

Abdominal pain in children

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- Acute abdominal pain
- Chronic abdominal pain

- There is considerable variation among children in their perception and tolerance for abdominal pain.
- This is one reason the evaluation of chronic abdominal pain is difficult.

- Two types of nerve fiber transmit painful stimuli
- **A fiber** – mediates sharp localized pain in skin and muscle
- **C fiber**- from viscera, peritoneum and muscle transmit poorly localized dull pain



Visceral pain

Somatic pain

Referred pain

Visceral pain

Epigastric

Liver, biliary tract, pancreas, stomach, upper bowel

Periumbilical

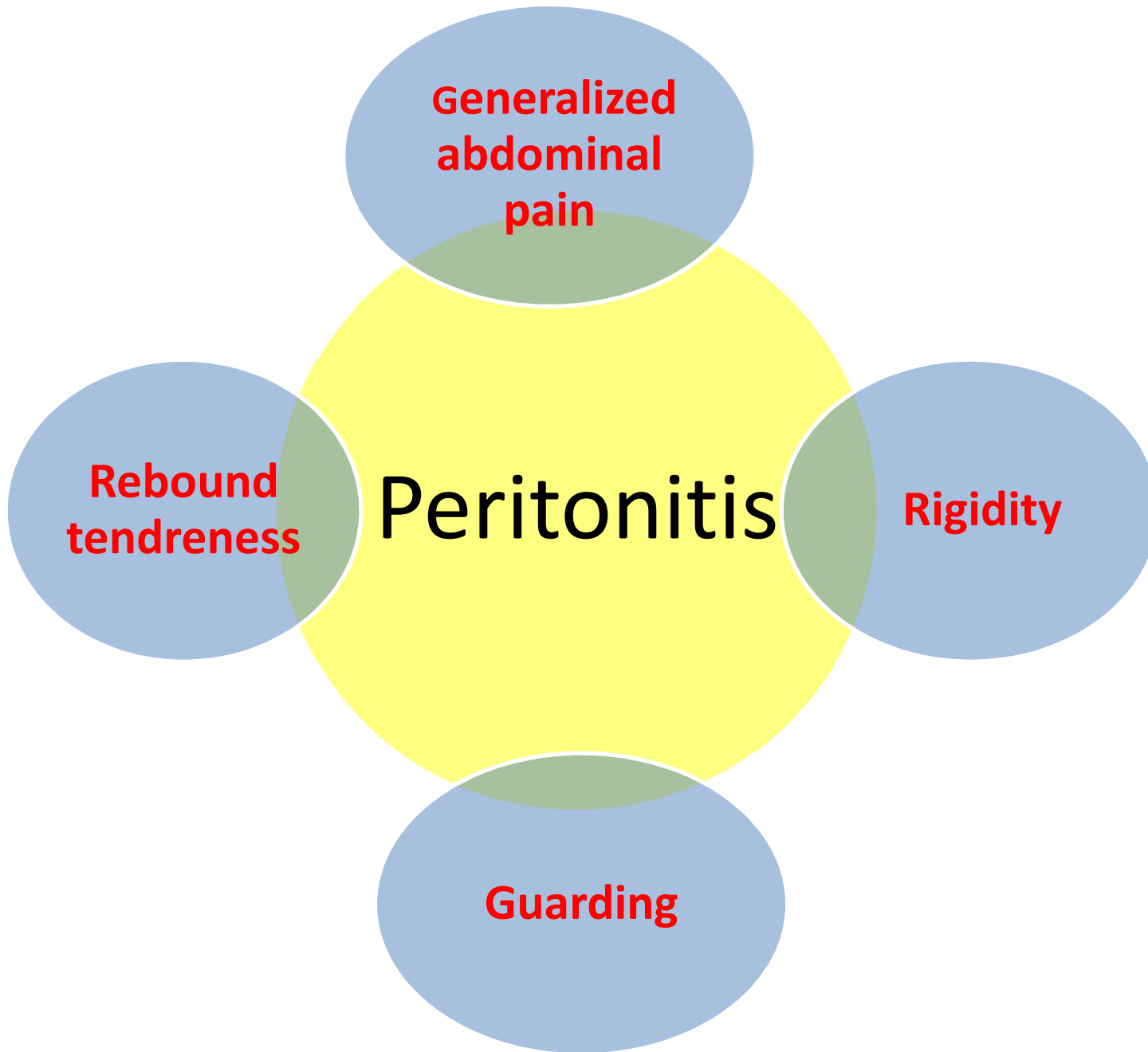
Distal small bowel, cecum, appendix, proximal colon

