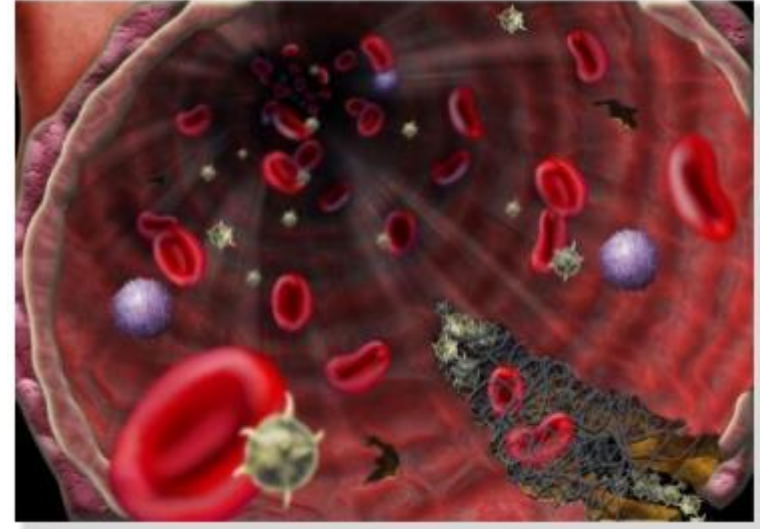


- Different presentations:

- Delayed passage of meconium (>48 hours after birth).
- acute obstruction: vomiting (which may be bilious or feculent) & abd. distension.
- progressive constipation or diarrhea associated with abdominal distension.
- **¼ of the patients have blood in the stool.**
- explosive expulsion of gas and stool after the DRE (squirt sign or blast sign).
- chronic refractory constipation
- Hirschsprung-associated enterocolitis



COAGULOPATHY



- Most present with other bleeding symptoms
- Occasionally: LGIB
- Vit K deficient bleeding (hemorrhagic disease of the newborn)
- Hemophilia

Infants and toddlers: 1 month- 2 years

- Anal fissures (introduction of solid food or cow's milk)
- Milk or soy protein-induced colitis (allergic colitis)
- Intussusception
- Infectious colitis
- Meckel's diverticulum
- Lymphonodular hyperplasia
- Infantile and very early onset IBD



Anal fissures

- The most common cause of rectal bleeding
- Diagnosis: inspection
- Painful defecation, straining, grunting, withholding behavior: streaks of bright red blood on the surface of the stools.
- With constipation: stool softeners and lubricants
- With diarrhea: keeping the perineum clean and dry
- Vigorous wiping or the use of [glycerin](#) supp.: be avoided



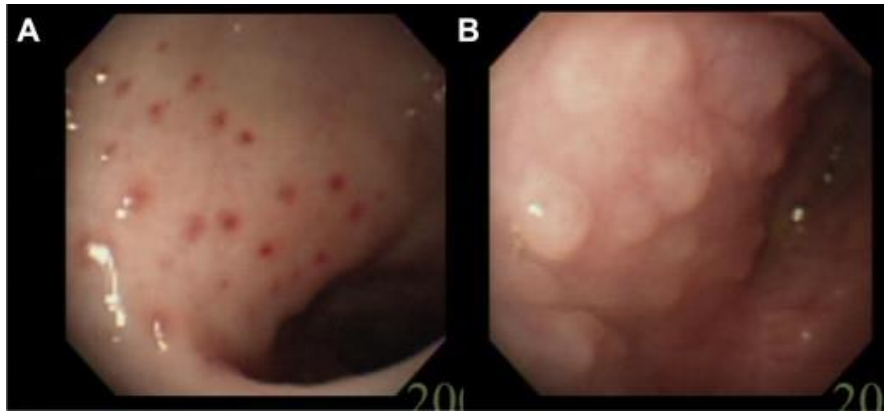
Constipation with associated risk for anal fissures during the following periods:

- Introduction of solid foods or cow's milk into the diet
- Toilet training
- School entry



