A few words first…

- Review, review, review
- I'll focus on key points
- Special attention to red text
- Special attention to "most common cause of…"
- Special attention to triads, quadrads
- Always consider deadly causes first

Dysphagia

- Difficulty swallowing, sensation of impaired food passage
- Solids: mechanical (obstructive)
- Solids and liquids: motility disorder
- Oropharyngeal dysphagia: neuromuscular disorder (CVA)
- Progressive (CA) vs. non-progressive (web)
- Strictures 2° to reflux
- Workup
  - Esophagram, endoscopy, motility studies
- Treat underlying disease process

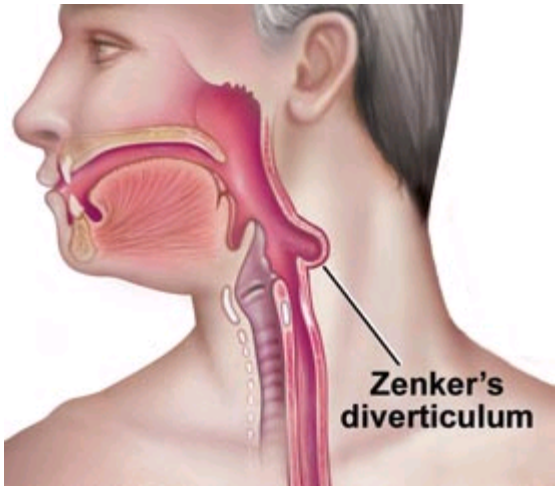
Dysphagia

- Infectious
  - Botulism, diptheria, poliomyelitis, rabies, Sydenham's chorea (rheumatic fever), tetanus
- Immunologic
  - Scleroderma, multiple sclerosis, myasthenia gravis, polymyositis
- Motor/nerve dysfunction
  - Achalasia
    - Aperistalsis of esophagus (loss of Auerbach's plexus in the esophagus)
  - Cranial nerve palsies

Dysphagia

Mechanical

- CA (usually squamous)
  - Risk factors: smoking, achalasia, caustic ingestion
- Extraluminal obstruction (tumor)
- Thyroid goiter
- Zenker's diverticulum
  - Rare, elderly patients
  - Pharyngoesophageal outpouching (above the upper esophageal sphincter)



Dysphagia Obstructive

Mechanical

- Proximal obstruction
  - Café coronary: Sudden cyanosis and collapse caused by food obstruction
- Distal obstruction
  - Steakhouse syndrome: Most common cause of distal obstruction (improperly chewed meat)
  - Schatzki ring: ring-like constriction of lower esophagus
- Webs (Congenital or acquired)
  - Circumferential mucosal outpouchings
  - Plummer-Vinson syndrome: anterior esophageal webs+ iron deficiency anemia + spooning of the nails

Singultus

Hiccups/Hiccoughs/Singultus

- Involuntary stimulation of the respiratory reflex with spastic contraction of inspiratory muscles on closed glottis
- Benign: gastric distention, smoking, EtOH
- Persistent: damage to vagus or phrenic nerves, CNS lesions
- Treatment: Chlorpromazine (Thorazine) if persistent
- Organic
  - CNS: neoplasm, MS, ↑ICP
  - PUD, goiter, pericarditis, pacemaker, STEMI?

Esophageal Rupture

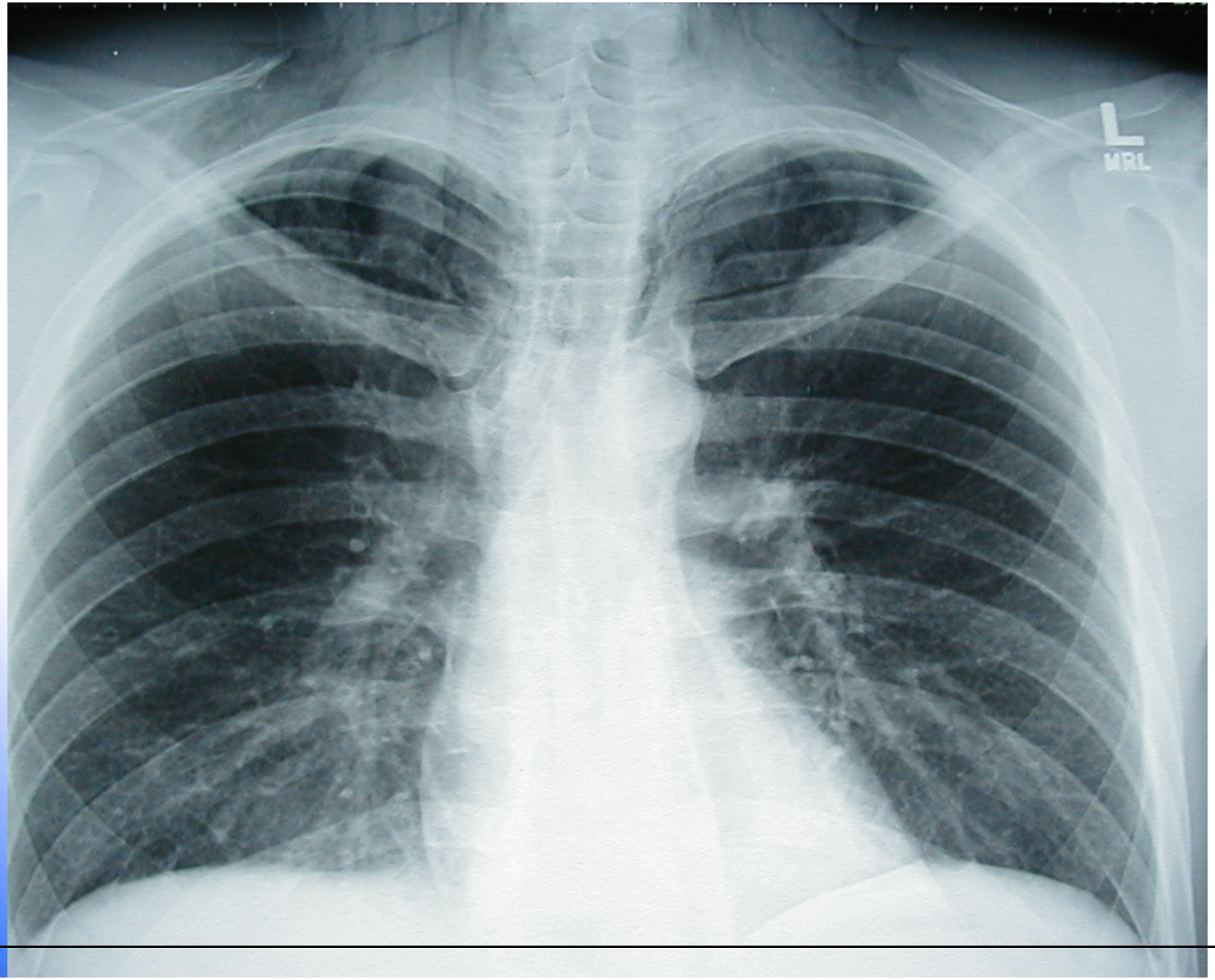
- Majority are iatrogenic
  - Endoscopy, dilatation, biopsy, sclerotherapy
  - Most at pharyngoespohageal junction

- Mallory-Weiss tear (partial thickness tear)
  - Location: GE junction
  - Common cause of upper GI bleeding
  - Vomiting, retching
  - Risk factors: EtOH, hiatal hernia
  - Spontaneous resolution is common

Esophageal Rupture

- Boerhaave's syndrome (full-thickness tear)
  - Usually males, ages 40-60
  - Typically associated with vomiting
  - Left posterior distal rupture
  - Mediastinitis (first chemical, then infectious)
  - Severe chest pain, shock, sepsis (antibiotics)
  - Air in mediastinum (Hamman's crunch)
  - Pyopneumothorax
  - Gastrografin (water-soluble) UGI, CT
- X-ray: mediastinal air, left pleural effusion, pneumothorax, widened mediastinum

Pneumomediastinum / Subcutaneous Emphysema



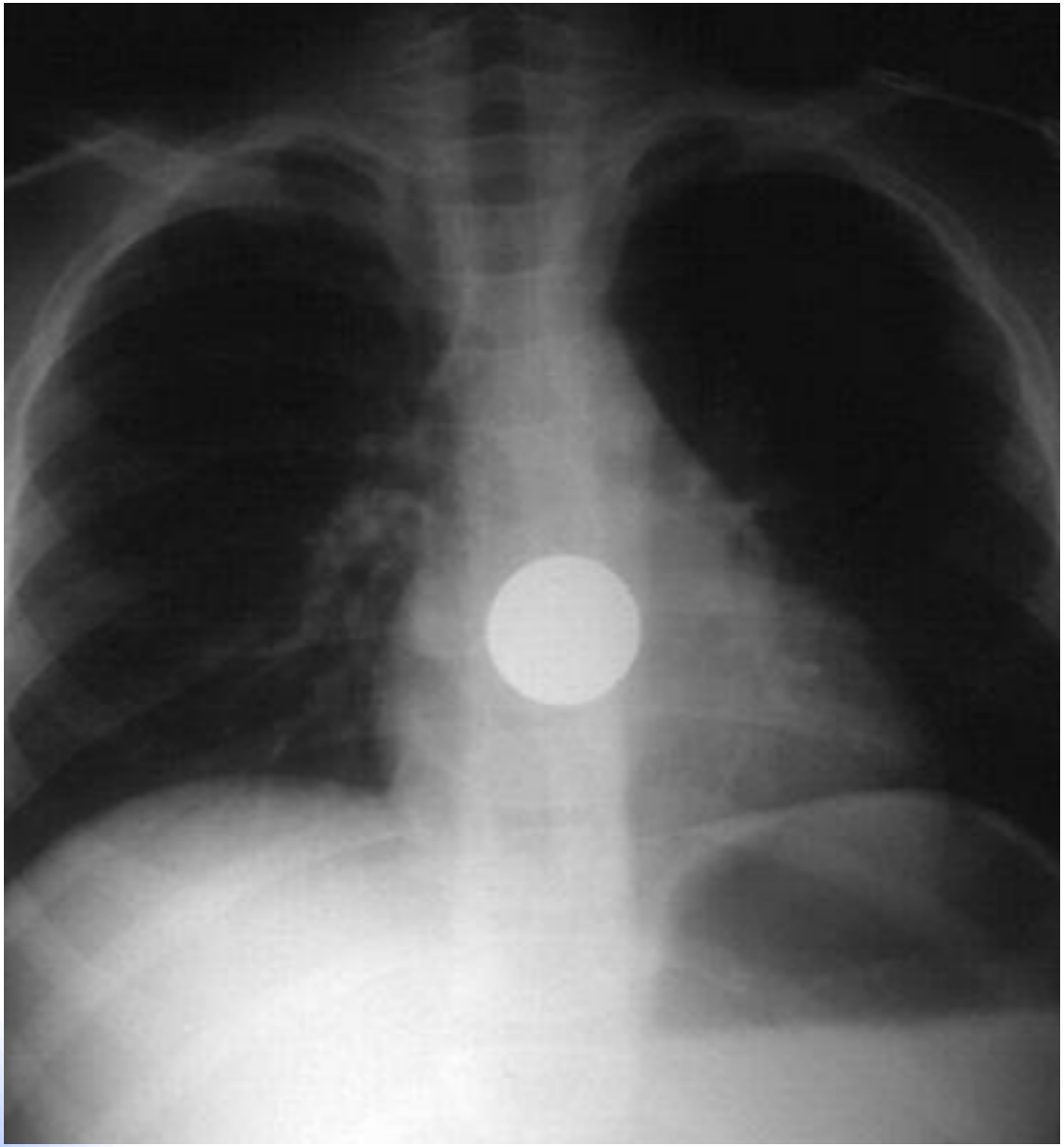
Esophageal Foreign Bodies

- Levels of narrowing
  - Cricopharyngeus muscle (C6)
  - Aortic arch (T4)
  - Tracheal bifurcation (T6)
  - Gastroesophageal junction (T11)

- Coin X-rays
  - AP orientation: coin in trachea (same plane as vocal cord orientation- sagittal)
  - Transverse orientation: coin in esophagus

Foreign Body

Esophageal Foreign Body

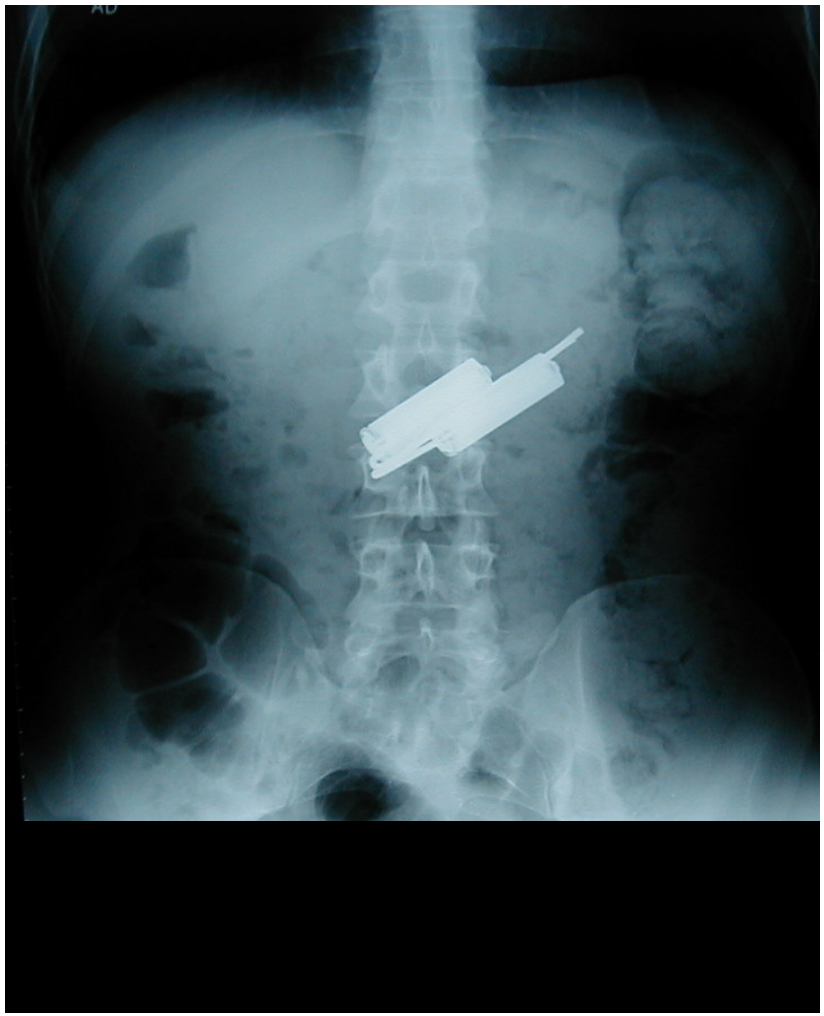


Esophageal Foreign Bodies

- Disk batteries characteristic double density radiographic appearance.
- Soft drink aluminium pull tabs - radiolucent
- Contrast studies may be required
- CT scan- good for chicken and fish bones, small plastic pieces
- Most foreign bodies will pass if they traverse the pylorus (exceptions: pointed, sharp, large)

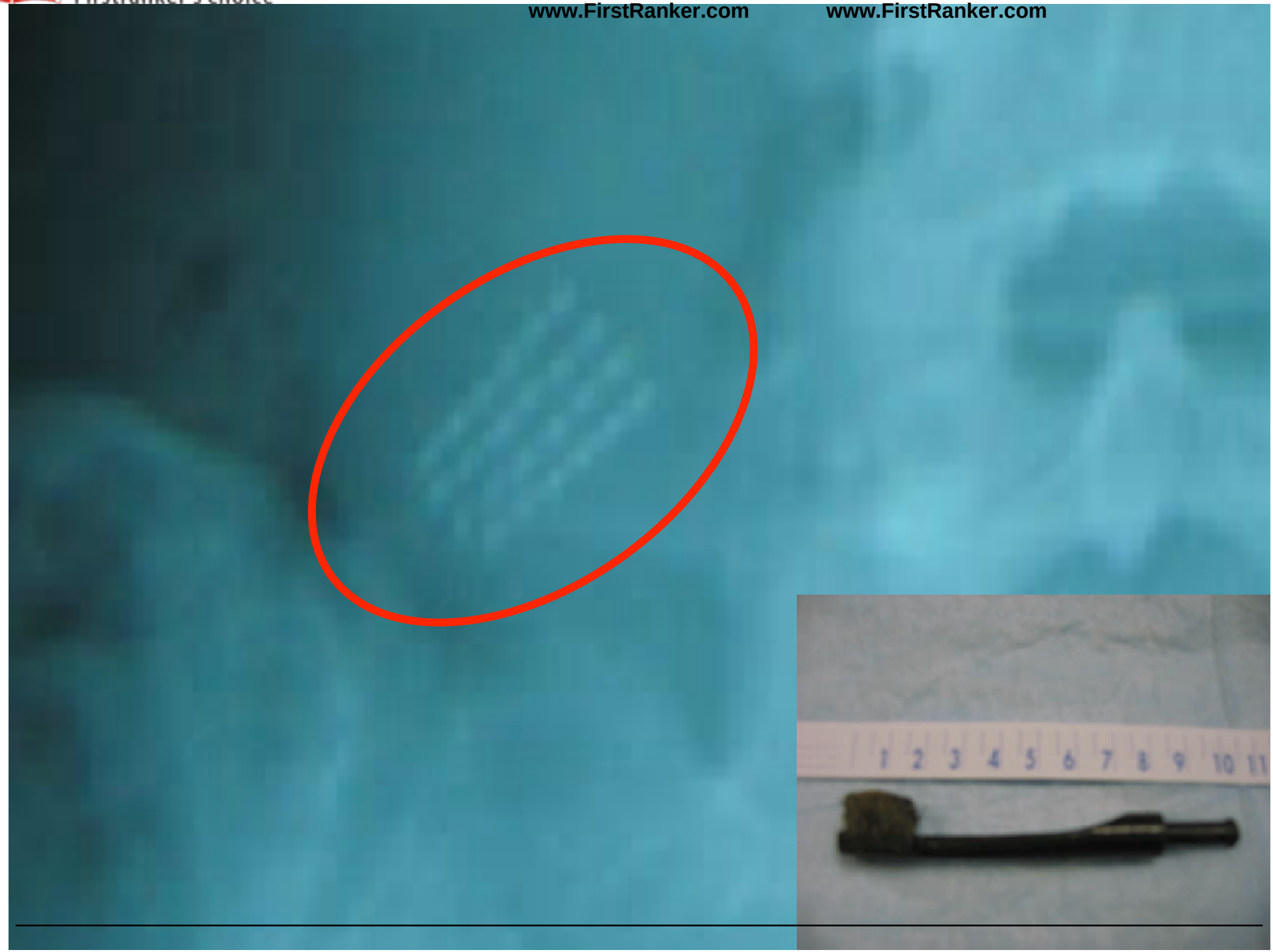
Sharp Foreign Body

Large-corrosive-impacted foreign Body



Esophageal Foreign Bodies

- Button batteries
  - If seen in esophagus, must be removed immediately
  - Rapid burns with perforation in 6 hours
  - Lithium batteries have the worst outcomes
  - Batteries that do not need to be removed
    - Passed esophagus, asymptomatic
    - Passed the pylorus within 48 hours
  - Most will pass completely in 48-72 hours
  - Asymptomatic batteries in the stomach are followed by serial X-rays
- Treatment if in esophagus: GI consult broad-spectrum antibiotics



Esophageal Food Impaction

- Most patients with food impaction have underlying esophageal pathology
- Must evaluate for cause after dislodgement
- Treatment options
  - Endoscopic retrieval
  - Foley catheter removal
  - Glucagon: relaxes lower esophageal sphincter
  - Nifedipine: reduces lower esophageal tone
  - Carbonated beverages: gaseous distention may push bolus into the stomach
  - Avoid meat tenderizers (papain)