Hypo gastric

Transverse colon, Distal large bowel, urinary tract, pelvic organ

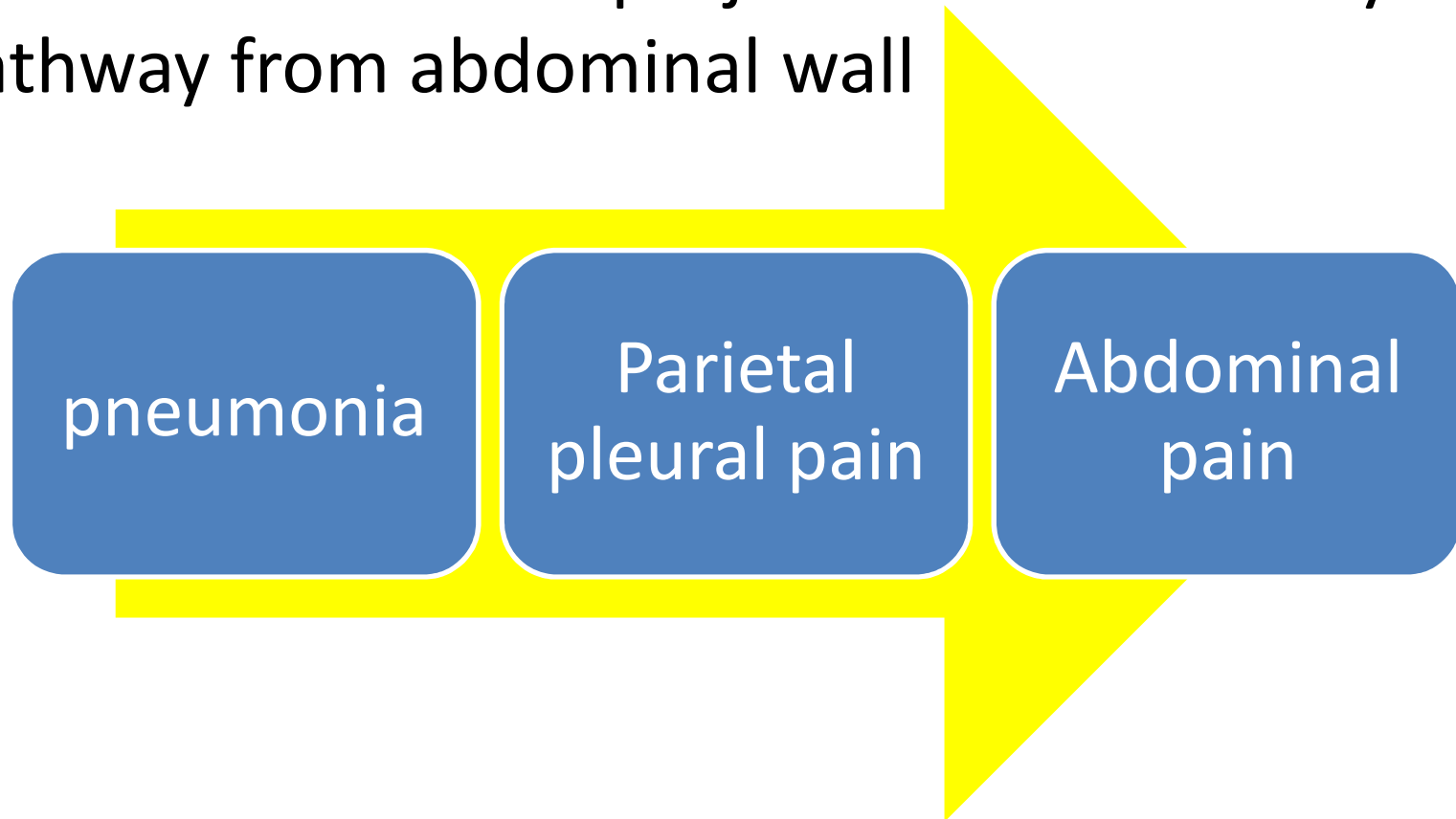
Somatic pain

- Intense
- Well localized
- Pain localized to site of inflamed viscus

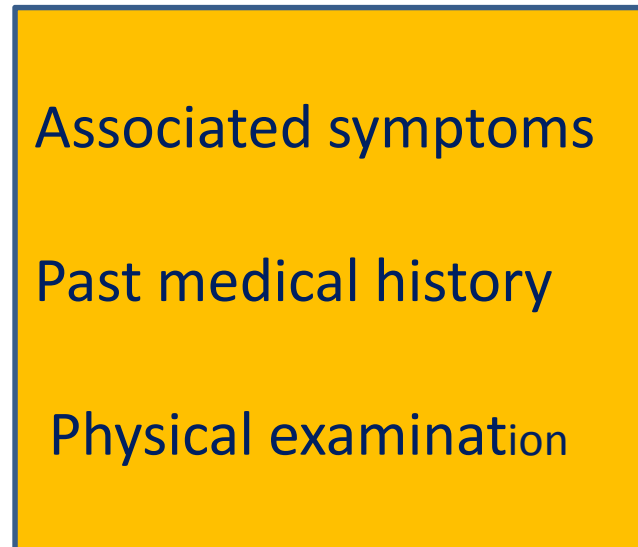
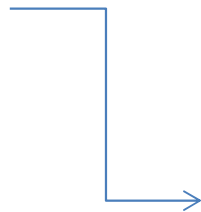


Referred pain

- From extraintestinal location
- From shared central projection with sensory pathway from abdominal wall



- The likely diagnosis is often suggested by
- Child's age
- Clinical features



Neonate

- Colic
- Dietary protein allergy
- Volvulus
- Necrotizing enterocolitis
- Testicular torsion
- Adhesions

2 mo – 2 y/o

- Gastroenteritis
- Viral illness
- Trauma (including inflicted injury)
- Incarcerated hernia
- Intussusception
- Urinary tract infection
- Foreign body ingestion
- Sickle cell syndrome vasoocclusive crisis
- Dietary protein allergy
- Tumor
- Hirschsprung disease
- Adhesions
- Hemolytic uremic syndrome
- Toxin
- Meckel's diverticulum
- Hepatitis

2 – 5 y/o

- Gastroenteritis
- Viral illness
- Trauma (including inflicted injury)
- Appendicitis
- Pharyngitis
- Constipation
- Urinary tract infection
- Pneumonia
- Intussusception
- Foreign body ingestion
- Sickle cell syndrome vasoocclusive crisis
- Henoch Schönlein purpura
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-

- Ovarian torsion
- Intraabdominal abscess
- Tumor
- Adhesions
- Hemolytic uremic syndrome
- Hepatitis
- Meckel's diverticulum
- Toxin
- Primary bacterial peritonitis

> 5 y/o

- Viral illness
- Appendicitis
- Trauma
- Constipation
- Pharyngitis
- Pneumonia
- Urinary tract infection
- Diabetic ketoacidosis
- Sickle cell syndrome vasoocclusive crisis
- Henoch Schönlein purpura
- Ovarian torsion
- Testicular torsion
- Inflammatory bowel disease

- Ruptured ovarian cyst
- Cholecystitis
- Pancreatitis
- Urolithiasis
- Hepatitis
- Meckel's diverticulum
- Perforated ulcer
- Adhesions
- Hemolytic uremic syndrome
- Myocarditis, pericarditis
- Primary bacterial peritonitis
- Familial Mediterranean fever
- Abdominal migraine

