บทความวิชาการ

Non-Traumatic Abdominal Emergency Imaging Hepatobiliary Emergency

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Non Traumatic Abdominal Emergency Imaging

Hepatobiliary Emergency

- Liver abscess
- Cholangitis
- Acute cholecystitis
- Gall stone ileus
- Mirizzi syndrome

Pancreatitis

Appendicitis

Small bowel obstruction

Peptic Ulcer perforation

Mid gut volvulous

Sigmoid volvulous

Mesenteric vascular ischemia

Diverticulitis

Imaging tools

Acute abdomen series

Chest upright

Abdomen upright

Abdomen supine

Left lateral decubitus

Ultrasound

CT

MRI

Liver abscess

- **Pyogenic liver abscess**
  - o (*K pneumonia*, *E coli*, *Enterococcus*, *Burkholderia, Streptococcus*, and *Staphylococcus species*)
  - o Solitary
  - o Multiple
  - o Few mm- cm
- **Amebic liver abscess**
  - o Amebic liver abscess; E.Histolytica
  - o most common extraintestinal from of invasive amebiasis
  - o Antibody to Entamoeba rising
  - o trophosoites ascend via portal vein then invaded parenchyma
  - o chocolate-colored, pasty material (anchovy paste)
  - o single/multipe Periperheral near capsule
- **Fungal liver abscess**
  - o Pts hematologic malignancy or compromised
  - o Microabcess involving liver, spleen and kidneys
  - o Leukemia/ most common Candia albicans
  - o Other; Cryptococcus, histoplasmosis, mucormycosis, Aspergillus
  - o Size 2-20 mm

Imaging;

- Plain film; hepatomegaly, intrahepatic gas/an fluid level
- US:
  - o variable in shape and echo (hypoechoic, hyperechoic, anechoic) with septation, fluid level without and with posterior enhancement
  - o Amebic; round/oval hypoechoic mass abuts liver capsule
  - o Fungal; multiple tiny small echoic lesions scattered through liver parenchyma
  - o US, CT 4 patterns of hepatosplenic candidiasis

1. wheel-within-a wheel; central hypoechic of necrosis containing fungal, surrounded echogenic inflammatory cells

2. Bull's-eye of central echogenic nidus surrounded by hypoechoic rim(pts active fungal infection with normal white cell)

3. a uniform hypoechic nodules, most common; DDX

with metastasis, lymphoma

4. Echogenic foci with variable posterior acoustic shadowing, lateral stages and indicates early resolution

- CT

- cluster, complex peripheral ring enhancement of hypoattenuation (0-45 HU) and edematous changed of adjacent liver parenchyma

- MRI

- T1WI; hypointense, T2WI; hyperintense and peripheral ring enhancement with edematous changed of surrounding liver parenchyma

Cholangitis; infectious pyogenic cholangitis, OV

- US; dilatation of IHD, CBD with evidence of stone
- CT; dilated biliary tree with periductal enhancement, stones, sludge, pneumobilia and abscess

Acute cholecytitis

- 90–95% of cases occur in the setting of cystic duct or gallbladder neck obstruction related to cholelithiasis
- Middle age obese woman
- Murphy's sign positive
- Plain film; gall stones
- US; sensitivity 80-100%, Specificity 60-100%
    - o Specific finding
        - Cholelithiasis
        - Gall bladder wall thickening >3-5 mm
        - Pericholecystic fluid
        - Positive sonographic Murphy's sign
    - o Less specific
        - Gall bladder wall distention
        - GB sludge
- Acute Complicated cholecystitis
    - o Gangrenous cholecystitis and GB perforation
    - o Emphysematous cholecystitis
    - o Suppurative cholecystitis
    - o Hemorrhagic cholecystitis

Gall stone ileus

- Gall stone lodge in terminal ileum near IC valve (small bowel anywhere, colon)
- Rarely ectopic gall stone migrate proximally causing gastric outlet obstruction
- Rigler's triad; pneumobilia, ectopic gall stone and evidence of bowel obstruction

Mirizzi Syndrome

- May occur as an acute presentation of cholelithiasis or setting of acute cholecystitis
- Impacted gall stone in the GB neck or cystic duct causing biliary tree obstruction
- Direct compression of adjacent CHD or secondary local inflammation causing bile duct wall edema and fibrosis
- RQU pain, fever and leukocytosis, acute onset of obstructive jaundice
- US findings
    - o Gall stone located within GB neck or cystic duct and dilated CHD and IHD
    - o Normal caliber of CBD
    - o Pericholecystic and peribiliary duct inflammation changes
    - o GB wall thickening

Acute Pancreatitis

Enlargement of pancreas, fluid collection, obliteration of fat plane

Plain film; sentinel loop, colon cut-off sign, gas in duodenum, non specific finding

CT; focal or diffused enlargement of pancreas with heterogeneous enhanancement (necrosis; non enhancement), fluid collections, infiltration of peripancreatic fat, abscess, pseudocyst, hemorrhage without or with gall stones

Appendicitis

Plain film abnormalities seen in <50%

- Calcified, frequently laminated, appendicolith in RLQ (in 7-15%)
- Cecal ileus" = local paralysis
- Small bowel obstruction pattern
- Soft-tissue mass and paucity or absence of intestinal gas in RLQ (more often with perforation)
- Extraluminal gas bubbles (again more often in perforation)

US ; (77-94% sensitive, 90% specific, 78-96%

accurate)