Caustic Ingestions

- Inconsistent relationship between oral and esophageal findings
- Gastric decontamination is contraindicated
- Dilution (water or milk) can cause vomiting
  - Indicated only for solid alkali ingestions
- Neutralization can generate excess heat
  - Indicated only for hydrofluoric acid ingestions (milk or magnesium citrate)

Endoscopy is the best diagnostic tool

Caustic Ingestions

- Complications
  - Early: acute airway compromise due to edema, perforation
  - Late: stricture, perforation

Peptic Ulcer Disease

- Incidence decreasing in general population and increasing in the elderly (liberal use of NSAIDs)
- Duodenal > gastric (relief of pain with eating)
- *Helicobacter pylori* responsible for most cases
- Predisposing factors:

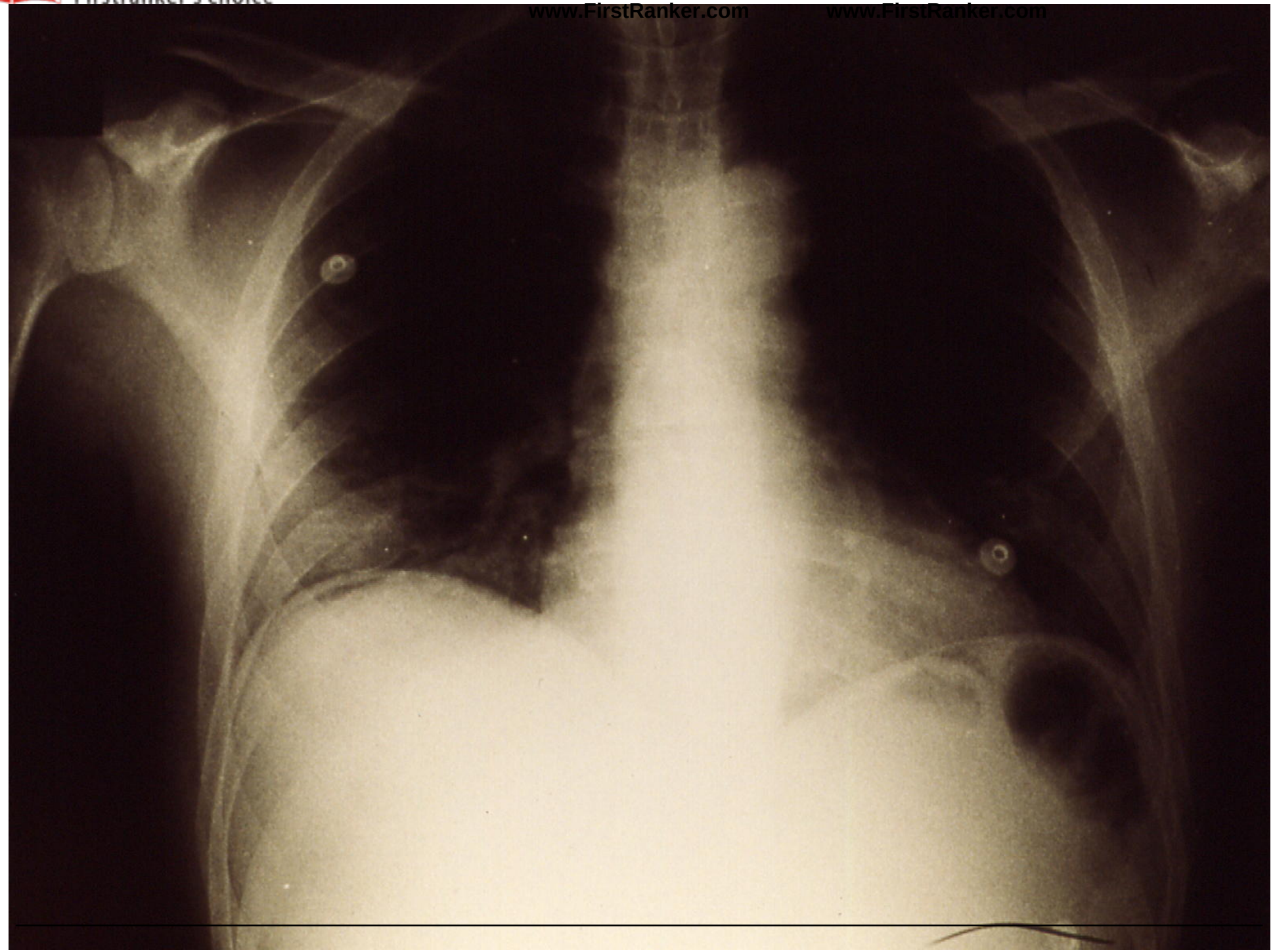
  - Smoking, alcohol
  -NSAIDs and steroids
  -Zollinger-Ellison syndrome

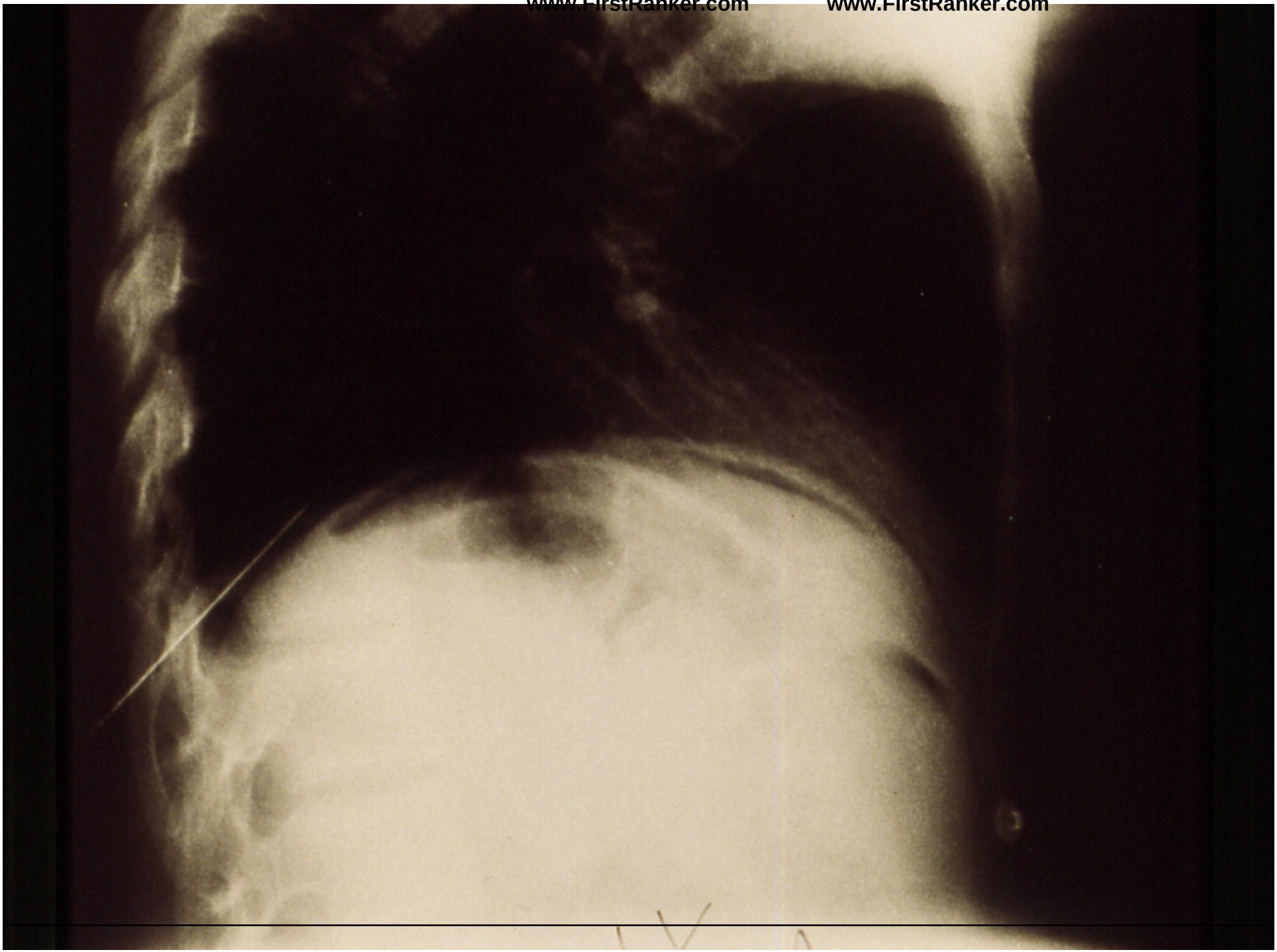
- Treatment:

  - Antibiotics against H. pylori (amox, flagyl)
  - H2 blockers
  - Proton pump inhibitors (omeprazole)
  - Surface protectants (sucralfate)

- Complications:

  - Bleeding
  - Perforation (can cause pancreatitis)
  - Gastric outlet obstruction





GI Bleeding

Definitions

- Hematemesis
  - UGI bleeding (proximal to ligament of Treitz)
- Hematochezia
    - Anus, rectum, sigmoid: bright red
    - Transverse and right colon: maroon
    - Rapid UGI bleed (uncommon)
    - Usually colon or small bowel
- Melena (black, tarry stools)
  - Usually UGI bleed
  - Black color from effects of acid and digestion
    - GI breakdown of blood causes increased BUN
    - Bismuth (Pepto-Bismol) black stool- heme-neg

Upper GI Bleeding Adults

- PUD most common (usually duodenal)
- Gastric erosions (alcohol, NSAIDs)
- Varices
- Mallory-Weiss tears
- Esophagitis (common in pregnancy)
- Duodenitis
- Patients with a previously documented GI lesion bleed from the same site in only 60% of cases

Upper GI Bleed

Therapies

- No benefit to initiating PPI or H2 blocker in the ED for patients with UGIB
- Octreotide (Somatostatin) for esophageal varices / causes splanchnic blood flow reduction / sclerotherapy
- Vasopressin (vasconstrictor) – used in variceal hemorrhage to limit exsanguination when endoscopy unavailable or delayed
- Sengstaken-Blakemore tube – esophageal varices
- Linton tube – Gastric varices

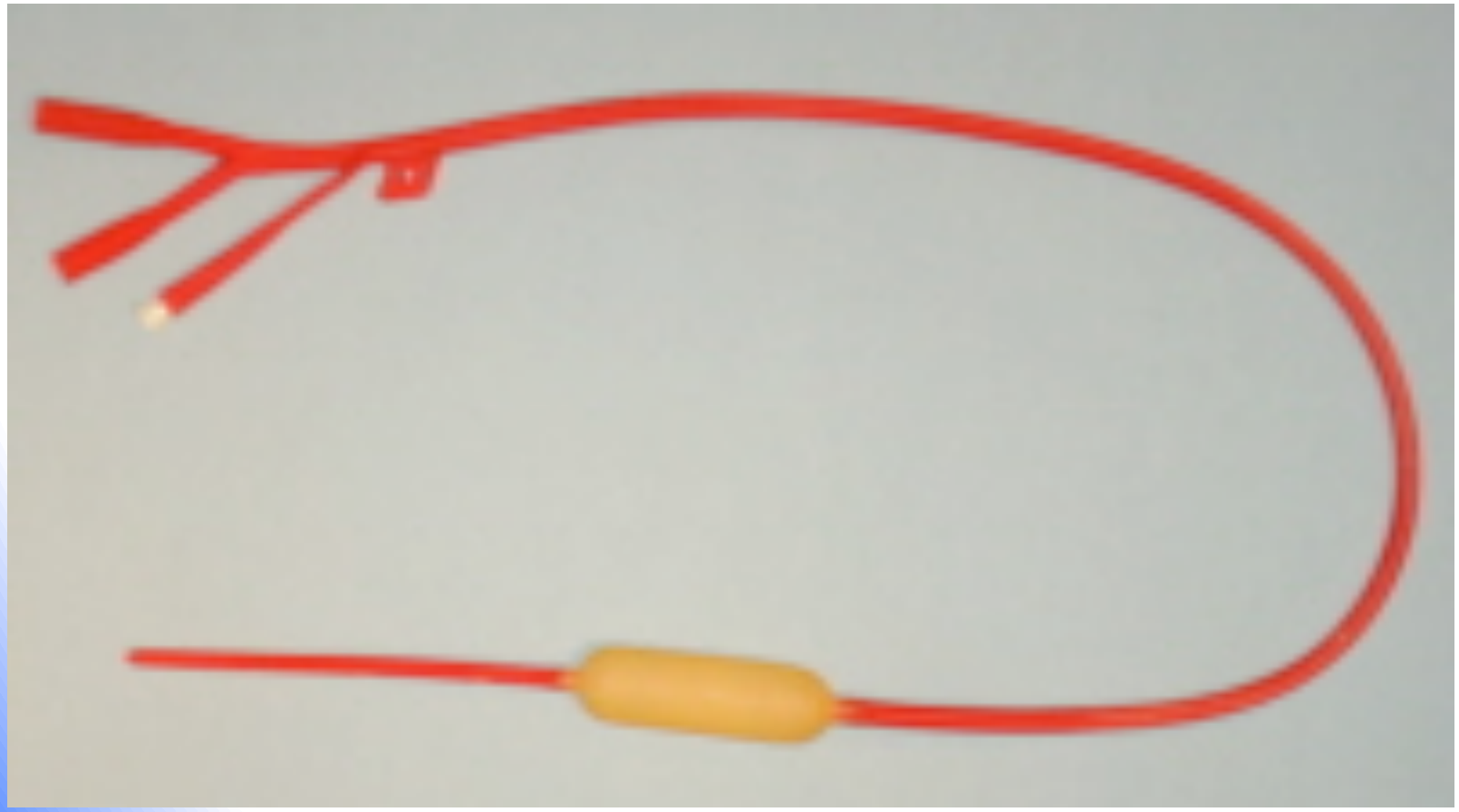
Upper GI Bleed

Sengstaken Blakemore Tube

From Google Images

Upper GI Bleed

LintonTube



From Google Images

Lower GI Bleeding Adults

- Upper GI Bleeding most common cause of LGIB
- Diverticulosis
- Angiodysplasia (AV malformations)
  - Associated with hypertension and aortic stenosis
- Cancer/polyps
- Rectal disease
- Inflammatory bowel disease
- Aortoenteric fistula
  - Erosion of synthetic vascular graft into gut (often preceded by premonitory bleed- prompt surgical consultation)

GI Bleeding

Low Risk Criteria –Discharge Home

- No comorbid diseases
- Normal vital signs
- Negative or trace positive stool guaiac
- Negative GI aspirate (if done)
- Normal H/H (consider pt's baseline)
- Good home support
- Understanding of signs & symptoms of significant bleeding
- F/U arranged in 24hrs

Osler-Weber-Rendu Syndrome

- Hereditary hemorrhagic telangiectasias
  - Autosomal dominant
- Multiple small telangiectasias of the skin, mucous membranes, GI tract
- Recurrent epistaxis, positive family history
- Recurrent episodes of GI bleeding, gross or occult

Fig. 2. Telangiectasia en mucosa labial.

Bilirubin

- Increased unconjugated (indirect) bilirubin
  - Hemolysis
  - Decreased conjugation (Gilbert's syndrome, neonatal jaundice, sepsis)
- Increased conjugated (direct) bilirubin
  - Hepatocellular disease (viral hepatitis, drug-induced hepatitis, cirrhosis, sepsis)
  - Obstruction (stone, tumor, infection)
  - CHF

Hepatitis

- Alcoholic hepatitis
- Causes: viral and toxic
  - Malaise, jaundice, increased ALT (SGPT) and AST (SGOT), increased bilirubin
  - Increased PT/INR: marker of significant liver dysfunction

Hepatitis A

- Viral Type A (infectious)
  - Fecal-oral transmission, contaminated water or food. Not associated with chronic carrier state
  - Prophylaxis: Hep A vaccine
  - Immune globulin within 2 weeks of exposure (travellers, household contacts)

Hepatitis B

- Viral Type B (HBV)
  - Percutaneous, parenteral or sexual exposure
  - Incubation period is 1-6 months
  - Complications: cirrhosis, liver cancer, carrier state (10%)
- Markers

  HBsAg: positive early, active infection

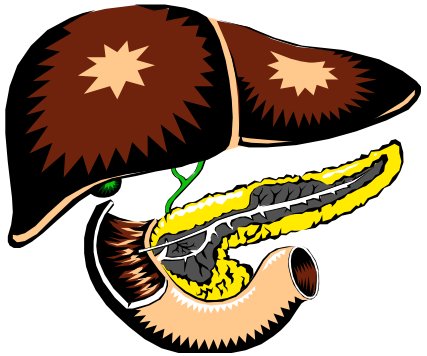
  HBsAb: positive after clearance of HBsAg
  best marker for immunity to HBV

  HBeAg: implies high infectivity

HBcAb: Appears after HBsAg, persists for life.
Best indicator of history of HBV infection

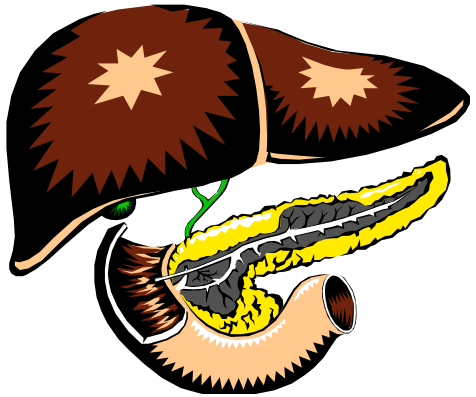
Hepatitis B

- Healthcare worker hepatitis B exposure (source known to be HBsAg-positive)
- Unvaccinated
  - HB immune globulin
  - Vaccination (0, 1 mo, 6 mos)
- Vaccinated
  - Incomplete series: vaccine booster
  - Test for HBsAb: if adequate antibodies, no treatment; otherwise: HBIG and vaccine booster



Hepatitis C

- Formally referred to as non-A, non-B
- Linked to blood transfusions, injection drug use
- Higher incidence in HIV victims
- 50% develop chronic disease cirrhosis, CA
- Seroconversion after percutaneous exposure HCV-positive source is about 2%
- No effective vaccine for HCV



Other Hepatitis Types

- Hepatitis delta (HDV): Requires HBsAG for co-infection
  - IV drug users, homosexual patient population, hemophiliacs / high likelihood for sequelae
- Hepatitis E Virus
  - Oral–fecal transmission
  - Encountered in Asia, Africa, Russia
- Hep G Virus: blood transfusions, sexual contact
- Indications for hospitalization (any hepatitis)
  - Encephalopathy, PT/INR significantly increased, dehydration, hypoglycemia, bilirubin over 20, age over 45, immunosuppression

Hepatic Encephalopathy

- Precipitants: “LIVER”

  (Librium [sedatives], Infection, Volume loss, Electrolytes disorders, Red blood cells in the gut)
- Others: dietary protein excess, worsening hepatocellular function
- Early sign is “sleep inversion” (sleeping during the day, awake at night)
- Asterixis (“liver flap”)
- Ammonia levels: arterial is best
- Check for hypoglycemia
- Treatment: neomycin, lactulose, decrease dietary protein, avoid sedatives, avoid bicarbonate (alkalosis can worsen encephalopathy)