Milk- or soy-induced colitis

- Common: almost exclusively in infants, resolves within 6-18 months of age.
- More in formula-fed, or less commonly in breast-fed infants
- Loose stools, occult or gross blood, but are otherwise healthy.
- Cow's milk: **the most common trigger**



INTUSSUSCEPTION



- The most common cause of intestinal obstruction in 6-36 m of age.
- 60 % < 1 year old, and 80 % < 2 years.
- Usually idiopathic and in the ileocecal region
- Clinical presentation: typical
- Stool: gross or occult blood in most cases: "currant jelly."
- Ultrasonography is the method of choice
- Diagnosis & treatment: air or water-soluble contrast enema

Meckel's Diverticulum

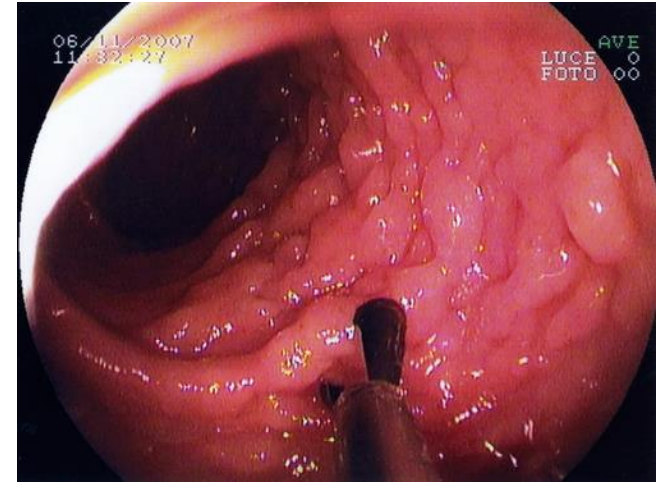


- Usually asymptomatic, **painless** rectal bleeding
- Dx: Meckel scan
- Treatment: Sx resection
- Rule of **2**:
 - Occurs in **2%** of the population
 - Male-to-female ratio: **2:1**
 - Within **2** feet of the ileocecal valve
 - Involves **2** types of tissue: gastric and intestinal epithelium
 - **2** inches long.
 - **2 %** of individuals: develop a complication



Lymphonodular hyperplasia

- Common finding in infants and young children
- Etiology?
- Frequently in children with food protein induced colitis
- Disrupts the normal mucosa: thinning: ulceration: hematochezia
- Blood loss: **minimal** and **painless**
- Stool softeners: reduce blood loss and minimize parental anxiety.
- Resolves spontaneously over time



Preschool period: ages 2-5 years

- Anal fissures (especially around toilet training)
- Intussusception
- Meckel's diverticulum
- Infectious colitis
- Hemolytic-uremic syndrome (HUS)
- Henoch-Schönlein purpura
- Juvenile polyps
- **Very early onset IBD**
- Solitary rectal ulcer syndrome (SRUS)





INFECTIOUS COLITIS

- The most common:
 - Salmonella
 - Shigella
 - E. coli 0157:H7
 - Clostridioides difficile
 - E. histolytica
 - CMV
- Fever, abd. pain, tenesmus, small volume bloody stools

Hemolytic Uremic Syndrome (HUS)

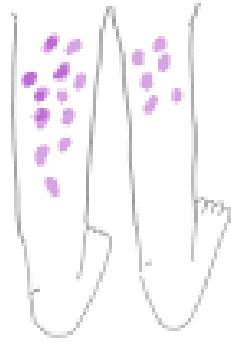


**Microangiopathic HA
Thrombocytopenia
Acute renal injury.**

- The highest rates: < 5 years.
- Associated with *E. coli* 0157:H7
- Typically develops 5-10 days after the onset of the diarrhea.