Life threatening causes

- **Trauma**

- Motor vehicle accident
- Child abuse



- Solid organ laceration
- Hollow viscus laceration

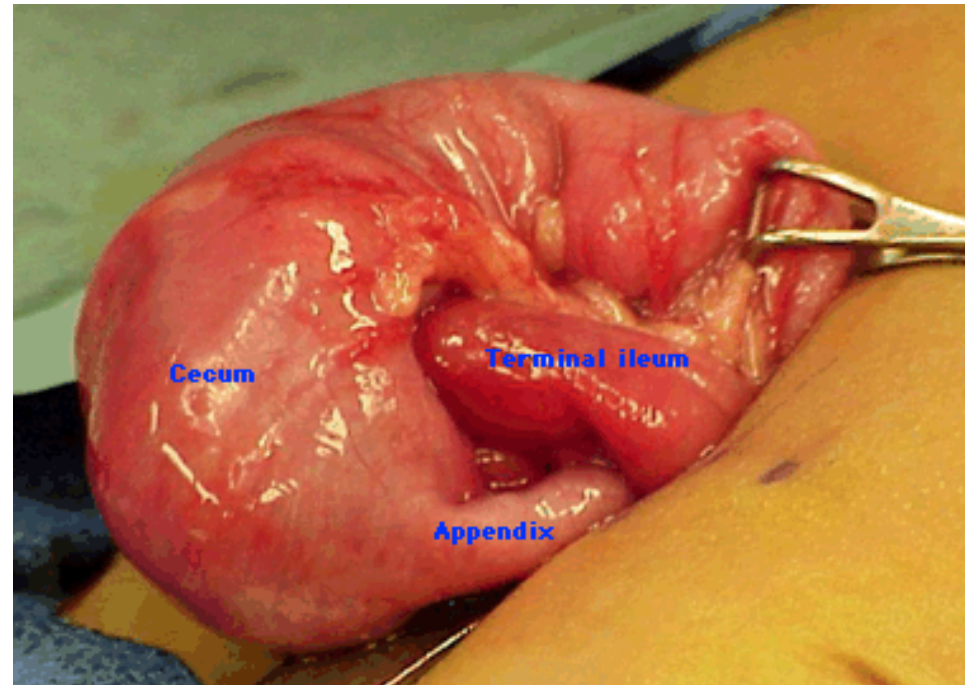
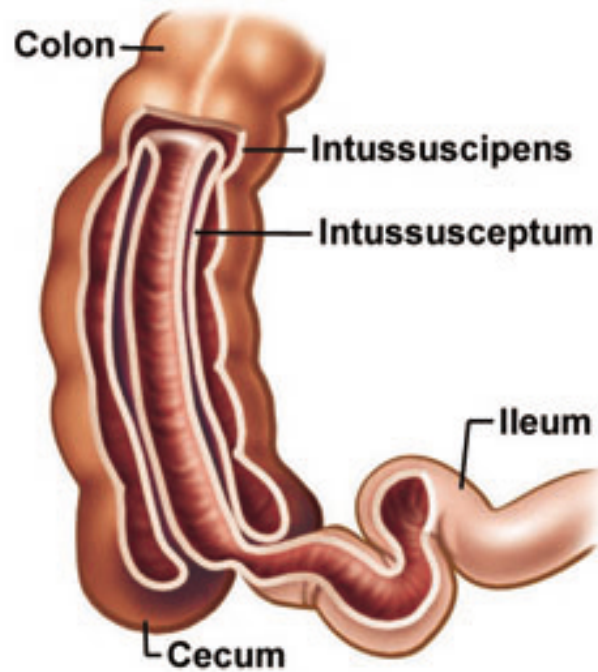
- **Appendicitis**

The three most predictive clinical features of appendicitis are pain in the right lower quadrant, abdominal wall rigidity, migration of periumbilical pain to the right lower quadrant.

However, at least one of these manifestations is frequently absent, particularly in younger children.

- **Intussusception:** two months to two years of age
 - and present with characteristic pain that develops suddenly, is intermittent, severe, and classically accompanied by inconsolable crying with drawing up of the legs toward the abdomen.
 - **Bilious emesis** may develop as the obstruction progresses
 - **Lethargy or altered** consciousness can be the primary symptom of intussusception, especially in infants. Most children have gross or occult blood in the stool

Ileocolic intussusception



Intussusception Surgical view of an ileocolonic intussusception. Courtesy of David Wesson, MD.