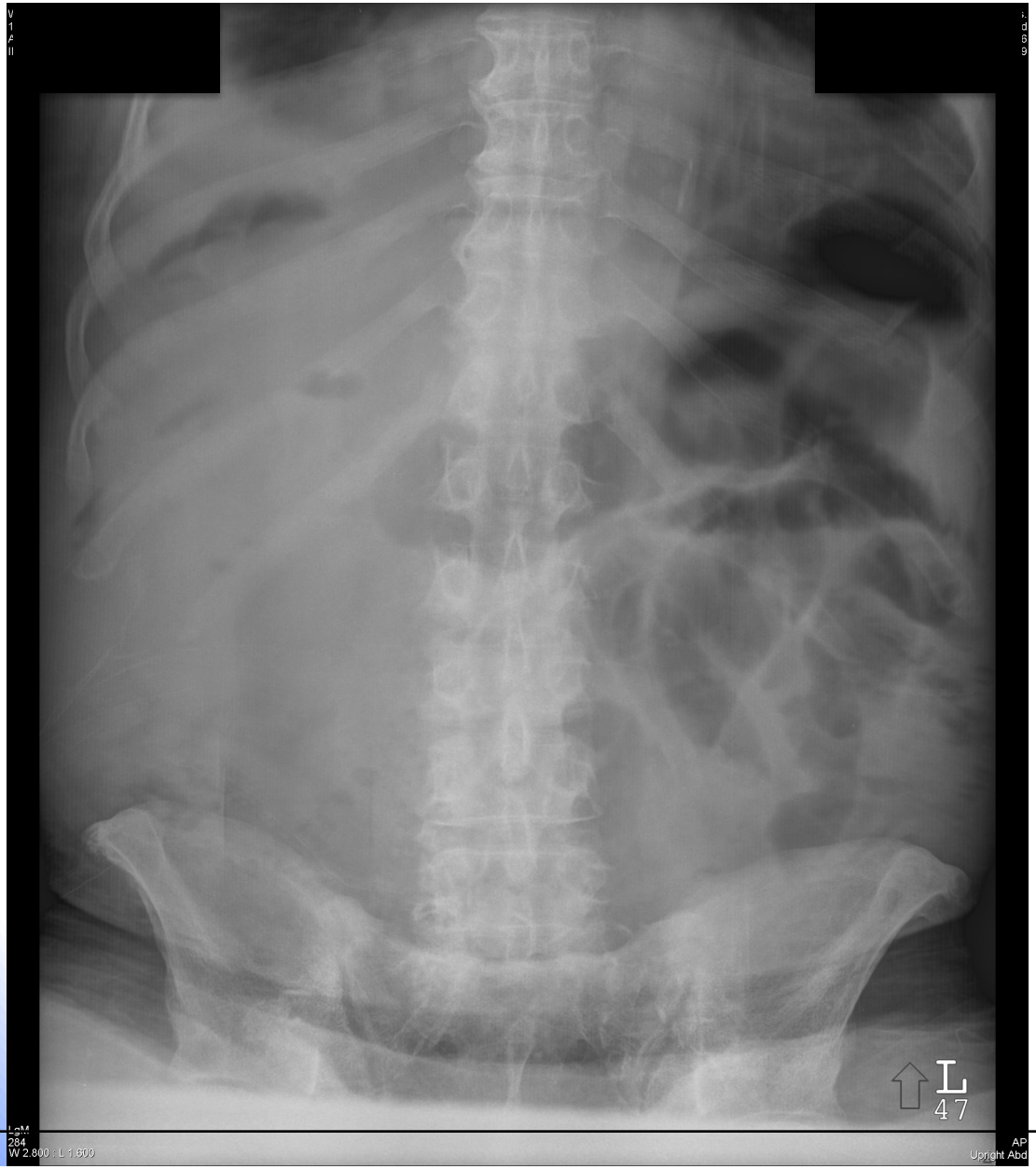
Spontaneous Bacterial Peritonitis

- Occurs with chronic liver disease
  - Portal hypertension → bowel edema → migration and leakage of enteric organisms (E. coli, Enterococcus)
- Abdominal tenderness, worsening ascites, encephalopathy, fever, sepsis, shock
- Diagnosis: paracentesis with increased WBCs
  - Neutrophil count > 250 cells/μL

Gallbladder (1)

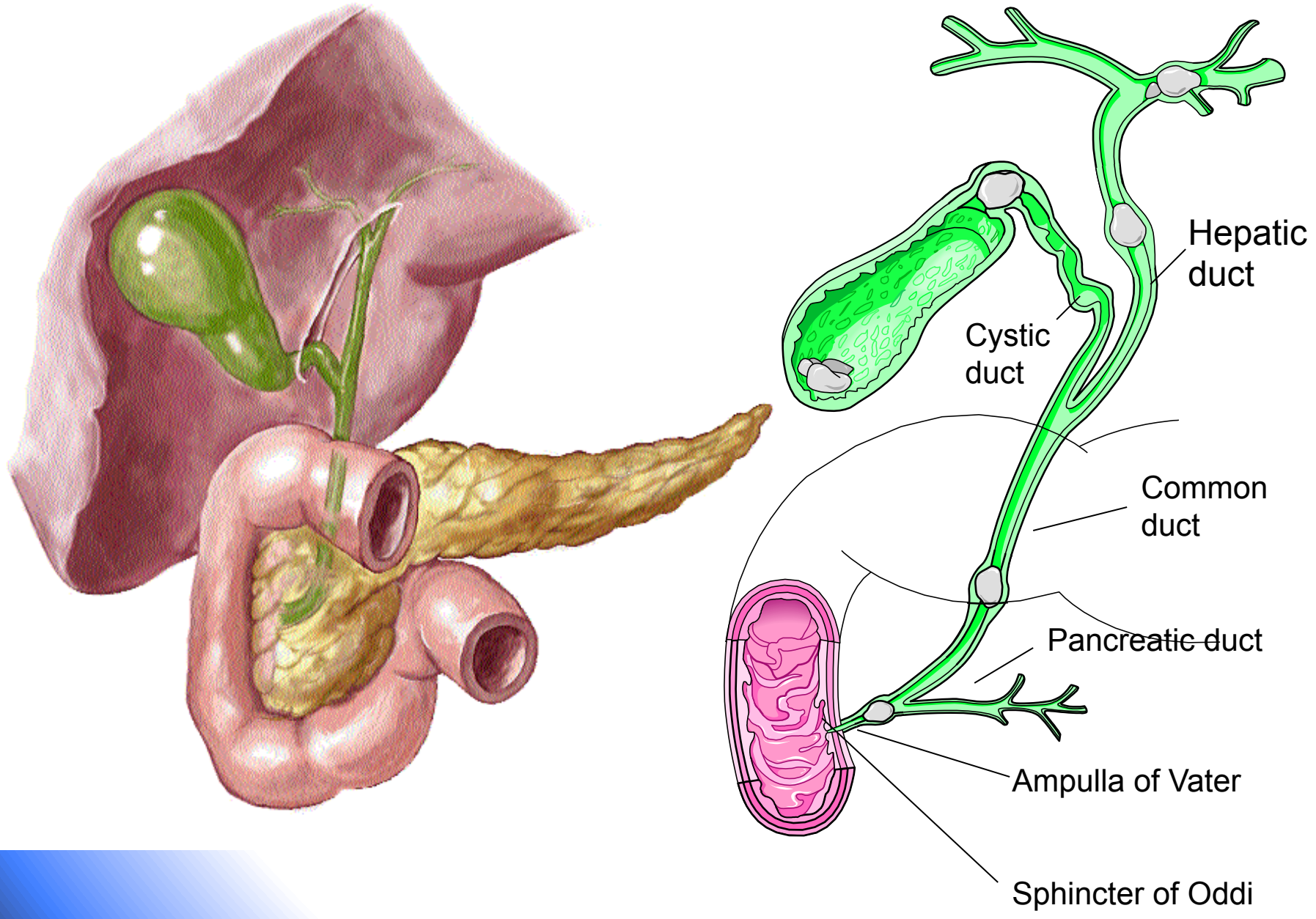
- Stones: bilirubin or cholesterol (radiolucent)
- Biliary colic: pain and vomiting due to obstruction by stones (without inflammation)
- Cholecystitis
  - Most common cause of surgical abdominal pain in the elderly
  - Obstruction → distention pain / vomiting / inflammation → infection (usually E. coli, Klebsiella) → increased WBCs
- Gallstone ileus: rupture of stone into small bowel with obstruction at ileocecal valve
  - Pneumobilia: air in biliary tree (from bowel)

Gallbladder (1)



Gallbladder (2)

- Acalculous cholecystitis
  - No stones
  - Usually a complication of another process (trauma, burn, postpartum, post-op, narcotics)
  - Patients often critically ill
  - Can cause GB perforation
  - Increased risk with diabetics and elderly
  - Greater morbidity than calculous cholecystitis
- Ascending cholangitis
  - Infection spreading through biliary tree
  - Charcot's triad: jaundice, fever, RUQ pain

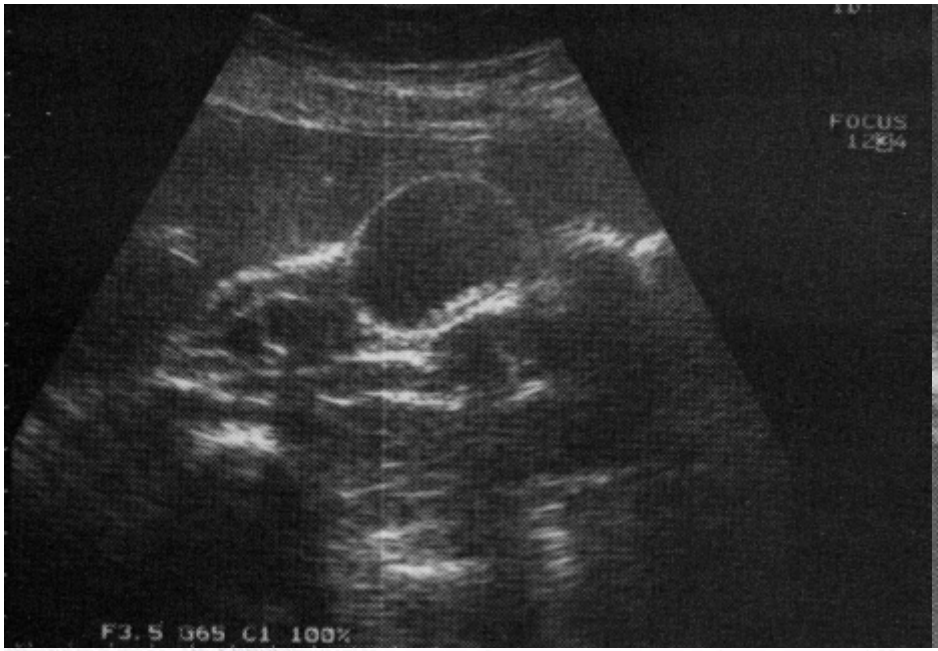


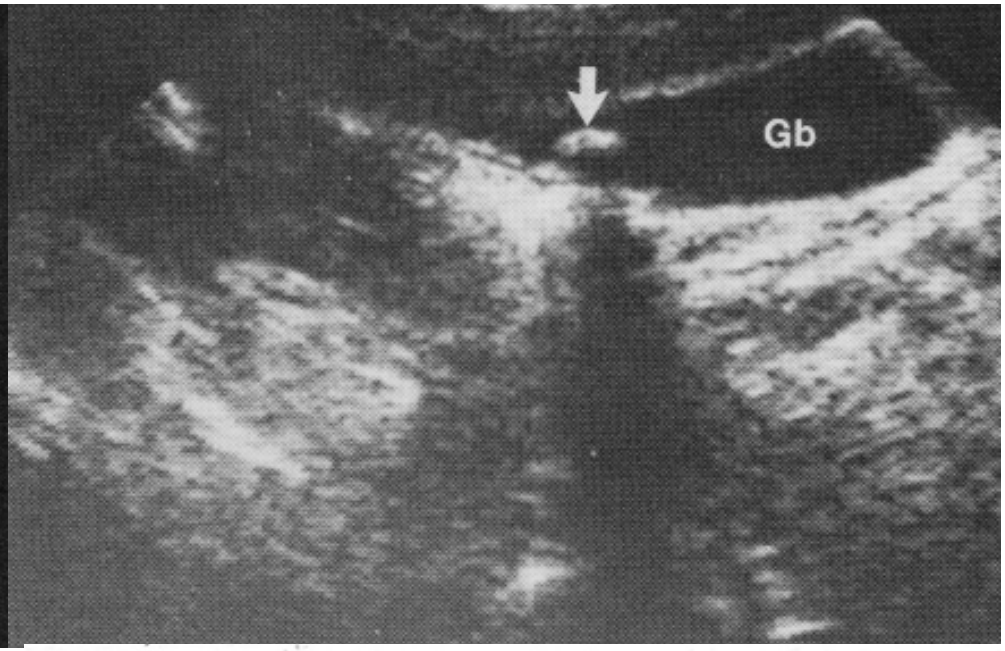
Gallbladder (3)

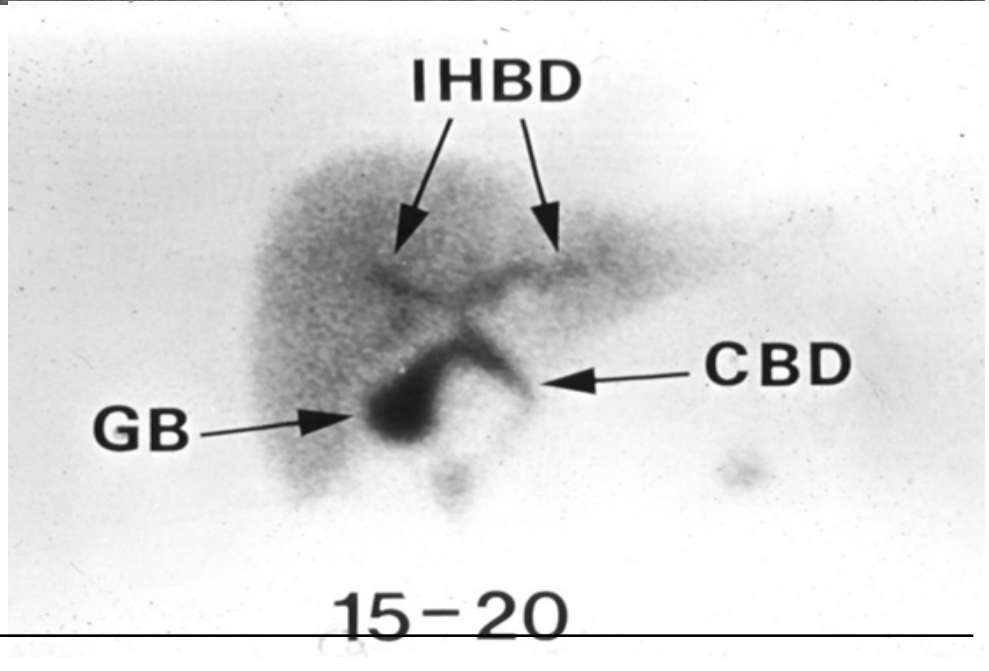
- Biliary ducts
  - Common bile duct: from junction of cystic and hepatic ducts to duodenum
  - Ultrasound is the diagnostic study of choice (shows stones, wall thickening, duct dilatation, sonographic Murphy's sign, but not inflammation)
  - HIDA scan and U/S have similar sensitivities and specificities
  - HIDA scan is positive if GB is not visualized (cystic duct obstruction; best test for GB function)

    Contrast excreted by hepatocytes into the biliary tree.
  - ERCP: Indicated for choledocholithiasis (stone near ampula of vater)

Gallbladder Ultrasound & HIDA Scan







Pancreatitis Causes

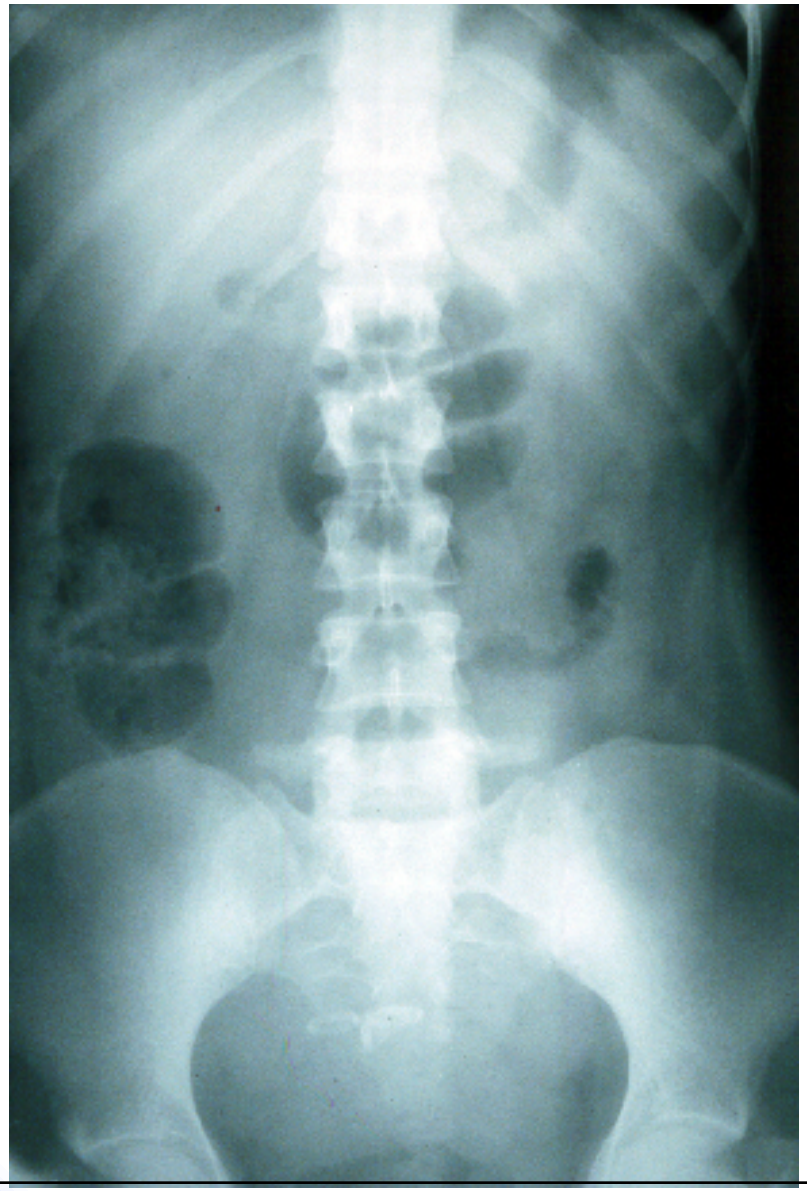
Two leading causes: gallstones, ethanol abuse

- Obstructive: gallstones, tumors
- Toxic: ethanol, methanol
- Traumatic injury (pediatrics)
- Drugs: thiazides, estrogens, salicylates, acetaminophen, antibiotics
- Metabolic disorders: hyperlipidemias, hypercalcemia DKA, uremia
- Viral infections: mumps, Coxsackie B, hepatitis, adenovirus, EBV
- Bacterial infections: Salmonella, Streptococcus, Mycoplasma, Legionella

Pancreatitis

- Amylase
  - Non-pancreatic sources (parotid, SBO, ectopic preg)
  - Height of amylase not related to severity
  - Provides no value over lipase alone
- Lipase
  - Equally sensitive/ more specific than amylase
  - Closely follows clinical course
- Plain X-ray
  - Routine imaging is not indicated
  - Colon cutoff: dilatation only over pancreas
  - Sentinel loop: small bowel air over pancreas
  - Pancreatic calcifications (chronic pancreatitis)
  - Contrast CT is imaging study of choice

Sentinel Loop (Pancreatitis)



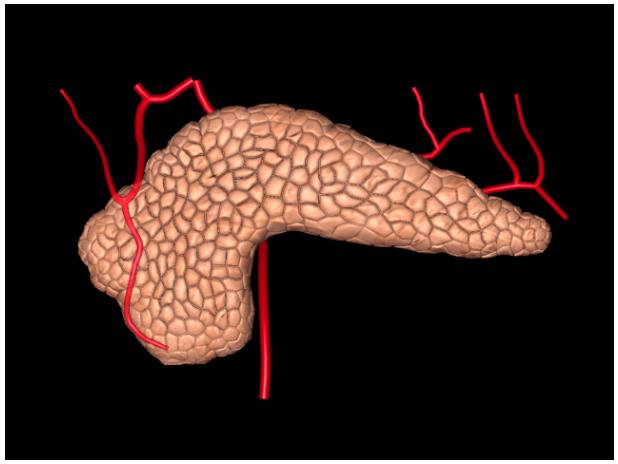
Pancreatitis

- Ranson's criteria (prognostic)
- On admission (ED)
  - Age > 55
  - Glucose > 200 mg/dL
  - WBC > 16,000
  - SGOT(AST) > 250
  - LDH > 350
- At 48 hours (ICU)
  - Decrease in HCT >10%
  - Increase in BUN over 5 mg/dL
  - Ca^{++} below 8 mg/dL
  - PaO_2 < 60 mm Hg
  - Base deficit > 4 mEq/L
  - Rapid fluid sequestration (over 6L)