- Visualization of noncompressible appendix as a blind-ending tubular aperistaltic structure (seen only in 2% of normal adults, but in 50% of normal children)
- Diameter >6 mm in total diameter on cross section (81%) with 2mm mural thickness
- Diffuse hypoechogenicity (associated with higher frequency of perforation)
- Lumen may be distended with anechoic / hyperechoic material
- Visualization of appendicolith (6%)
- Localized periappendiceal fluid collection
- Prominent hyperechoic mesoappendix / pericecal fat

CT (87-98% sensitive, 83-97% specific, 93% accurate)

- Distended lumen
- Circumferentially thickened and enhancing wall
- Appendicolith = homogeneous / ringlike calcification (25%)
- Periappendicular inflammation-linear streaky densities in periappendicular fat
- Pericecal soft-tissue mass
- Abscess
  - o Poorly encapsulated
  - o Single or multiple fluid collection(s) with air
  - o Extraluminal contrast material
- Focal cecal wall thickening (80%)
- "Arrowhead" sign = funnel of contrast medium in cecum centering about occluded orifice of appendix

Small bowel obstruction

Supine Abdomen film

- Centrally dilated small bowel loops above the obstructed site, with little or no gas distally (disproportionately dilated proximal bowel compared to distal bowel)
- The dilated loops often stacked one under the other in a "stepladder appearance"
- Prominent valvulae conniventes in dilated loops

Upright Abdomen film

- Multiple air-fluid levels with different heights (2 different levels) in the same loop ("candy cane appearance" or hairpin loop)
- "String- of- beads (pearls)" sign, seen later when the SMB is almost completely filled w/ fluid, diagnostic of SBO in most cases
- Pneumoperitoneum; sign of bowel perforation

CT;

- Small bowel obstruction?
- Level of obstruction
- Cause of obstruction
- Complication of obstruction

Peptic Ulcer perforation

Perforation of peptic ulcer causing free air within peritoneal cavity

Mid gut volvulous

Torsion of entire gut around superior mesenteric artery (SMA) due to a short mesenteric attachment of small intestine in malrotation

Plain film findings

- o Dilated, air-filled duodenal bulb and paucity of gas distally
  - "Double bubble sign" = air-fluid levels in stomach and duodenum
- o Isolated collection of gas-containing bowel loops distal to obstructed duodenum = gas-filled volvulus = closed-loop obstruction
  - From nonresorption of intestinal gas secondary to obstruction of mesenteric veins

Barium studies

- o Duodenojejunal junction (ligament of Treitz) located lower than duodenal bulb and to the right of expected position
- o Spiral course of midgut loops = "apple-peel / twisted ribbon / corkscrew" appearance (in 81%)

US findings

- o Clockwise whirlpool sign = color Doppler depiction of mesenteric vessels moving clockwise with caudal movement of transducer
- o Distended proximal duodenum with arrowhead-type compression over spine
- o Superior mesenteric vein to the left of SMA
- o Thick-walled bowel loops below duodenum and to the right of spine associated with peritoneal fluid

CT findings

- Whirl-like pattern of small bowel loops and adjacent mesenteric fat converging to the point of

torsion (during volvulus)

- SMV to the left of SMA (NO volvulus)
- Chylous mesenteric cyst (from interference with lymphatic drainage)

Sigmoid volvulous

Twisting of loop of sigmoid around its mesenteric attachment site

Abdominal plain films usually diagnostic

- **Inverted U-shaped** appearance of distended sigmoid loop
- Largest and most dilated loops of bowel are seen with volvulus
- **Coffee-bean sign** ไ midline crease corresponding to mesenteric root in a greatly distended sigmoid
- **Sigmoid volvulus –** bowel loop points to RUQ
- **Cecal volvulus –** bowel loop points to LUQ
  - o Dilated cecum comes to rest in left upper quadrant
- **Bird's-beak or bird-of-prey sign** ไ seen on barium enema as it encounters the volvulated loop

CT scan useful in assessing mural wall ischemia

Mesenteric vascular ischemia

Acute interruption of blood flow to small or large intestine

- o **Imaging**
  - o Plain abdominal radiographs (abnormal in 20-60% of cases)
    - Thumbprinting
    - Non-specific finding indicating intestinal wall edema with hemorrhage in the setting of acute mesenteric ischemia
    - Pneumatosis
    - Portal venous gas
    - Pneumoperitoneum
    - All are indicative of infarcted bowel
- o **CT**
  - Bowel wall thickening from edema or hemorrhage
  - Lack of enhancement indicates infarction
  - Pneumatosis, portal venous gas, pneumoperitoneum
  - Intraluminal thrombus in involved vessel
- o **Mesenteric angiogram**
  - Can distinguish between arterial embolic and thrombotic causes of acute mesenteric ischemia

Diverticulitis

Herniation of mucosa and submucosa through muscular layers *pseudodiverticulum=false diverticulum*=pulsion type

Plain Film X-ray

- Sentinel loop or, less likely, LBO
- Air bubbles in abscess
- Pneumoperitoneum (rare)

BE

- Extraluminal contrast
- Pericolonic abscess produces mass effect
- *Double-tracking*=barium in longitudinal sinus tract in wall
- Spasm is an indirect sign of diverticulitis
- Fistula to bladder (diverticulitis is most common cause of non-traumatic fistula here) or small bowel or vagina (diverticulitis causes 1/3 of fistulae to vagina)

CT

- Infiltration of pericolonic fat
- Bowel wall thickening >1cm
- Abscess
- Fluid or free air in peritoneal cavity
- Colovesicle or colovaginal fistula
- Intramural sinus tracts

Reference

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