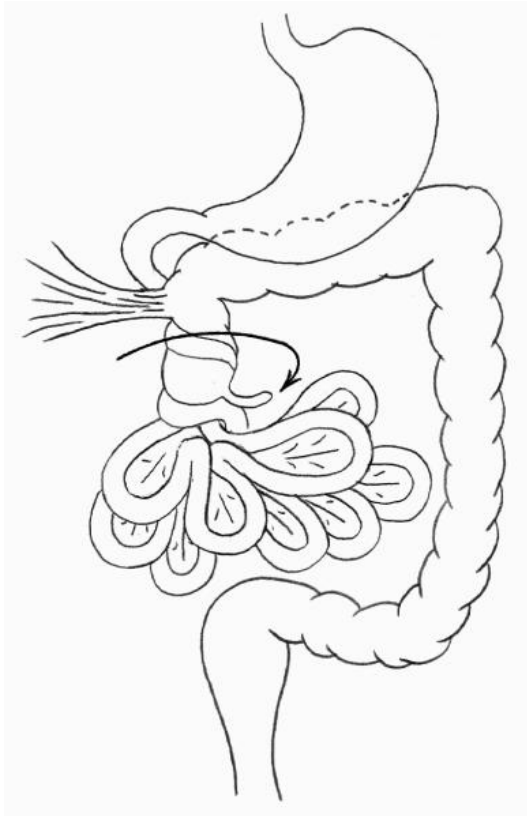
Currant-jelly stool



Mixture of blood and mucus
Foul smelling

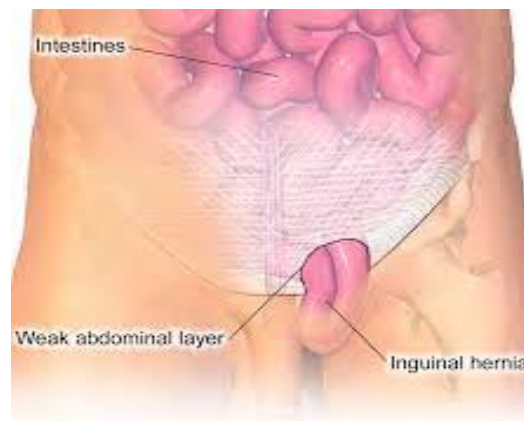
- **Malrotation & Midgut volvulus** Neonates may have emesis (bilious or nonbilious) with apparent abdominal discomfort as the result of midgut volvulus. Over 50 percent of children with malrotation present before one month of age with this life-threatening complication.

UGI with SBFT



Cork-screw pattern - barium flowing through restricted bowel lumen

- **Incarcerated inguinal hernia** —
irritable and crying. Vomiting and abdominal distention depending on the duration of incarceration and whether or not intestinal obstruction has occurred



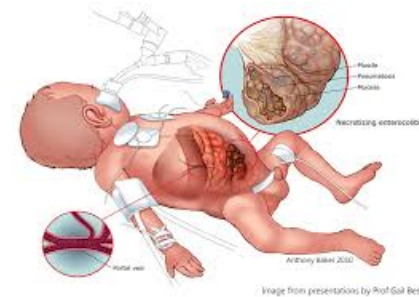
Inguinal Hernia

Intestinal Obstruction

- Adhesion with intestinal obstruction previous abdominal surgery
- may have small bowel obstruction (SBO) as the result of adhesions



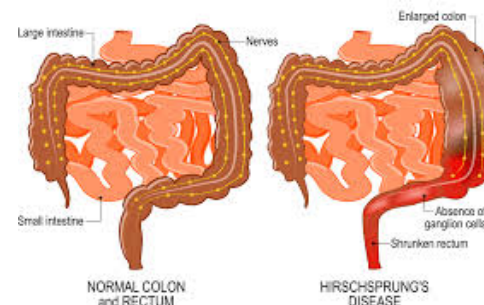
- **Necrotizing enterocolitis** Newborns intestinal necrosis, typically have vomiting, abdominal distention, and tenderness



- **Peptic ulcer disease** (PUD) complicated by severe hemorrhage or perforation is uncommon
- Vomiting, hemorrhage, and perforation are more commonly seen in young children,
- while older children and teens have a presentation similar to adults

Uncommon Life Threatening Causes

- **Diabetic ketoacidosis (DKA)** polyuria, polydipsia, and glycosuria,
 - but may also present with abdominal pain and vomiting, especially in young children
- **Hirschsprung associated enterocolitis (HAEC)** is an uncommon, fulminant complication of Hirschsprung disease.
 - Children typically have explosive diarrhea, fever, and abdominal pain.
 - HAEC can occur prior to surgical intervention, in the immediate postoperative period, or **more than two years** after definitive repair.



- **Hemolytic uremic syndrome** (HUS) typically develops after an infection with Shiga toxin-producing enterohemorrhagic E. coli (EHEC) or Shigella
- HUS has also been associated with pneumococcal infection, HIV, and genetic factors.
- Bloody diarrhea, & **Triad of** hemolytic anemia, thrombocytopenia, and acute renal injury manifested by elevated blood urea nitrogen.

- **Primary bacterial peritonitis**, usually caused by Streptococcus pneumoniae or E. coli, is a life-threatening infectious complication of nephrotic syndrome and occasionally other conditions that cause ascites (eg, cirrhosis of the liver)

- **Myocarditis** may cause abdominal pain as the result of passive **hepatic congestion** from heart failure. Pericarditis may cause referred abdominal pain
- Case reports have described children who have developed volvulus and bowel perforation following ingestion of small rare- **earth magnet**. Injury occurs when objects become magnetically attached to each other across bowel wall. Symptoms are nonspecific and typically include abdominal pain.