3 positives: severe disease
(Poor predictive value in acute settings)

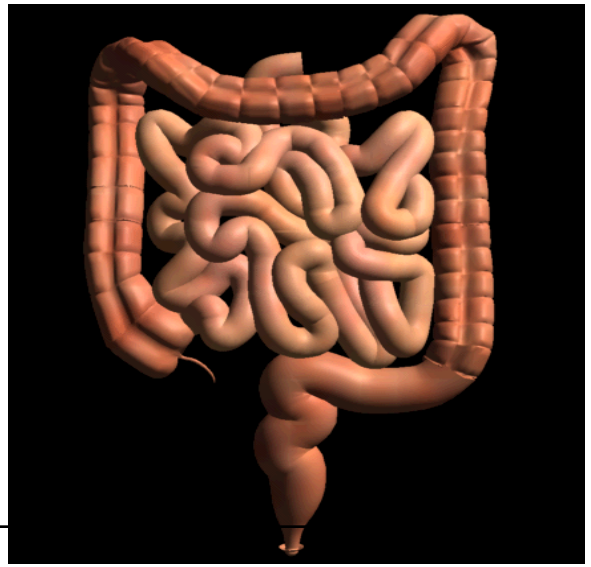
Pancreatitis

- Complications of acute pancreatitis
  - Pseudocyst, necrosis
  - Hyperglycemia, hypocalcemia
  - Volume loss, acidosis, GI Bleed
  - ARDS, DIC, renal failure
  - Death

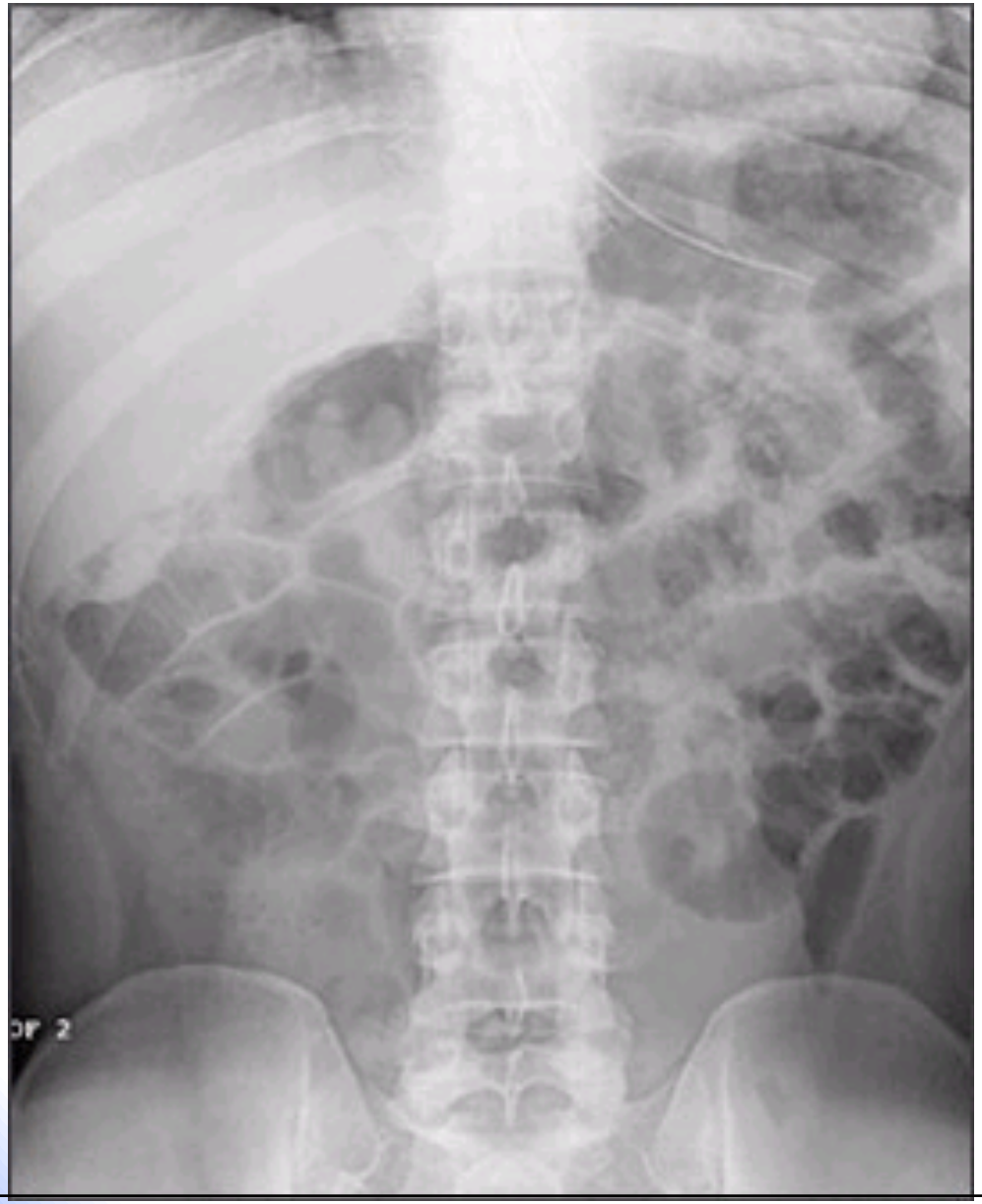


Ileus

- Cessation of normal peristalsis without mechanical obstruction
- Continuous pain, distention, decreased bowel sounds, minimal or no tenderness, no flatus or BM, usually self-limited
- Ileus is more common than mechanical bowel obstruction
- X-ray: dilated, fluid-filled loops throughout entire bowel; air-fluid levels not as prominent as with mechanical obstruction



Ileus

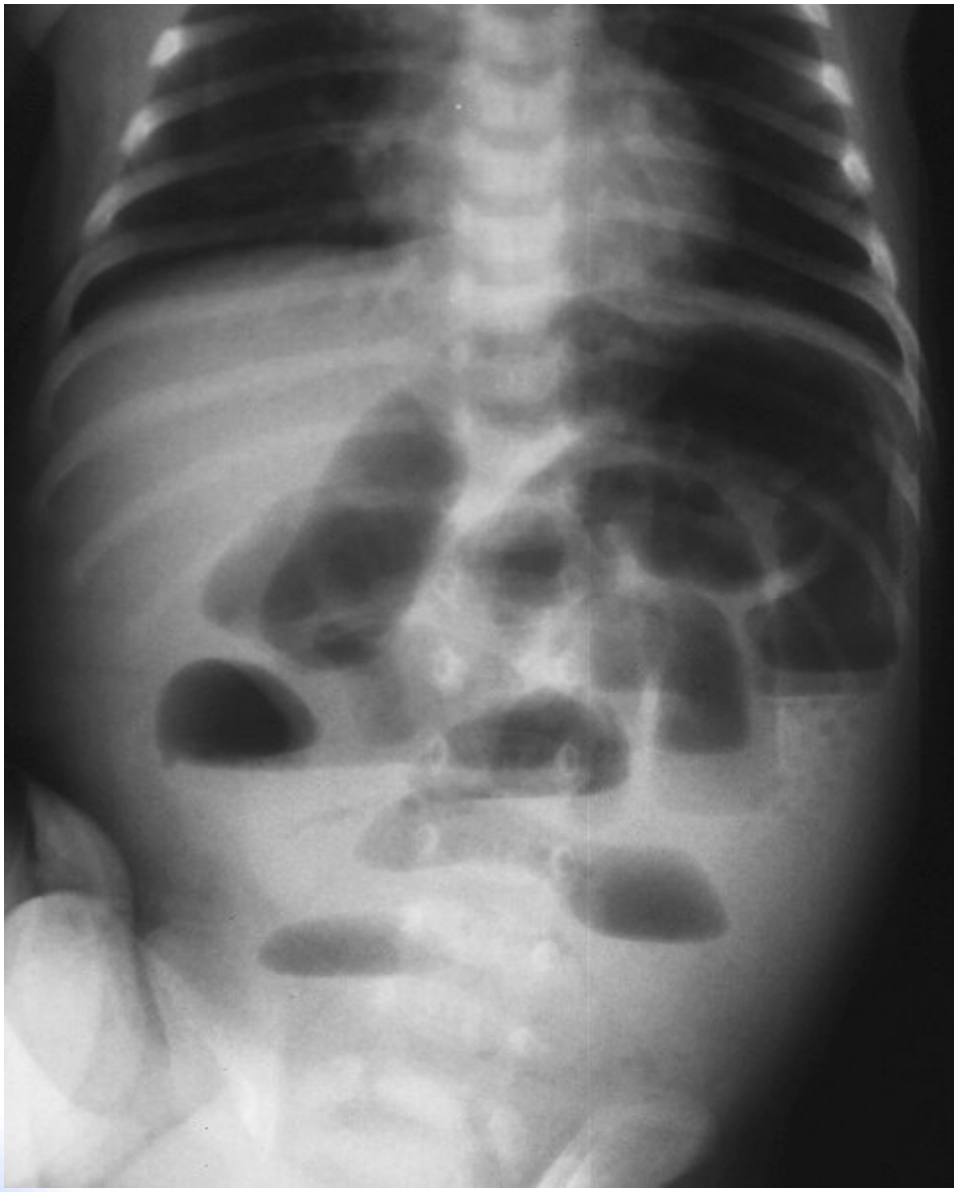


Bowel Obstruction

- Small bowel
  - Adhesions (#1 cause), hernias, malignancy
  - Generally more intense pain, more vomiting and less distention than large bowel obstruction
  - X-ray: “step ladder,” “string of pearls;” plicae circulares (traverse bowel width)
  - CT scan complimentary diagnostic study
- Surgical adage: “Never let the sun set or rise on a bowel obstruction”
- SBO from adhesions- laparoscopic approach

Small Bowel Obstruction

Small Bowel Obstruction



Bowel Obstruction

- Large bowel
  - Cancer (#1 cause), volvulus, diverticulitis
  - Obstructive series: distended colon, haustral pattern (doesn't traverse entire bowel width)
  - CT scan if diverticular etiology or intussusception
- "Closed-loop" bowel obstruction
  - Requires competent ileocecal valve
  - Dangerous (risk of perforation)
  - Coffee bean

Volvulus

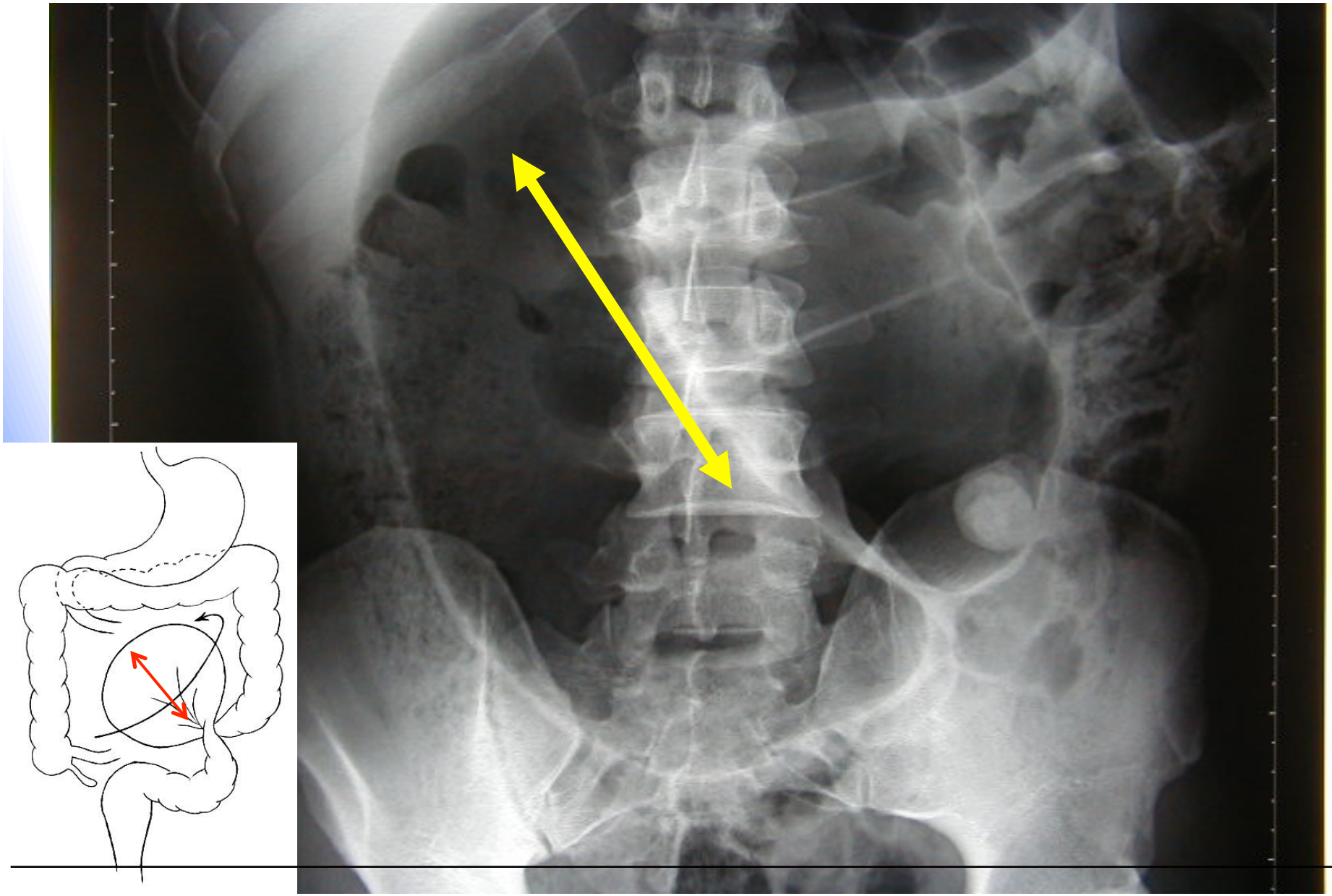
- Sigmoid volvulus
  - Typically elderly, debilitated, chronic motility disorder, insidious onset; high fiber diet
  - X-ray: inverted “U” or “bent inner tube” Loops project obliquely to RUQ
  - Sigmoidoscopy decompression & detorsion

Volvulus

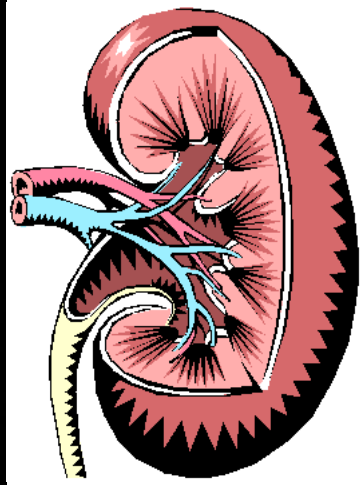
- Cecal volvulus
  - Young (20-40), acute onset
  - Congenital freely-mobile cecum
  - X-ray: kidney-shaped loop in LUQ "bird's beak" with contrast studies
  - Requires surgery