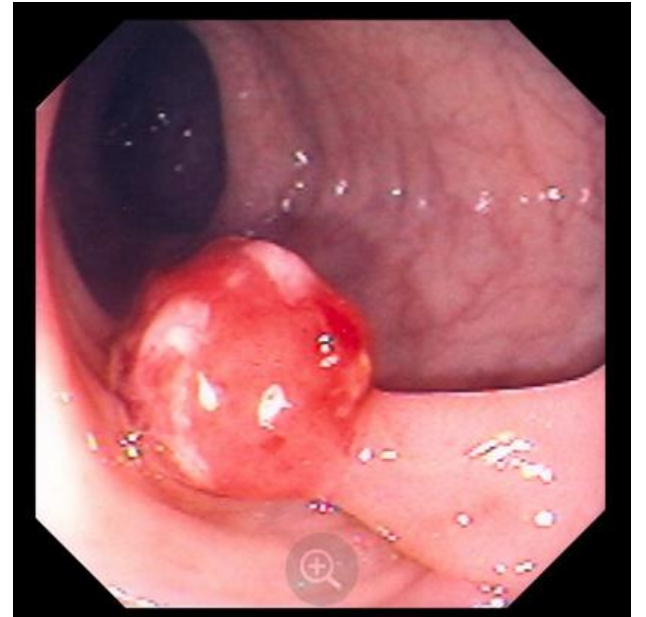
Henoch-Schonlein Purpura (HSP) MNEMONIC



- A systemic vasculitis in ages of 3-15 years.
- Palpable cutaneous purpura, abdominal pain, and arthralgias.
- 50 % of patients develop gross or occult GI bleeding
- The abdominal pain:
 - Purpuric lesions within the GI tract
 - Intussusception

Juvenile polyps

- Benign: 2-10 yrs old: peak: 3-4 years
 - painless rectal bleeding, with or without mucus
 - may autoamputate: significant bleeding.
 - prolapsed tissue.
- Usually bleed after defecation: bright red blood: outside of the stool.
- Diagnosis & treatment: Colonoscopy





SRUS

means

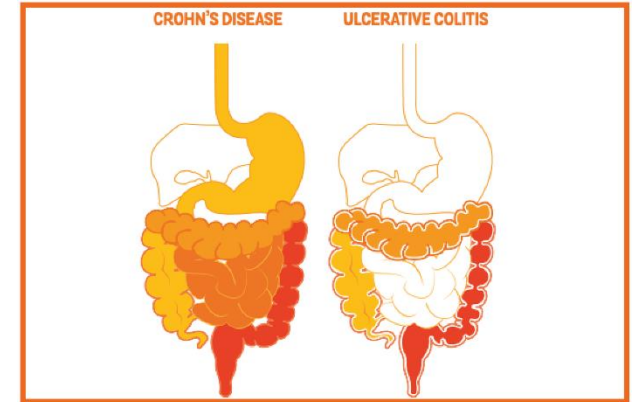
Solitary Rectal Ulcer Syndrome

- A benign but chronic ulcerative dx of the rectum
- Presentation:
 - bleeding, mucus passage
 - straining during defecation
 - sense of incomplete evacuation
- Dx: colonoscopy & biopsy
- Treatment of constipation and avoid excessive straining

School-aged children & adolescents

- Similar to preschool age: HUS and intussusception: less common:
- Anal fissures (especially around school entry)
- IgAV (HSP)
- Meckel's diverticulum
- Infectious colitis
- Juvenile polyps
- Hemorrhoids (primarily in older adolescents)
- Inflammatory bowel disease
- Solitary rectal ulcer syndrome (SRUS)





- More common in school-aged children and adolescents.
 - UC: mostly affects the colon
 - CD: involve any portion of the GI tract.
 - abdominal pain, fever, diarrhea (with or without blood): in 80% of patients
- 20% of CD and 95% of UC: visible rectal bleeding.
- Iron deficiency anemia, \uparrow ESR or CRP, \downarrow Alb, and \uparrow fecal calprotectin.
- Extraintestinal symptoms

A Diagnostic Approach



- Is the child hemodynamically stable?
- Is it blood?
 - Examine the stool directly:
 - Red-colored stools resembling hematochezia: beets, red licorice, or [rifampin](#).
 - Black-colored stools resembling melena: bismuth, a. charcoal, iron, chocolate, blueberries, or dark green foods.
 - Guaiac test
- Is the blood from the lower GI tract?
 - Hematochezia: LGIB: colon or anus.
 - massive UGIB
 - Melena: UGIB, nose bleeding or bleeding from the proximal small bowel
 - GU system?
- What are the most likely causes of the LGIB in this patient?