- **Testicular torsion** causes scrotal pain that may radiate to the abdomen.
- Patients may have associated nausea, vomiting, and fever. The affected testis usually is tender, swollen, and slightly elevated because of shortening of the cord from twisting
- **Ovarian torsion** result of an ovarian mass or cyst, but can develop in normal ovaries.
- Nausea and vomiting frequently occur.
- Partial or intermittent ovarian torsion may present as intermittent abdominal pain.



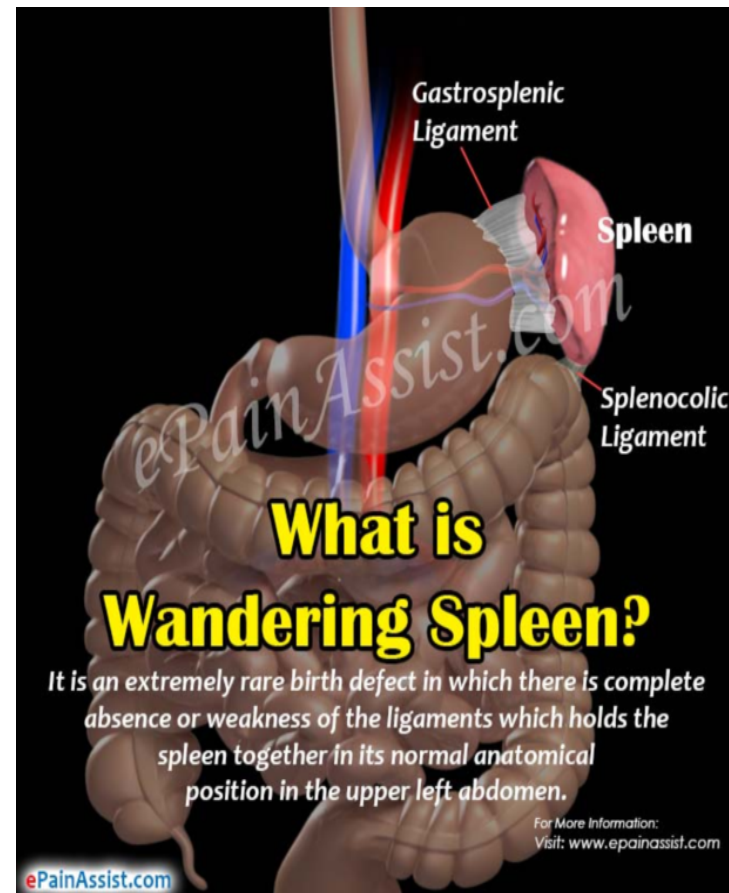
Ectopic pregnancy

- Postmenarchal girls.
- Abdominal pain, amenorrhea, and vaginal bleeding are the classic symptoms, with or without rupture.
- Life-threatening hemorrhage can occur with rupture.
- Symptoms typically appear **six to eight** weeks after a missed menstrual period.