Cecal volvulus: most common cause of bowel obstruction in pregnancy

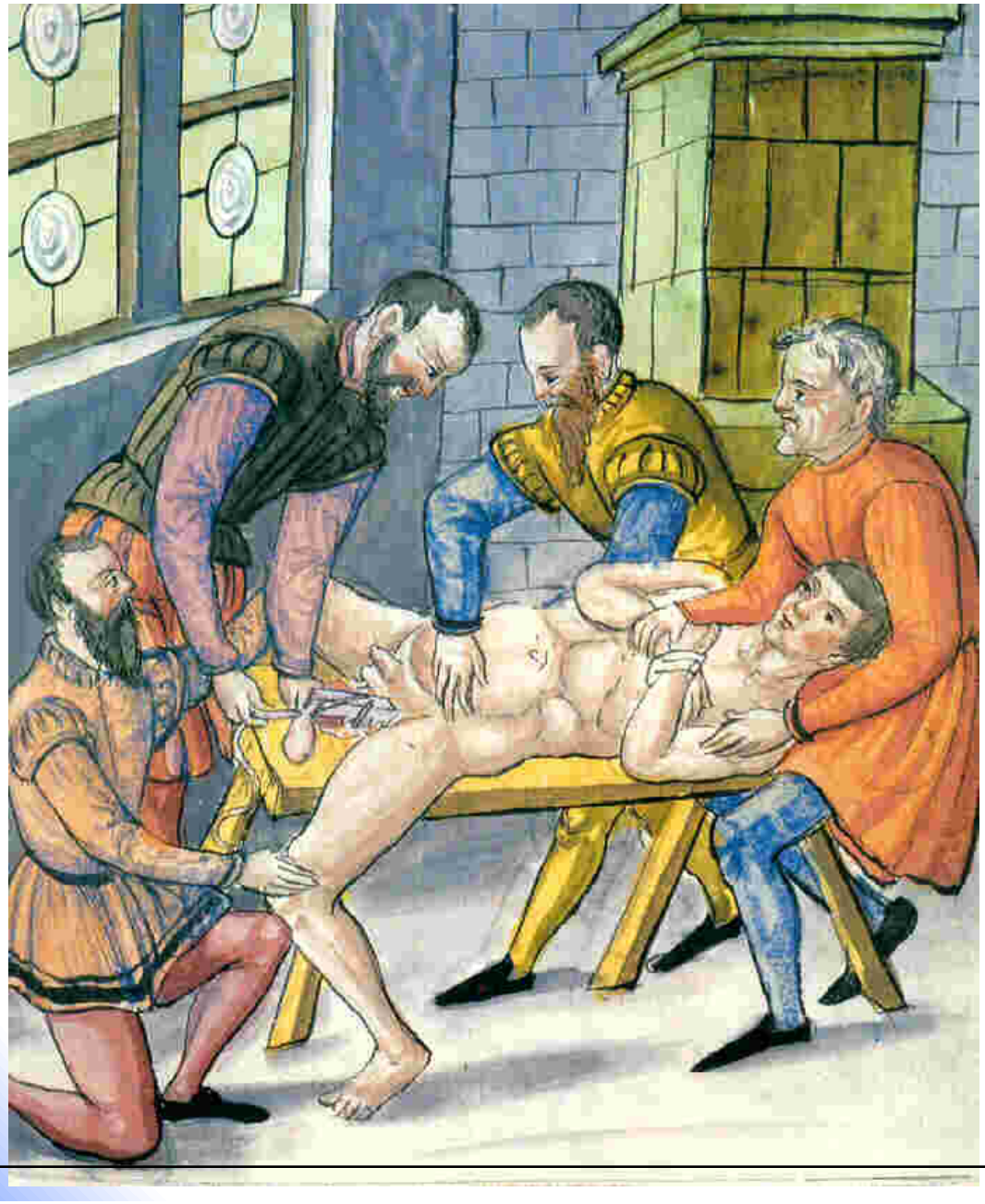
Sigmoid Volvulus



Cecal Volvulus



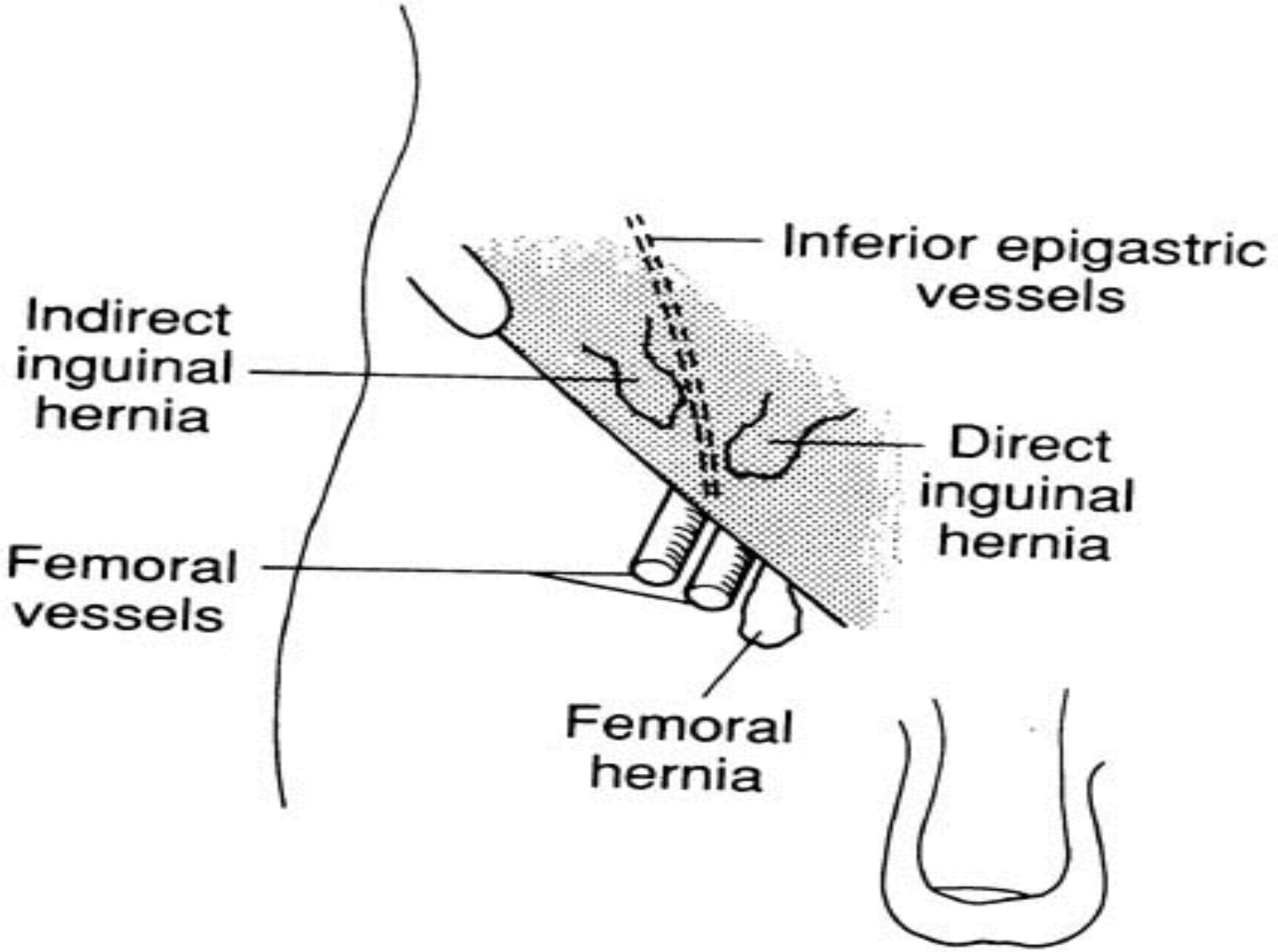
HERNIAS



Hernias (1)

- Incarcerated: irreducible (bowel obstruction is common)
- Strangulated: irreducible with vascular compromise and ischemic bowel (do not manually reduce)
- Inguinal
  - Indirect inguinal: herniates through inguinal canal, extends into scrotal sac. Common in boys
  - Direct inguinal: herniates through abdominal wall. Common in middle age men
- Pantaloon: indirect and direct at the same time
- Femoral: common in women. Incarceration and strangulation more likely than in inguinal hernia

Hernias (2)



Hernias (3)

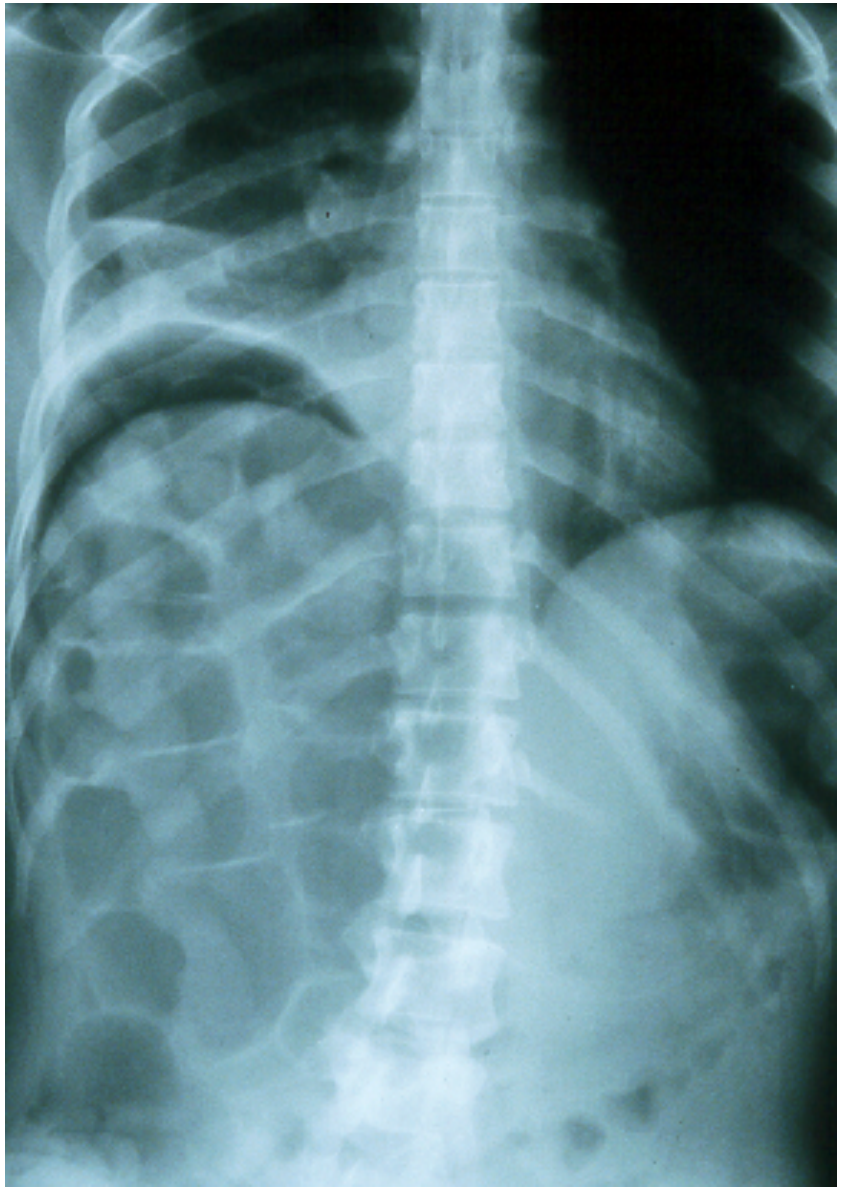
- Umbilical
  - Congenital: usually appear in first month, closed by end of first year
  - Acquired: obesity, pregnancy, ascites. Incarceration and strangulation are more common
- Spigelian: lateral edge of rectus abdominis. Difficult to diagnose (CT, ultrasound)
- Obturator (rare): through obturator foramen. More common in woman. Presents as obstruction, pain in medial thigh (obturator nerve)
- Richter: only a portion of the bowel herniates. Even if the hernia is incarcerated or strangulated, the bowel may not be obstructed

Bowel Perforation

- Large bowel > small bowel
- Mechanisms: inflammation, ulceration, trauma, obstruction
- Causes: diverticulitis, appendicitis (especially at extremes of age), colitis, inflammatory bowel disease, ischemia, cancer, foreign body, PUD, radiation, trauma
- Cecum is the most common site
- X-rays may miss small amounts of free air or retroperitoneal air. Best view is upright CXR

Ulcers are the most common cause of visceral perforation

Free Air; Thickened Bowel Wall

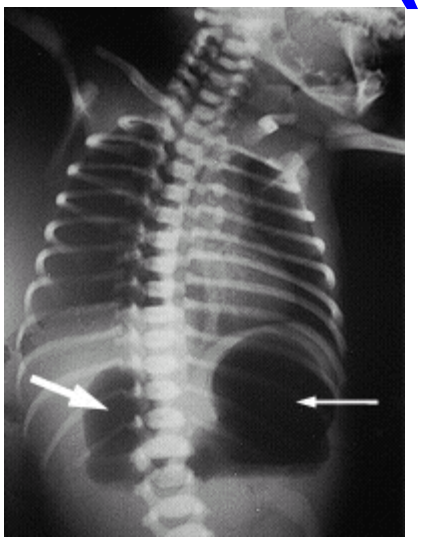


Pediatric Bowel Obstruction (1)

- Obstructive GI lesions 1st year
  - Gut atresia and stenosis
  - Incarcerated inguinal hernia
  - Intussusception
  - Meconium ileus (earliest sign of cystic fibrosis)
  - Hirschsprung's disease
  - Duplication cysts of intestine
  - Malrotation with volvulus

BE is diagnostic study of choice after plain X-ray

Pediatric Bowel Obstruction (2)

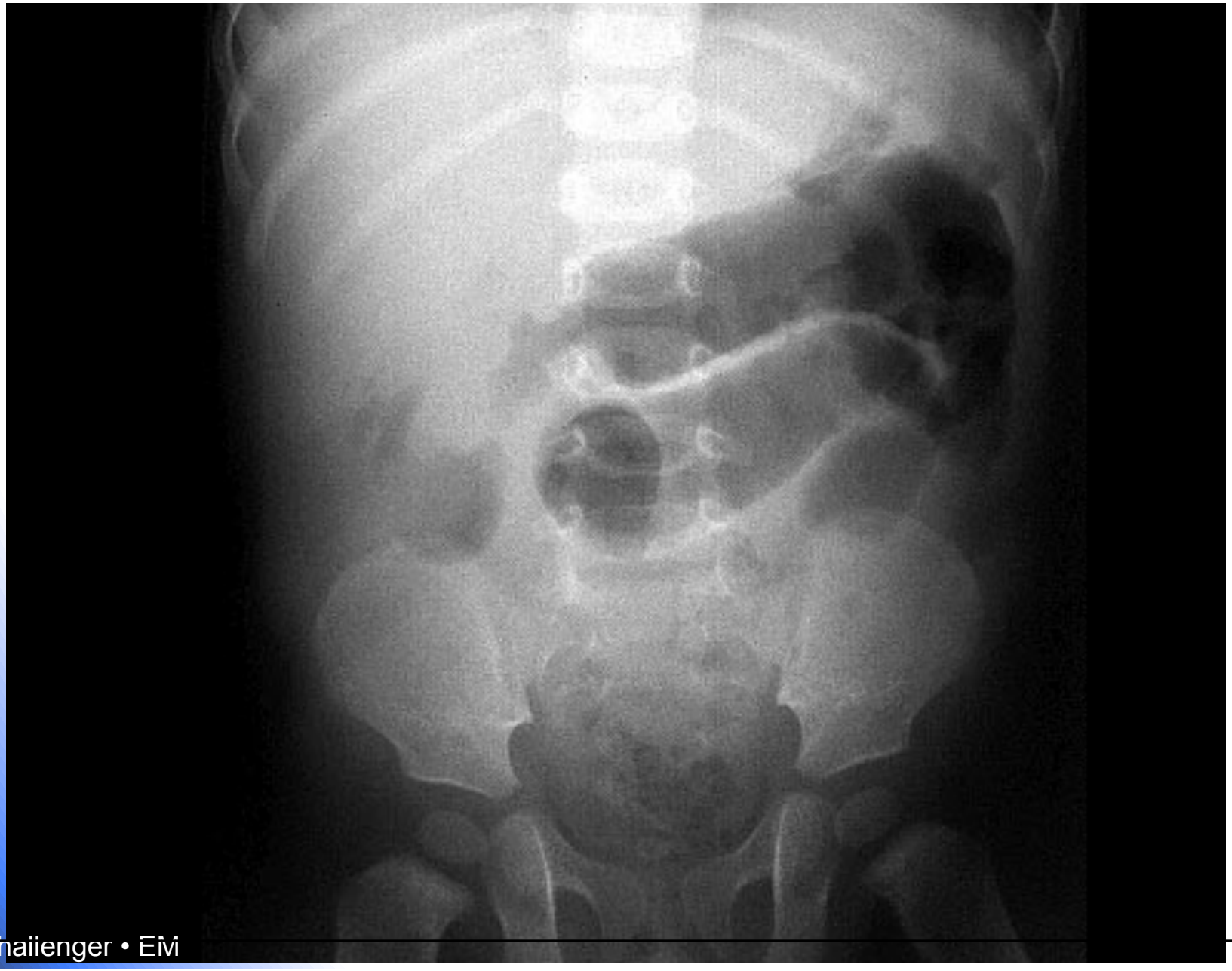


- Malrotation with volvulus
  - Early infancy (first month).
  - Sudden onset of bilious vomiting
  - Early diagnosis is crucial to prevent gangrene of midgut
  - Abnormal rotation & fixation of midgut
  - X-ray: double bubble sign (air-fluid levels in stomach and in distended duodenum)
  - Rigid, distended abdomen, bilious vomiting, heme-positive stools, shock
  - Prompt surgical consultation

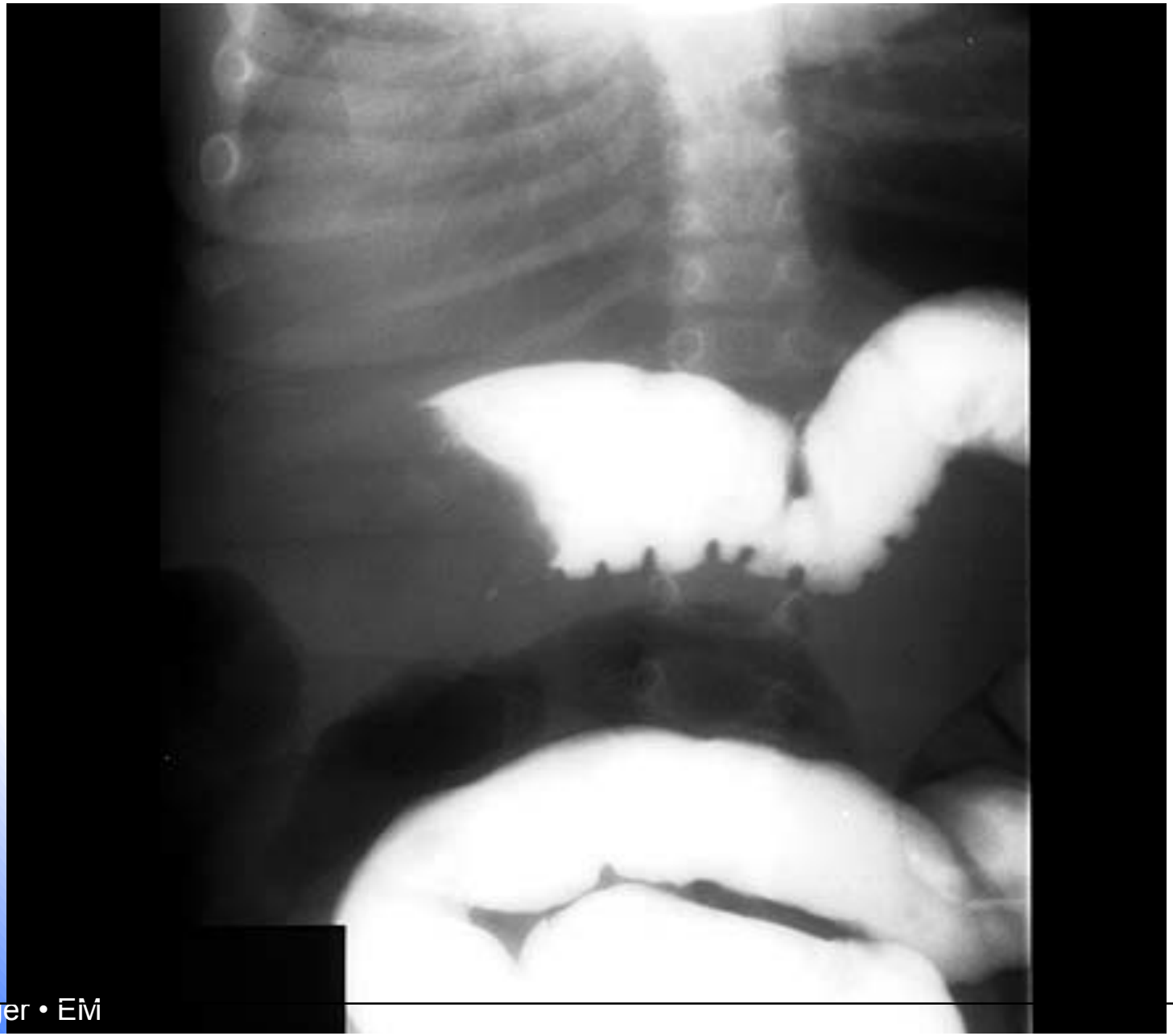
Pediatric Bowel Obstruction (3)

- Intussusception
  - Most common cause of surgical abdomen & SBO 3 months to 6 years
  - Rare under 3 months, uncommon after age 3
  - Intermittent pain, vomiting, heme-positive stools ("currant jelly" is late finding)
  - Child appears healthy between paroxysms of pain
  - "Sausage-shaped" mass in right abdomen (ileocecal area most common)
  - Increased risk with HSP and cystic fibrosis
  - Diagnosis: plain x-ray, ultrasound, barium enema ("coiled spring" sign)
  - Treatment: air contrast enema, surgery

Intussusception



Intussusception - Barium Enema



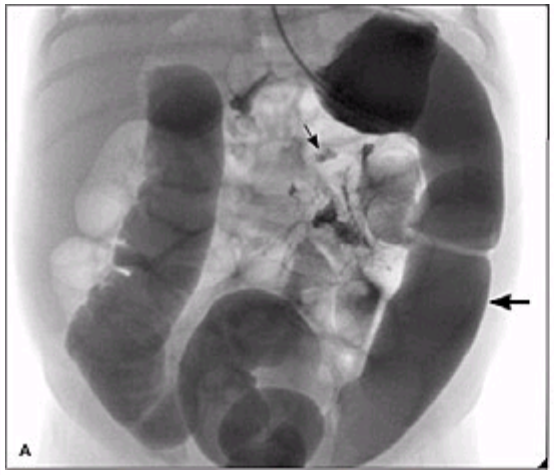
Intussusception - Barium Enema

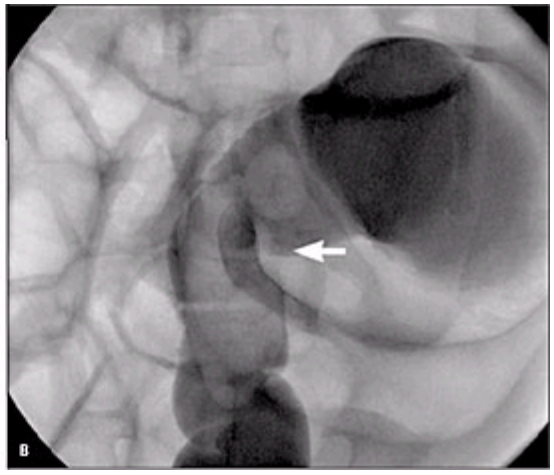
Pediatric Bowel Obstructions (4)

- Pyloric stenosis
  - Non-bilious projectile vomiting after feeding; dehydration, hypochloremic metabolic alkalosis
  - Increased incidence in first-born males; familial propensity
  - Third week to third month of life
  - Palpable “olive” (pylorus) in RUQ
  - Diagnosis: ultrasound, upper GI series (delayed gastric emptying)
  - Treatment: Surgery