- Stool OB (guaiac test)
- Iron no longer produces a false-positive



HISTORY



- Duration and amount of bleeding
- Color of the blood:
 - Bright red blood: lower GI source, hemorrhoid, or anal fissure.
 - UGIB: in any child with evidence of hemodynamic instability
- Consistency of accompanying stool:
 - Diarrhea: colitis (food allergy, HUS, HSP, IBD, infectious colitis)
 - Constipation: anal fissures or SRUS.
- Distal bleeding: anorectal source: anal fissure, hemorrhoid, or polyp.
 - blood that is primarily on the outside of a formed stool
 - blood that is mostly seen on the toilet paper rather than in the stool
 - drips into the toilet after the bowel movement ("terminal bleeding").

Associated symptoms



- Well:
 - Anal fissure
 - protein induced colitis
 - Juvenile polyps
 - Meckel's diverticulum
- Diarrhea with abdominal pain: colitis.
- Fever: infectious colitis, Hirschsprung-associated enterocolitis, IBD.
- Wt loss and fatigue, delayed puberty: underlying systemic dx: IBD.
- Abnormal non-GI bleeding: coagulopathy: hemophilia, HUS, HSP
- Epistaxis
- NSAIDs: peptic ulcers, or exacerbate LGIB due to anti-platelet effects.
- Underlying dx:
 - Immunodeficiency
 - liver disease

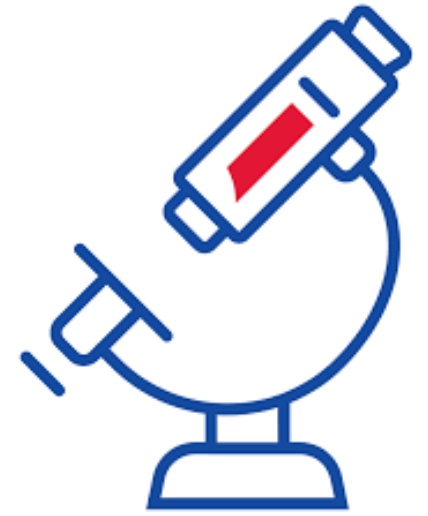
Physical Examination



- 1st step: evaluate hemodynamic stability:
- Sepsis?
- Bowel obstruction? Abd. pain & distension, bilious or nonbilious vomiting.
- Shock, sepsis, or abd. Obstruction: treated promptly with fluid resuscitation
- Stable patients: investigate potential sites of bleeding
- Anus inspection: fissures, large skin tags or fistulas
 - A rectal examination: polyps
 - Squirt sign or blast sign: Hirschsprung dx
- Nasopharynx and oropharynx: nosebleeds, aphthous ulcers
- Skin
- Abdomen

Lab tests

- Significant rectal bleeding: Hb and cross match
- Minor bleeding: fissure or viral GE: no lab. testing.
- Not well: extensive lab. Test
- Colitis:
 - ESR, CRP, Alb and CBC
 - Consider *C. difficile*, enteric pathogens, OP, & fecal calprotectin.
- Non-GI bleeding: ?bleeding dx.
- HUS: serial evaluation of CBC and renal function.





- Abnl abd. Exam or ill-appearing: Abd X ray, at a minimum.
- Intussusception: ultrasonography
- RBC scan, angiography, or CT angiography, endoscopic procedures



Thank You
For
Your Attention!

Any Questions?