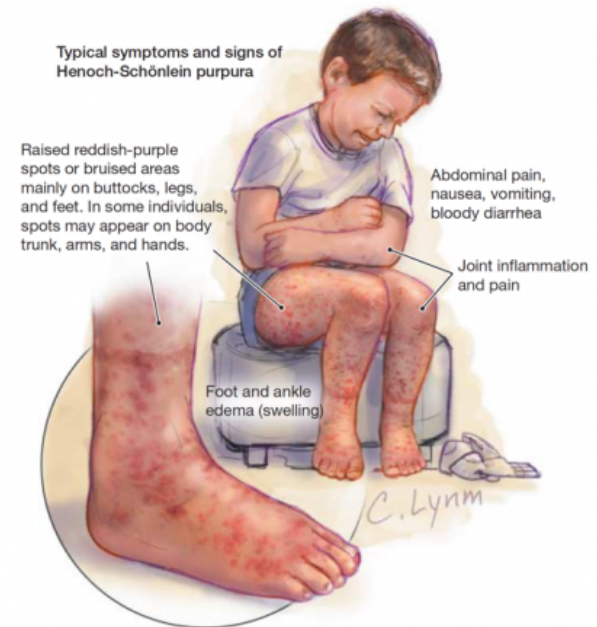
Wandering Spleen

- Refers to acquired laxity or congenital underdevelopment or absence of the primary ligamentous attachments of the spleen in the left upper quadrant -----
- splenic torsion and infarction.
- Most commonly seen in children and is associated with congenital diaphragmatic hernia, prune-belly syndrome, renal agenesis, and gastric volvulus.
- It typically presents with acute, diffuse, severe abdominal pain. Patients may also have an abdominal mass which is mobile to the left upper quadrant
- **Ultrasound** is most helpful in establishing a preoperative diagnosis and can assess adequacy of splenic perfusion.
- **Two-thirds** of patients require splenectomy.
- Early diagnosis allows for **splenopexy** and preservation of splenic function



Non GI causes

- **Henoch-Schönlein purpura** (HSP [IgA vasculitis (IgAV)]) is a systemic vasculitis affecting small vessels in **skin, gut, and glomeruli**
- may present with colicky abdominal pain (presumably due to local vasculitis). Pain typically develops after the appearance of a characteristic purpuric rash involving predominantly the lower extremities and buttocks. Stool often contains gross or occult blood.
- Rare complications of HSP (IgAV) that can cause abdominal pain include **intussusception (typically in the ileum), pancreatitis, and cholecystitis.**
- **Hepatitis** typically causes jaundice, mild abdominal pain, and fever, but young children in particular may be afebrile and/or anicteric
- **Sickle cell syndromes** :acute painful episodes that may manifest as abdominal pain



- **Malignant solid tumors**
- Abdominal pain and abdominal mass.
- Wilms' tumor and neuroblastoma occur more commonly in infants, whereas leukemic or lymphomatous involvement of the liver, spleen, or retroperitoneal lymph nodes occurs more often in older children.
- Other causes include hepatic tumors, ovarian tumors, Burkitt lymphoma, and soft tissue sarcomas.
- **Urolithiasis** – Nonspecific abdominal pain among young children. In comparison, adolescents are more likely to experience colicky flank pain
- Hematuria and urinary tract infection are other frequent manifestations of urolithiasis among children.

Common Causes

- Constipation
- GI infections
- Other infections
 - UTI
 - strep pharyngitis
 - Pneumonia
 - viral infections
 - pelvic infection
 - mesenteric lymphadenitis
- Ruptured ovarian cyst
- Foreign body ingestion
- Colic

Other Causes

- **GI causes**

IBD

Pancreatitis

Acute cholecystitis

Intra – abdominal abscess

Dietary protein allergy

Malabsorption (celiac)

Meckles diverticulum:(Abdominal pain may develop as the result of mucosal ulceration (from ectopic gastric tissue) with perforation or from bowel obstruction)

☐ **Toxins** include lead and iron.

- **Lead poisoning** is usually the result of chronic ingestion and causes intermittent abdominal pain.
- **Iron poisoning** is typically an acute ingestion with other gastrointestinal symptoms, such as vomiting and diarrhea

□ Acute porphyria

- Present with a variety of nonspecific **neurovisceral symptoms** (eg, abdominal pain, psychiatric disorders, neurologic symptoms), the most common of which is abdominal pain.
- These can include potentially life-threatening neurological effects (eg, seizures, coma, bulbar paralysis)
- Elevations in the porphyrin precursors delta-aminolevulinic acid (ALA) and porphobilinogen (PBG).
- Symptoms usually occur as acute attacks, but are sometimes chronic

❑ Familial Mediterranean fever

Episodic attacks of fever lasting one to three days and accompanied in most cases by

- Abdominal pain,
 - Pleurisy, and
 - Arthralgias or arthritis, the result of accompanying serositis and synovitis.
- Elevation in peripheral white blood cell count and acute phase markers, while fluid from inflamed joints exhibits a neutrophil-predominant leukocytosis.

Persistent inflammation can lead to secondary (AA) amyloidosis

- **Abdominal migraine**
- childhood periodic syndromes) often presents with acute onset of abdominal pain that is periumbilical (**78 percent**),
- or occasionally more diffuse (**16 percent**)
- . It is more common after age **seven years**. The pain is often incapacitating, with or without vomiting and headache.
- A family history of migraine is common.

Diagnosis

- Hx , P/E , Rectal exam
- Lab, CBC, ESR,
- ESR, CRP, celiac panel
- Liver function test, Amylase and lipase, VBG\
- CXR, Abdx- ray,
- Sonography
- Endoscopy , colonoscopy