Pediatric Bowel Obstruction (5)

- Hirschsprung's disease
  - Congenital megacolon
  - Newborn: failure to pass meconium
  - Children: chronic constipation
  - Enterocolitis is potentially fatal complication





Constipation

- Most common digestive complaint in US
- Acute causes: obstruction, medication (narcotics, CCBs, psychiatric meds, iron, antacids)
- Common causes: decreased fiber and fluid intake, lack of exercise
- Chronic causes: slow-growing tumor, hypothyroidism, hypoparathyroidism, lead, neurologic dysfunction
- Rectal exam for fecal impaction, rectal mass, heme-positive stool, anal fissure
- Treatment: diet changes, medical adjuncts, identify and treat underlying cause

Irritable Bowel Syndrome

- Disorder of altered gut motility, gut sensation, perception of intestinal activity
- Abdominal pain, bloating, constipation or diarrhea
- EM Dx: “Abdominal pain of unclear etiology”
- Treatment: Osmotic laxatives, antidiarrheals, antispasmotics
- Psychiatric conditions often co-exist

Inflammatory Bowel Disease

- Crohn's disease & ulcerative colitis
- Idiopathic, chronic
- High rate of colon CA with disease >10 years
- Exacerbation-remission pattern
- Peak incidence ages 15-40
- Extra-intestinal manifestations: arthritis, dermatologic (erythema nodosum, pyoderma gangrenosum), hepatobiliary disease, vasculitis, uveitis
- Treatment: sulfasalazine, mesalamine, prednisone, metronidazole, ciprofloxacin

Crohn's Disease (Regional Enteritis)

- Chronic inflammatory disease of the entire GI tract (mouth to anus) - entire colonic wall
- Segmental involvement is characteristic ("skip lesions")
- Abdominal pain, cramps, diarrhea (sometimes bloody), fever, perianal fissures, fistulas and abscesses, rectal prolapse, toxic megacolon
- Gross blood is uncommon
- Increased oxalate absorption leads to calcium oxalate kidney stones

Ulcerative Colitis

- Chronic inflammatory disease of colon
- GI symptoms similar to Crohn's disease
- Major finding is bloody diarrhea
- Toxic megacolon
  - Transverse colon, gross distention (over 6 cm)
  - Peritonitis, systemic toxicity
- Location: rectum and colon (small bowel not affected - unlike Crohn's)
- Risk of colon cancer increased 30-fold

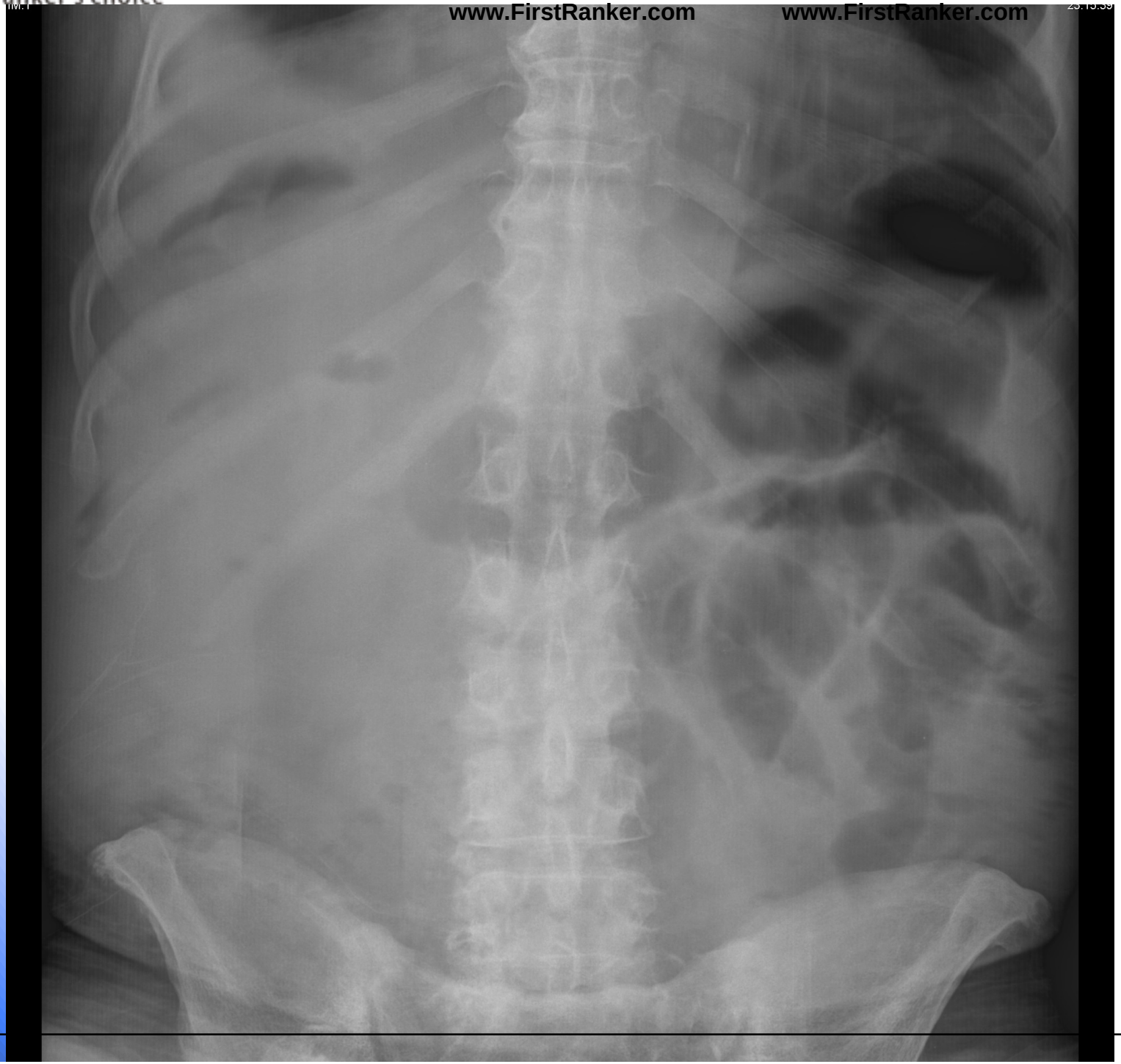
Mesenteric Ischemia

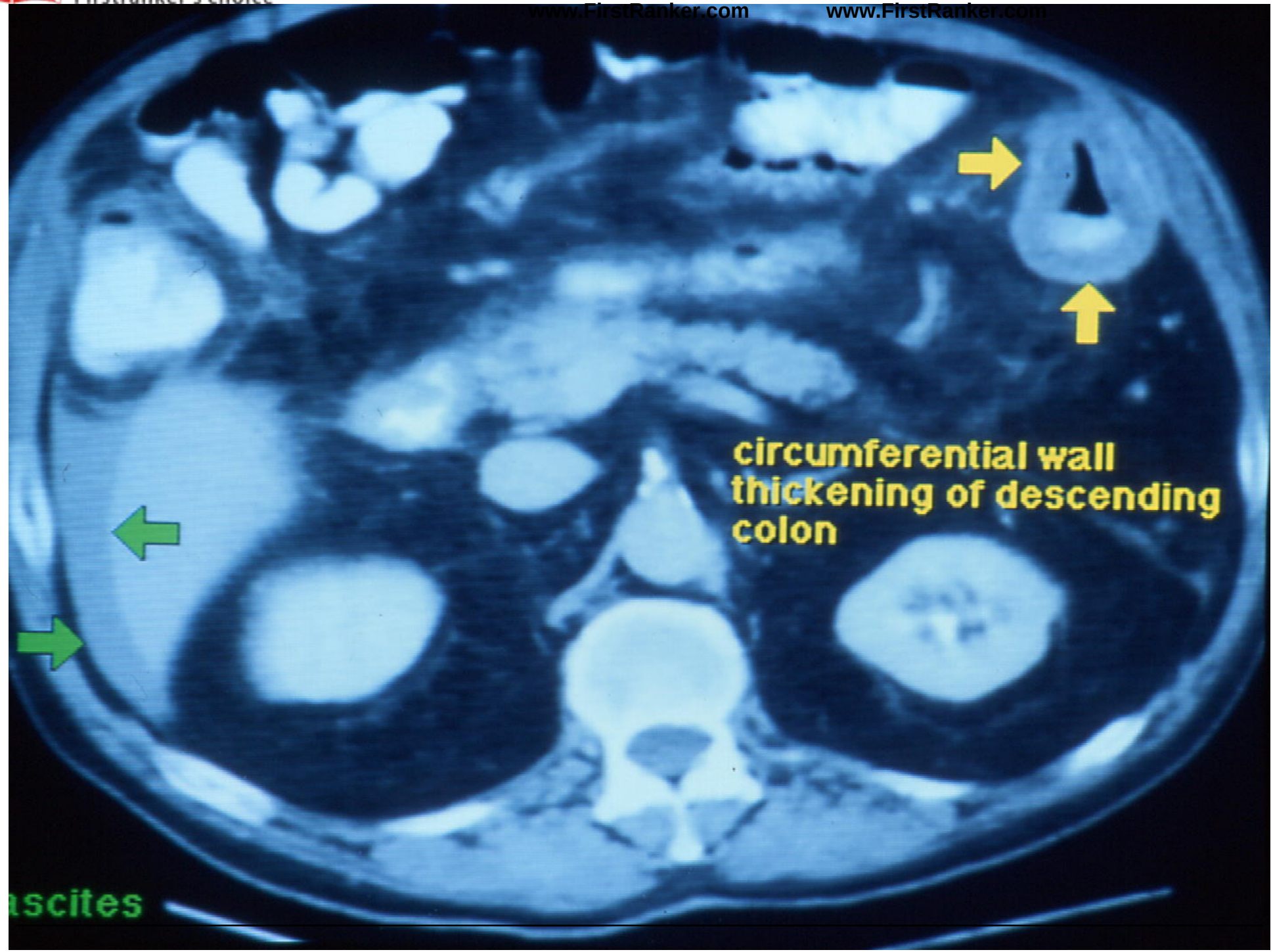
- "Abdominal angina"
- Risk factors: dysrhythmias (Afib), low-flow & hypercoagulable states, vascular disease
- Deadly disease of the elderly. Diagnose with CT (thumbprinting sign), angiography
- Causes
  - Embolic
  - AV thrombus

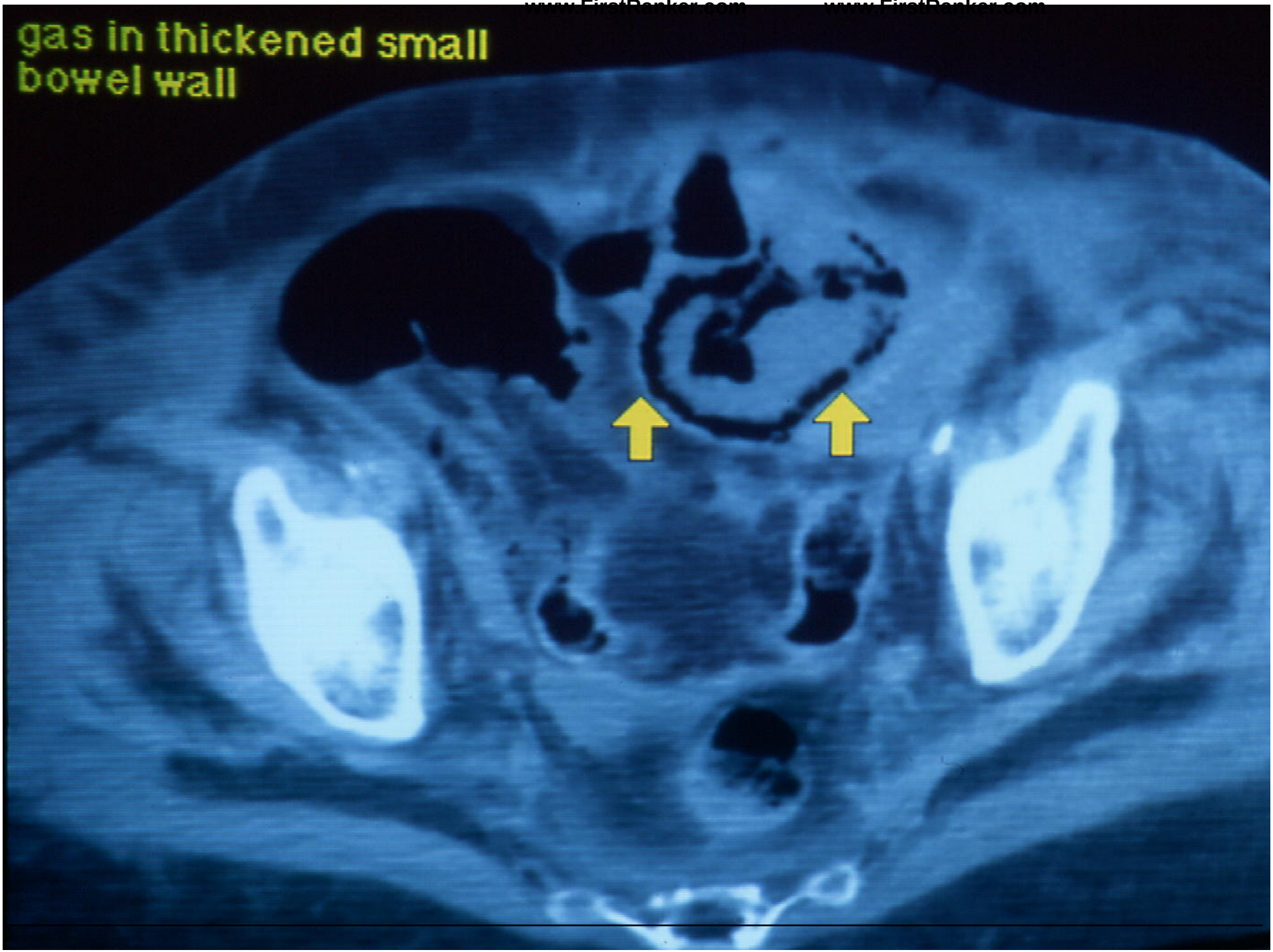
Sudden onset with pain out of proportion to physical findings

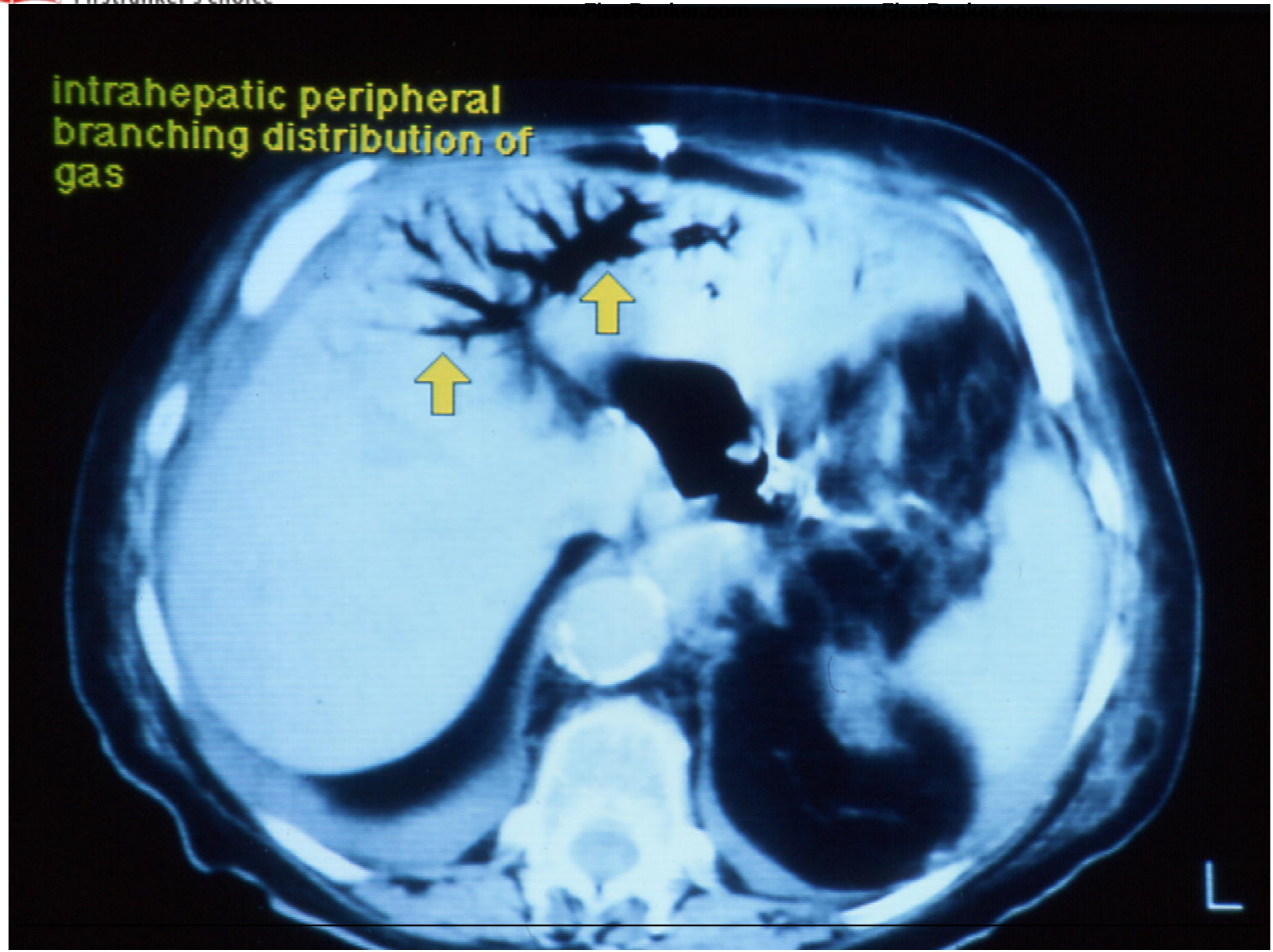
- Leukocytosis (present in most cases), lactic acidosis, hyperphosphatemia, hyperamylasemia (inconsistently present)
- Avoid digoxin, beta blockers, vasopressors (decrease splanchnic blood flow)

Focal thickening causing thumbprinting

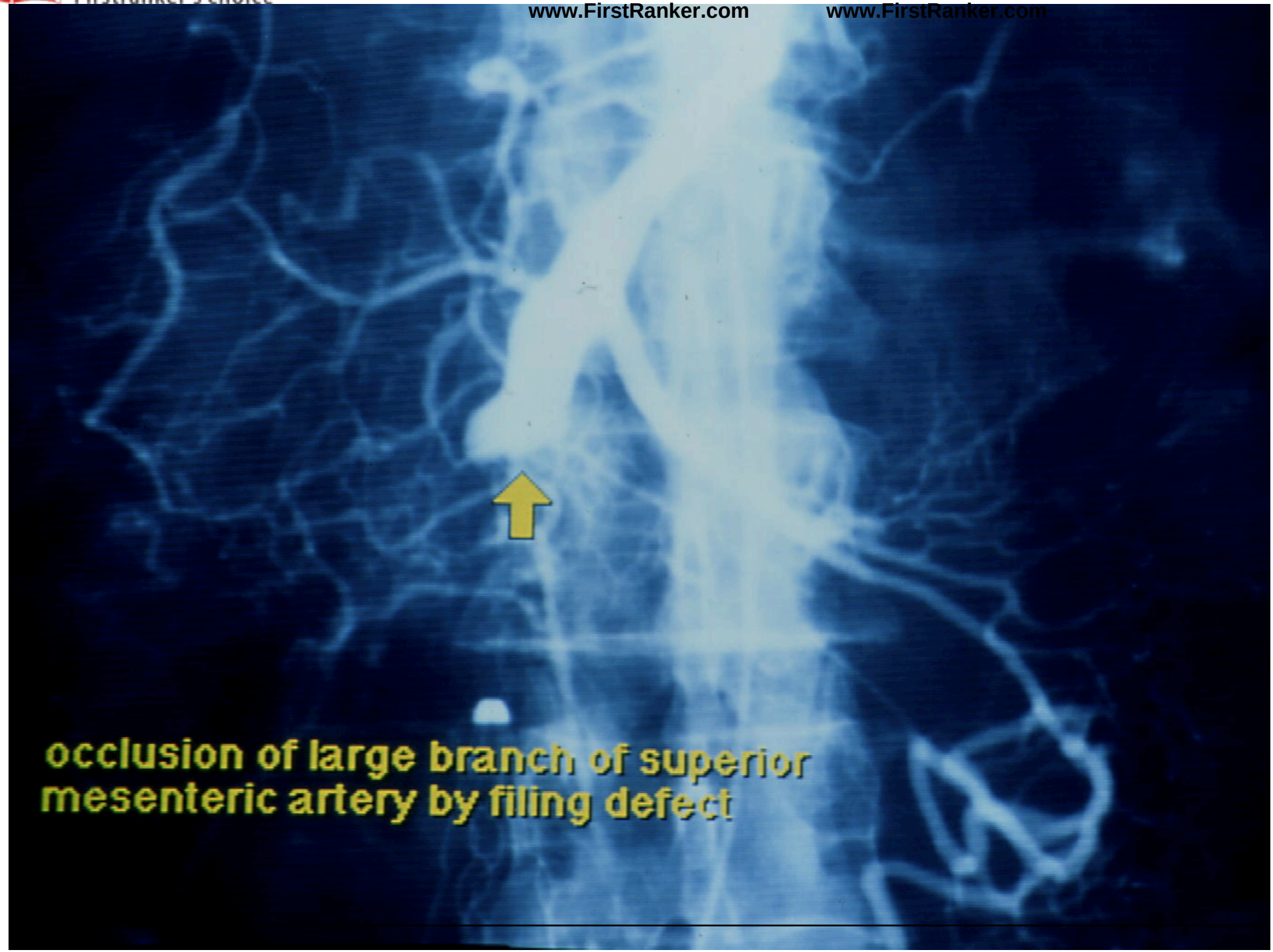


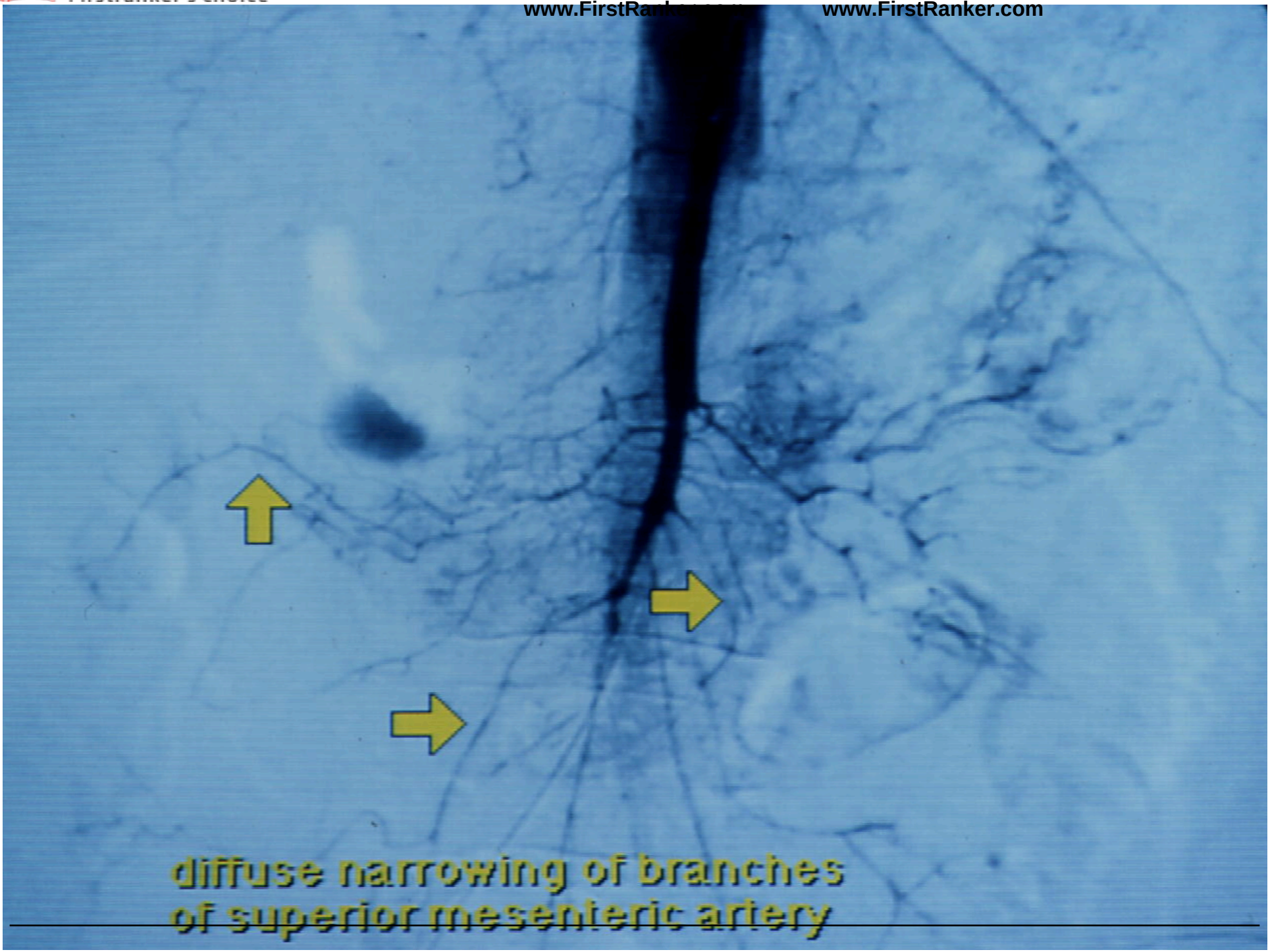






Angiogram?





Appendicitis

- Anorexia is often present; low grade fever 15%
- High positive likelihood: McBurney's point pain, rigidity, migration of periumbilical pain to RLQ
- Increased frequency of perforation in elderly and small children
- WBC may be normal
- BE: mass effect and non-filling
- Ultrasound: dilated, non-compressible >6mm
- CT: usually diagnostic- best with female cases
- KUB: appendicolith (rare)

Most common cause of surgical abdomen

Appendicolith

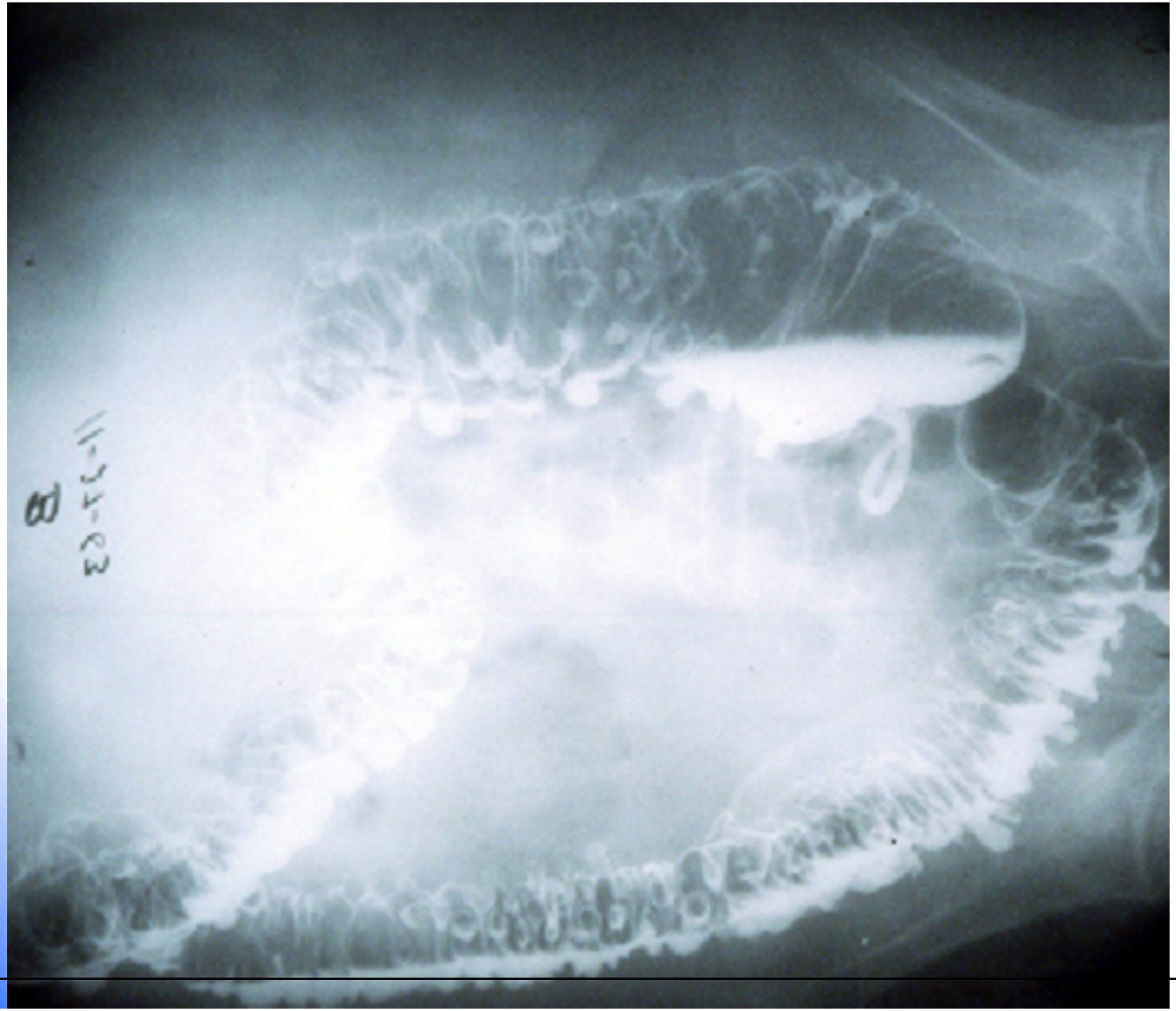
Appendicitis

- Confounders: Pregnancy, situs inversus, retrocecal, malrotation, very long appendix
  - Result is uncommon pain location: right upper quadrant, back, flank, testicular, suprapubic
- Rovsing's sign: LLQ palpation causes RLQ pain
- Psoas sign: RLQ pain on thigh extension while lying in left lateral decubitus position
- Obturator sign: RLQ pain with internal rotation of the flexed right thigh

Appendicitis

- Rectal tenderness with low lying appendix
  Although more common in PID,
  may have cervical motion tenderness
- May have pyuria: often misdiagnosed as UTI

Diverticular Disease



Diverticular Disease(1)

- Pain is the most common symptom
  - Steady, deep, LLQ location (Western world)
  - RLQ Japan-Hawaii
- Bowel habits may be altered (diarrhea or constipation)
- May mimic appendicitis
- Intraluminal pressure is greatest in the sigmoid (most diverticula there)

Diverticular Disease (2)

- Manifestations: pain (inflammation, infection) and bleeding.
- Free perforation is rare; most are contained within the mesentery
- May cause urinary frequency and urgency due to irritation of underlying GU structures
- CT scan preferred method of evaluation
- Colon cancer must be excluded
- High fiber diet, analgesics, broad spectrum antibiotics with anaerobic coverage

Diarrhea - Viral

- Most common cause of diarrhea
- Winter and spring seasons
- Children, daycare centers
- Rotavirus, adenovirus, calicivirus, enterovirus, Norwalk virus ("RACE to Norwalk")
- Norovirus (Norwalk-like) virus is the leading cause of gastroenteritis in the US – cruise ships
- Rotavirus is the most common cause of diarrhea in children
- No blood or WBCs in stool

Diarrhea - Invasive (1)

- Inflammation (stool WBCs) and bleeding (degree varies by pathogen)
- E. coli 0157:H7
  - Enterohemorrhagic E. coli (gross blood in stools)
  - Undercooked hamburger, petting zoos, raw milk, untreated water
  - Causes HUS (in children), TTP (in elderly)
  - Antibiotics may increase risk of HUS

Diarrhea - Invasive (2)

- Shigella
  - Very infectious
  - High fever, febrile seizures, bloody diarrhea, dysentary
  - Incubation 2-6 days
  - Ciprofloxacin
- Salmonella
  - Very common bacterial diarrhea
  - Watery or mucoid stools
  - Cafeteria food, pet turtles, amphibians, eggs, chickens
  - Osteomyelitis can occur in sicklers (autosplenectomy) and after splenectomy
  - Ciprofloxacin

Diarrhea - Invasive (3)

- Campylobacter
  - Most common cause of bacterial diarrhea
  - Contaminated food/water, backpacker's diarrhea
  - Fecal-oral spread; incubation 2-6 days
  - Bloody diarrhea, fever, mimics IBD, appendicitis
  - Erythromycin (children), fluoroquinolones (adults)
  - Acute infection is associated with development of Guillain-Barré syndrome
- Vibrio
  - Parahaemolyticus: raw oysters, clams, shrimp; 6-24 hour incubation
  - Vulnificus: oysters, shellfish; increased morbidity with preexisting liver disease

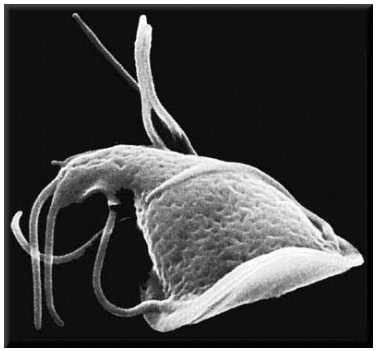
Diarrhea - Invasive (4)

- Yersinia enterocolitica
  - Invasive Gram negative bacterium
  - Can also mimic appendicitis
  - Fever
  - Colicky abdominal pain (may be prolonged)
  - Diarrhea
  - May persist 10-14 days
- Diagnosis: fecal Wright stain positive, stool C&S
- Treatment: supportive if uncomplicated, quinolones or TMP-SMX if complicated

PROTOZOANS

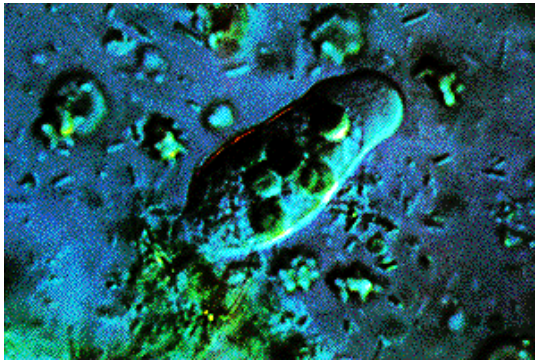
Diarrhea - Protozoan (1)

- Giardia
  - Most common cause of water-borne diarrheal outbreak in US, "backpacker's" diarrhea
  - Contaminated streams from beavers, dogs, raccoons, muskrats, pools, day care centers (fecal-oral spread), sexually transmitted
  - Symptoms begin after 1-4 weeks
  - Audible borborygmi, floating, frothy, foul-smelling stools
  - Stool specimens to identify cysts/trophozoites
  - Metronidazole, furazolidone



Diarrhea - Protozoan (2)

- Amebiasis (Entamoeba histolytica)
  - Spreads between family members and sexual partners
  - Fecal-oral contact and anal intercourse
  - Diarrhea can be bloody

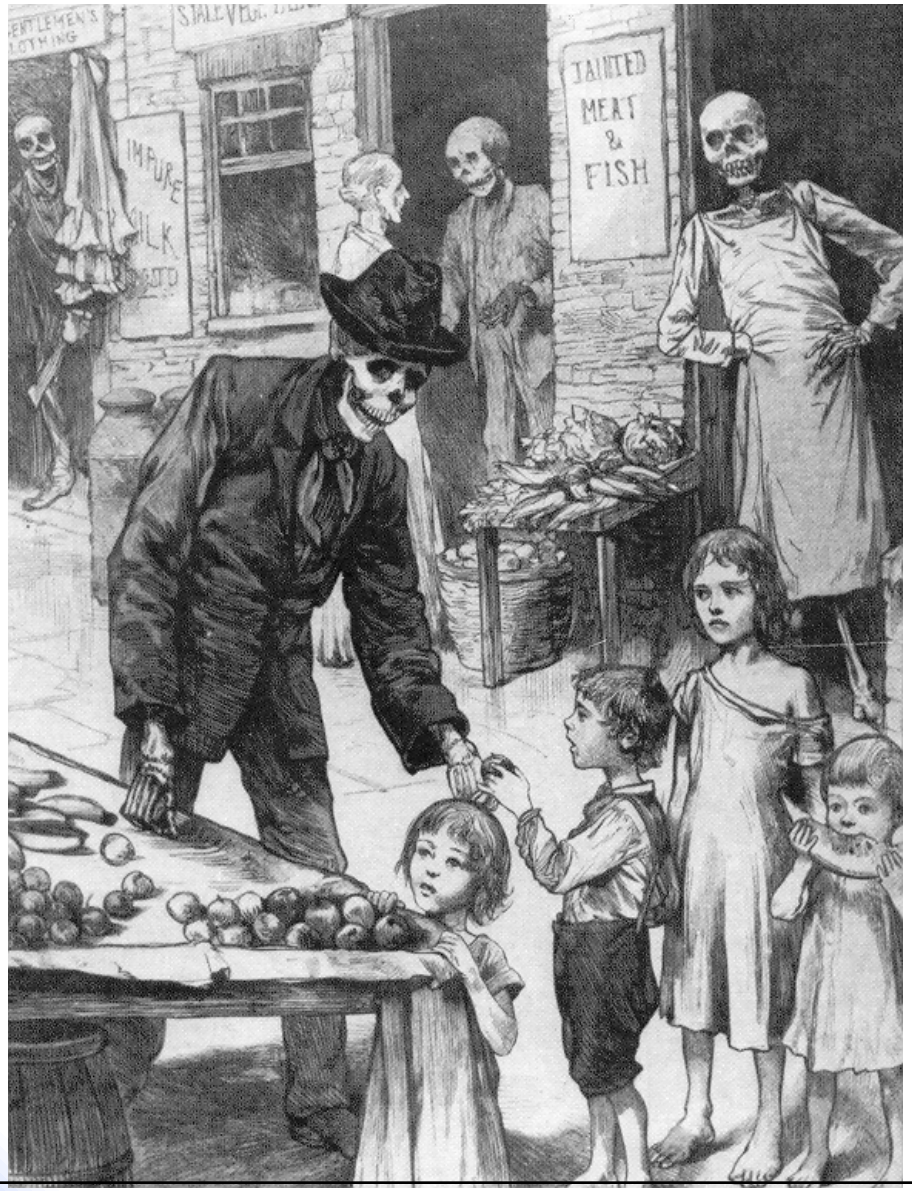


  - Extra-intestinal manifestations: liver abscess, pericarditis, pleuropulmonary disease, cerebral amebiasis
  - Wide variety of presentations, from asymptomatic cyst-passer to colitis to fatal cerebral amebiasis

Diarrhea - Protozoan (3)

- Cryptosporidium
  - Intestinal protozoan parasite
  - Most common cause of chronic diarrhea in AIDS
  - Contaminated water supply
  - Children, animal handlers, immunocompromised
  - Ingestion of oocysts; trophozoites attack intestinal membrane
  - 1 week incubation, severe watery diarrhea, abdominal pain
  - Diagnosis: oocysts in stool
- Treatment: fluid replacement, paromomycin (Humatin) plus azithromycin

Food Poisoning



Diarrhea - Bacterial (1)

- Toxigenic bacteria produce enterotoxins
- Foodborne infections
- Diarrhea is watery and voluminous
- Minor fever, no septicemia
- No WBCs or RBCs in stool

Diarrhea - Bacterial (2)

- Staph
  - Contaminated foods (dairy, meat, poultry, eggs, potato salads, cream-filled pastries)
  - Nausea, vomiting, diarrhea
  - Most common cause of food-borne disease- Large outbreaks
  - Symptoms within 6 hours of ingestion
  - Afebrile, no antibiotics, proper refrigeration

Diarrhea - Bacterial (2)

- E. coli
  - Water contaminated by feces
  - The most common cause of traveler's diarrhea
  - Pepto Bismol prophylaxis, antiperistaltic agents
  - TMP/SMX, ciprofloxacin

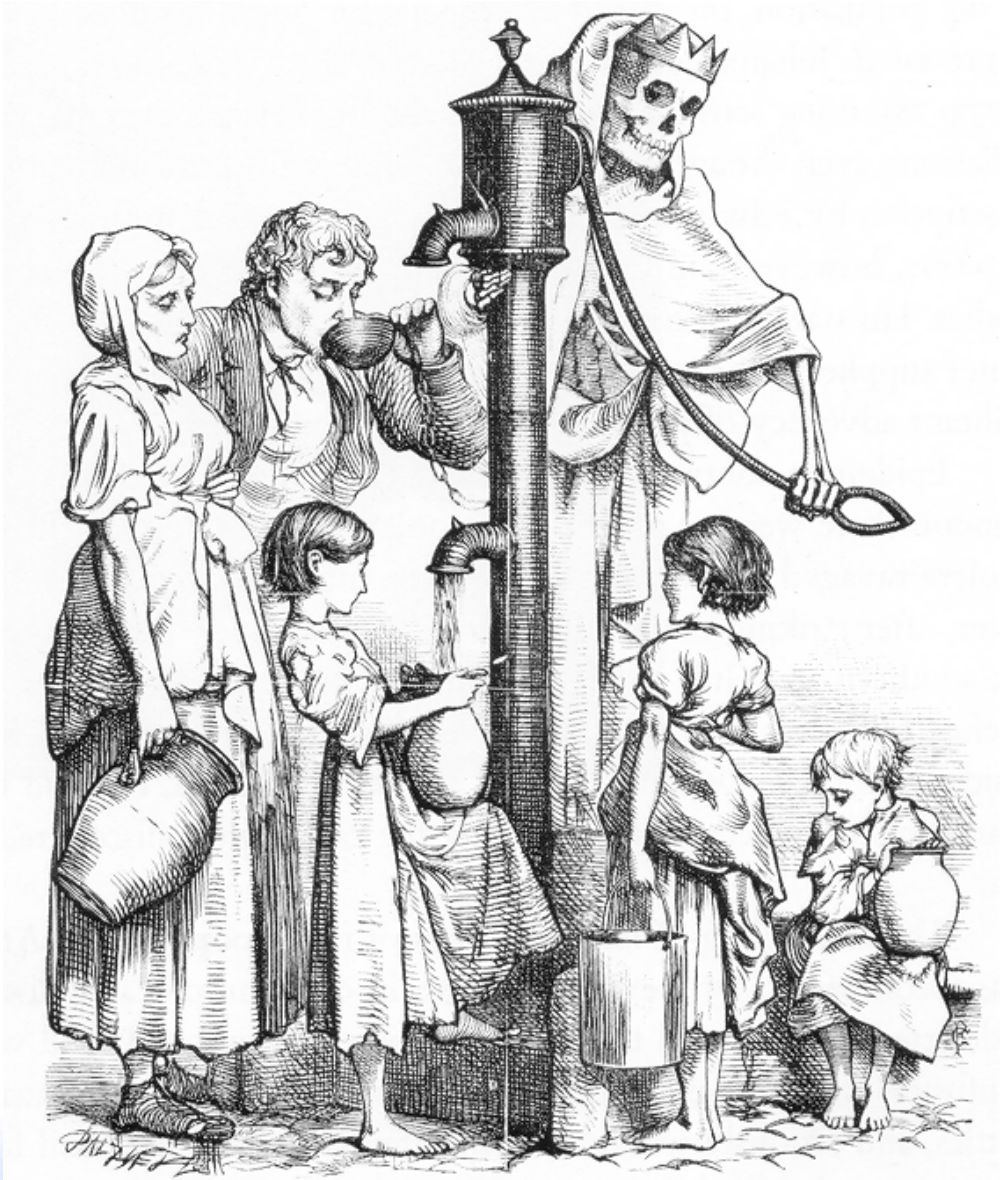
Diarrhea - Bacterial (3)

- Clostridium perfringens
  - Common, large outbreaks (buffets, schools)
  - Casseroles, stews, gravies, steam table meats
  - Spores survive cooking, then produce toxins
  - 6-24 hour onset
  - Watery diarrhea, no fever or vomiting
  - Fecal WBCs and RBCs negative
  - Treatment: fluids (antibiotics not helpful)

Diarrhea - Bacterial (3)

- Vibrio cholera
  - Copious watery "rice water" diarrhea
  - Severe fluid and electrolyte problems
  - Treatment: WHO rehydration, ciprofloxacin, TMP-SMX

Vibrio cholera



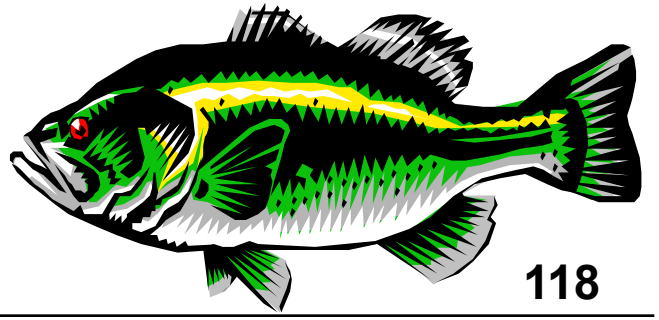
DEATH'S DISPENSARY.

Diarrhea – Bacterial (4)

- Bacillus cereus
(aerobic spore-forming bacterium)
  - Common in fried rice (Chinese restaurants), starchy foods, vegetables, meat
  - Spores germinate when boiled rice not refrigerated
  - Two forms
    - "Violent vomiting": 2-3 hours post ingestion (much like Staph)
    - Diarrheal: 6-14 hours post ingestion (much like Clostridia)
  - Self-limited; no specific therapy or test

Diarrhea - Bacterial (5)

- Scombroid poisoning
  - Deep ocean fish (tuna, mackerel, mahi-mahi)
  - Heat-stable toxin from bacterial action on dark meat fish not promptly refrigerated
  - Histamine-like toxin, rapid symptom onset (30 minutes)
  - Fish tastes “peppery”
  - Facial flushing, diarrhea, throbbing headache, abdominal cramps, palpitations
  - Give antihistamines
  - Suspect when multiple patients have “allergic reaction”



Diarrhea - Other

- Ciguatera (Gambierdiscus toxicus)
  - Reef fish (groupers, red snapper, barracuda)
  - Fish eat dinoflagellates containing ciguatoxins that accumulate in the food chain
  - Muscle weakness, paresthesias (perioral, burning hands and feet), distorted or reversed temperature sensation, vomiting, diarrhea
  - Neuro symptoms worsened with alcohol
  - Treatment: mannitol, amitriptyline, diphenhydramine
  - Symptoms can last for years. Avoid fish, alcohol

Pseudomembranous Enterocolitis

- Varieties: neonatal, post-op, antibiotic-related
- Due to overgrowth of toxin-producing C. difficile
- Begins 7-10 days after antibiotics
- Patients may be quite sick (high fever, toxic, profuse diarrhea, dehydration)
- Diagnosis: immunoassay for toxin in stool
- Inflammatory disease, membrane-like yellow plaques
- Treatment: stop the precipitating antibiotics; oral metronidazole or vancomycin
- No anti-diarrheals

Rectal Prolapse (Procidentia)

- Full-thickness protrusion of rectum through anal canal
- Sensation of rectal mass
- In children, intussusception more likely
- Differentiation from internal hemorrhoids and intussusception
  - Intussusception: can place finger between protruding rectum and anus
  - Internal hemorrhoids: fold of mucosa radiates out like spoke on a wheel
  - Rectal prolapse: folds of mucosa are circular

Prolapsed Internal Hemorrhoid

Rectal Prolapse (Procidentia)

Hemorrhoids

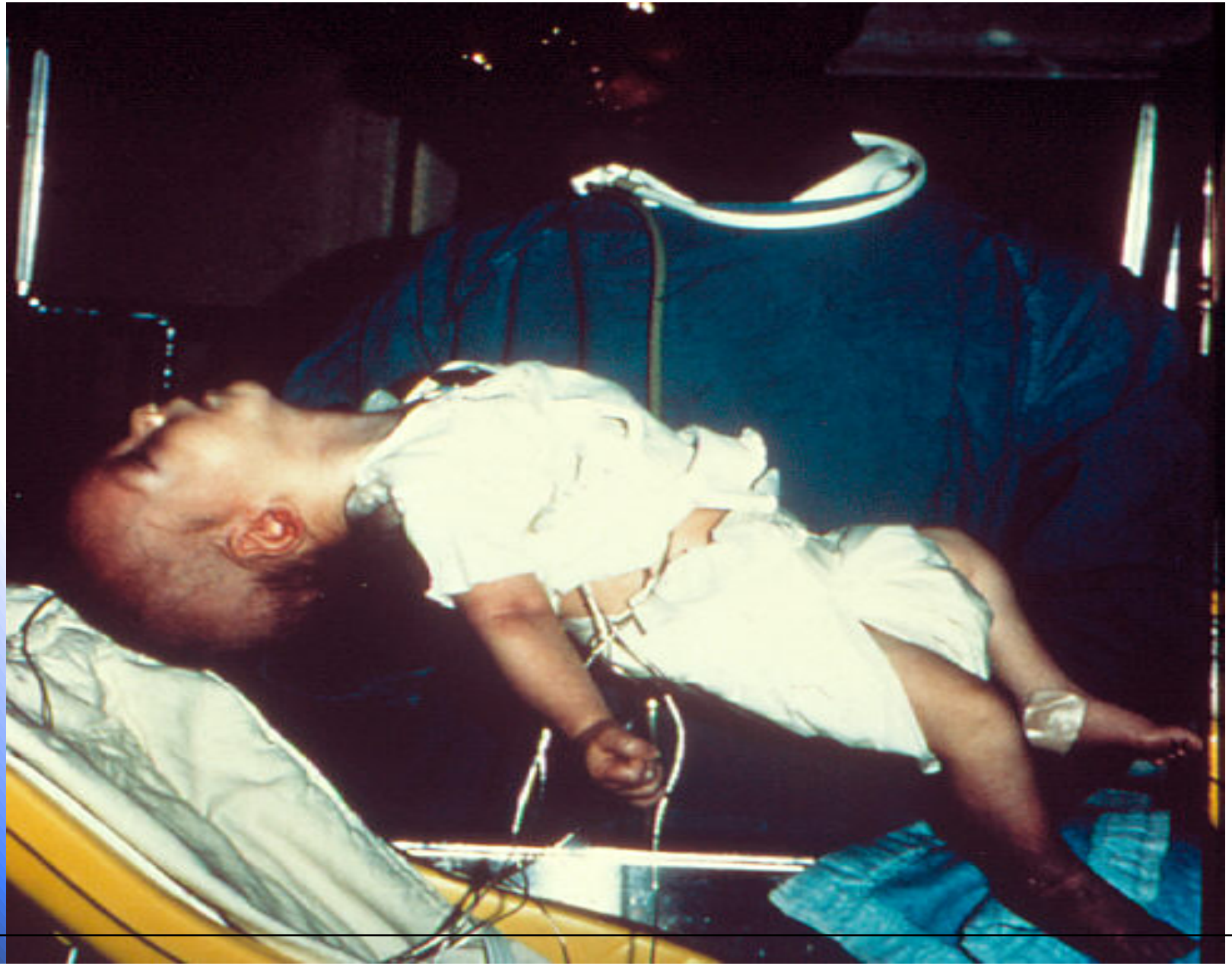
- Engorgement, prolapse or thrombosis of the hemorrhoidal veins
- Internal hemorrhoids are located at 2, 5 and 9 o'clock
- Risk factors: constipation, pregnancy, ascites, portal hypertension
- Painless, self-limited, BRBPR
- Treatment
  - Non-complicated (non-surgical) WASH:
    Warm water, analgesics, stool softeners, high fiber diet
  - Topical steroids
  - Complicated: large, incarcerated, strangulated, intractable pain (require surgery)
  - Thrombosed: elliptical incision (in ED) to remove clot

Anal Fissure

- Most common causes of painful rectal bleeding in adults and children
- Usually midline, posterior
- Non-midline fissures suggest more serious conditions (IBD, CA, sexual abuse)
- Sharp cutting pain, especially with bowel movements; blood-streaked stools
- Perianal hygiene, WASH regimen, NTG ointment, anal dilatation, surgical intervention, BOTOX

Botulism (1)

- Characteristics
  - Heat-labile neurotoxin, short onset (half hour)
  - Inadequately processed canned foods
  - Bulbar symptoms, descending paralysis, anticholinergic findings
  - Potential contaminant in street drugs
- Infants
  - Floppy baby, constipation, feeble cry
  - Honey can be source
  - Most common in breastfed (also less severe in this subset)



Botulism (2)

- Adults
  - Diplopia (the most common early finding), dysphonia, ptosis, dysarthria, dysphagia
  - Anticholinergic symptoms (urinary retention, pupil abnormalities, dry mouth, abdominal cramps, nausea and vomiting)
- Antitoxin available

GI QUESTIONS

A 30 y/o in her third trimester presents with nausea, fever and abdominal pain. She is diagnosed with appendicitis. Which of the following is true?

A. Most common surgical emergency in pregnancy
B. Incidence in pregnancy is lower than the general population
C. The diagnosis is rarely delayed
D. There is no increased fetal mortality with rupture
E. The appendix moves in a counter clock-wise fashion as pregnancy progresses

Which is true of acalculous cholecystitis?

A. Stones are present but are radiolucent
B. Perforation is extremely unlikely
C. It occurs in nearly half of all cases of cholecystitis
D. Diabetics are at increased risk
E. Is less severe than calculous cholecystitis

A 72 y/o presents with abdominal pain out of proportion to her examination. Rectal: Heme + PMHx: A-fib. Serum CO2 = 12. The intern wants to administer a stool softener and discharge the patient home. Which of the following statements is true regarding this patient's diagnosis?

A. This is a classic presentation for cecal volvulus
B. This diagnosis is associated with lactic acidosis
C. This patient will demonstrate peritoneal signs
D. Systemic anticoagulation is indicated in all cases
E. US is the diagnostic modality of choice

Which of the following is a true statement regarding GI perforations?

A. The best view for free intra-abdominal air is an upright abdominal x-ray

B. The most frequent cause of a large bowel perforation is appendicitis

C. Ulcers are the most common cause of perforations

D. Small bowel perforations are more common than large bowel perforations

E. The highest percentage of bowel perforations occur in middle-aged patients

A 52 y/o presents with nausea, vomiting and epigastric abdominal pain. His amylase = 1300. Which of the following statements is true?

A. The elevated serum amylase is predictive of this patient's severity of disease
B. This test is highly specific for acute pancreatitis
C. This patient requires an emergent surgical procedure
D. A serum lipase is a superior diagnostic test for pancreatitis
E. Narcotic administration is contraindicated in this patient due to acute spasms in the sphincter of Oddi

A concerned healthcare worker presents to the ED following a needle stick from a "patient with hepatitis". Which of the following statements is true?:

A. The employee should be reassured that a vaccine for hepatitis C does exist

B. Since the "patient" most likely has hepatitis A, no chronic carrier state would be expected

C. The employee should be asked about their hepatitis B vaccination history and serum HBsAb titers drawn

D. As long as the employee's liver transaminases and PT are normal, no treatment is necessary

E. Hepatitis E and hepatitis G vaccines should be administered

A 25 y/o male patient with Crohn's disease presents with multiple complaints. Which of the following is an extraintestinal manifestation of Crohn's disease?

A. Sarcoidosis
B. Pneumonitis
C. Erythema marginatum
D. Pyoderma migrans
E. Ankylosing spondylitis

A 33 y/o patient was taking Clindamycin for 2 weeks for an odontogenic abscess. He developed profuse, watery diarrhea. Which of the following is the most likely cause?

A. Shigella
B. Giardia
C. *Clostridium difficile*
D. *Yersinia enterocolitica*
E. *Vibrio parahaemolyticus*

Which of the following is true regarding Boerhaave's Syndrome?

A. The patient may demonstrate a "Hamman's crunch" from pneumomediastinum

B. It usually causes a rupture in the proximal espohagus

C. The CXR may demonstrate pneumothorax with a narrowed mediastinum

D. An upper GI series with barium swallow should be performed in order to establish the diagnosis

E. It occurs more frequently in women

Which is true about appendicitis?

A. It is distinctly uncommon during pregnancy

B. Perforation is very frequent in young females of childbearing age

C. A negative CT rules out appendicitis

D. Is never associated with Crohn's disease

E. An appendicolith on KUB is an uncommon radiographic finding

Which of the following is true regarding volvulus?

A. Cecal volvulus is more common in the young than the elderly
B. Sigmoid volvulus is associated with coffee bean appearance on an acute abdominal series
C. Sigmoidoscopy is usually therapeutic for cecal volvulus
D. Sigmoid volvulus is more common in the young than the elderly
E. Sigmoid volvulus usually requires surgical intervention

Which of the following is associated with a poor prognosis in pancreatitis?

A. Hypercalcemia
B. Metabolic alkalosis
C. Hypoglycemia
D. LDH > 350
E. GLC > 150

Of the following, what is the best test to diagnose cholelithiasis?

A. Ultrasound
B. CT
C. MRI
D. HIDA
E. Upper GI

Indications for hospitalization for hepatitis include:

A. SGOT > 2500
B. Bilirubin > 10
C. INR of 1.5
D. Encephalopathy
E. Telangectasias

Which of the following is true regarding ulcerative colitis?

A. Can be associated with toxic megacolon and peritonitis
B. Is rarely associated with bloody diarrhea
C. Involves small and large bowel
D. Is rarely associated colon cancer
E. Skip lesions are common

Which of the following are true concerning large bowel obstructions?

A. Generally are associated with more vomiting and more pain than small bowel obstructions
B. Typically are associated with “step ladder” plicae circulares on x-ray
C. A potential carcinoma should be ruled-out
D. Most commonly caused by adhesions
E. More common than generalized ileus

Which of the following is characteristic of viral diarrhea?

A. Norovirus is most common in preschools
B. Rotavirus is a common cause in adults
C. It is the usual cause of traveler's diarrhea
D. More common than bacterial causes of diarrhea
E. Fecal WBCs are frequently present

Holy mackerel! A patient presents with flushing, palpitations, nausea and diarrhea 10 minutes after eating some fish. He has a diffuse macular rash. Which is true about scombroid poisoning?

A. Has a slow symptom onset
B. Imparts a "salty" taste to the fish
C. The treatment is H1 and H2 blockers
D. Is caused by the ingestion of dinoflagellates
E. Causes a classic reversal of hot and cold sensation

A 45 y/o presents from home complaining of double vision, trouble swallowing and speaking, after eating a 12 yr old can of baked beans. Which is true regarding this diagnosis?

A. Results in ascending paralysis and anticholinergic symptoms

B. 72 hour onset of symptoms

C. Diplopia is the latest symptom

D. Produces cholinergic symptoms

E. Results in descending paralysis

The most common cause of bacterial enteritis in sickle cell patients is which of the following?

A. Campylobacter
B. Shigella
C. Salmonella
D. Vibrio parahaemolyticus
E. E. coli

The agent causing this diarrhea is typically treated with oral metronidazole:

A. Salmonella
B. Amebiasis
C. C. difficile
D. Campylobacter
E. Enterobius vermicularis

GI Answer Key

1. A
2. D
3. B
4. C
5. D
6. C
7. E
8. C
9. A
10. E
11. A
12. D
13. A
14. D
15. A
16. C
17. D
18. C
19. E
20. C
21. C