



Round : Radiology

Group no : A5

Done By : Raneem Abuqtaish

Gallbladder & Biliary system

x ray كى G.B. stones نه فشفوف نه
بنسبة 10-15%

Gallstones:

85% فشفوف renal stones

Best study for:

G.B. stones renal stones
US. x ray

Types of gallstones:

- Cholesterol gallstones: are the most common, accounting for more than 80 % of cases.

- Pigment gallstones: usually form when there is excess bilirubin and calcium salts in bile.

- Mixed stones: are mixture of cholesterol and calcium salts.

Pigment + mixed → هذول يلى فشفوفه
كى x ray

هذول risk factors
Gallstones

The 5 F's

Fair

Fat

Female

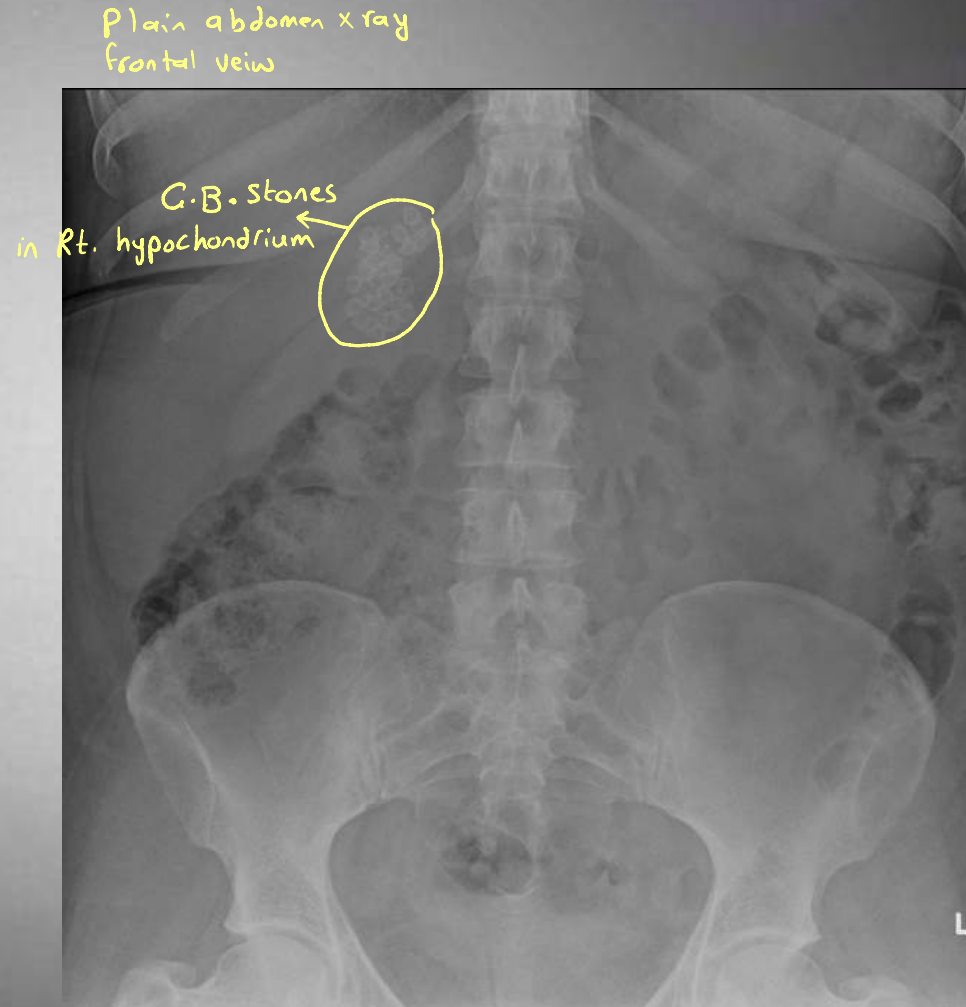
Forty

Fertile



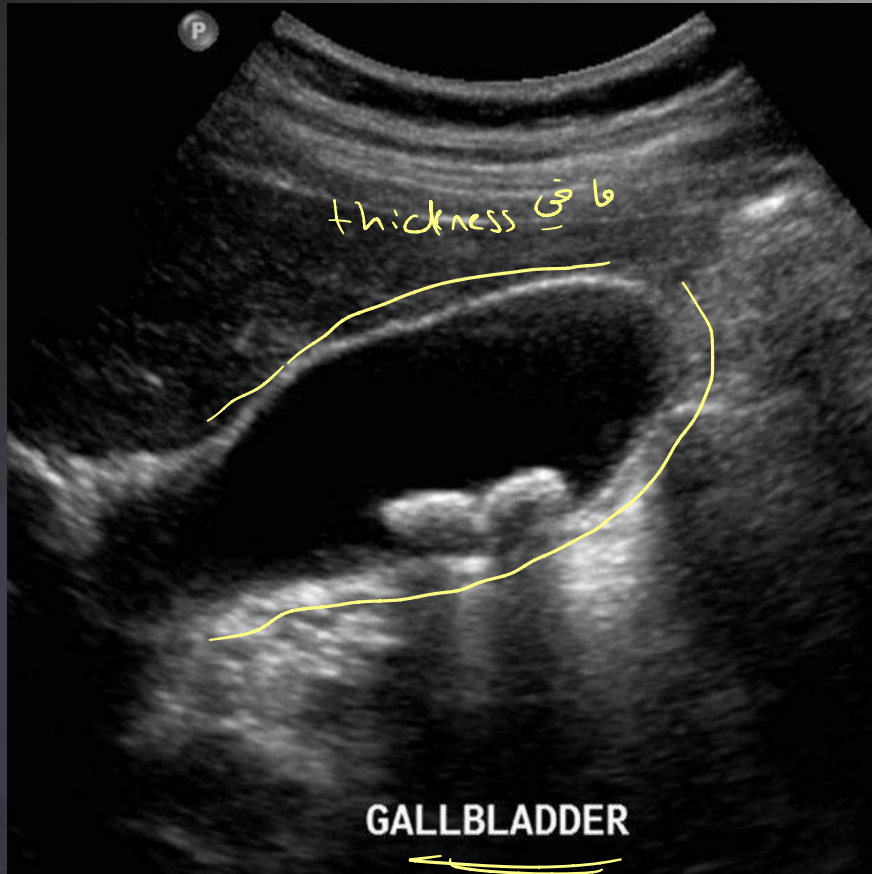
Radiological features of gallstones

- Plain film reveal approximately 10 to 20% of calculi as they are radio-opaque.
- Ultrasound is the best test for gallstones, which is non-invasive and very accurate.
- A gallstone on ultrasound is echogenic, it appears as a white structure that casts a dark shadow behind it.



type of study: ultrasound

التهورتن ما حسم
signs of inflammation



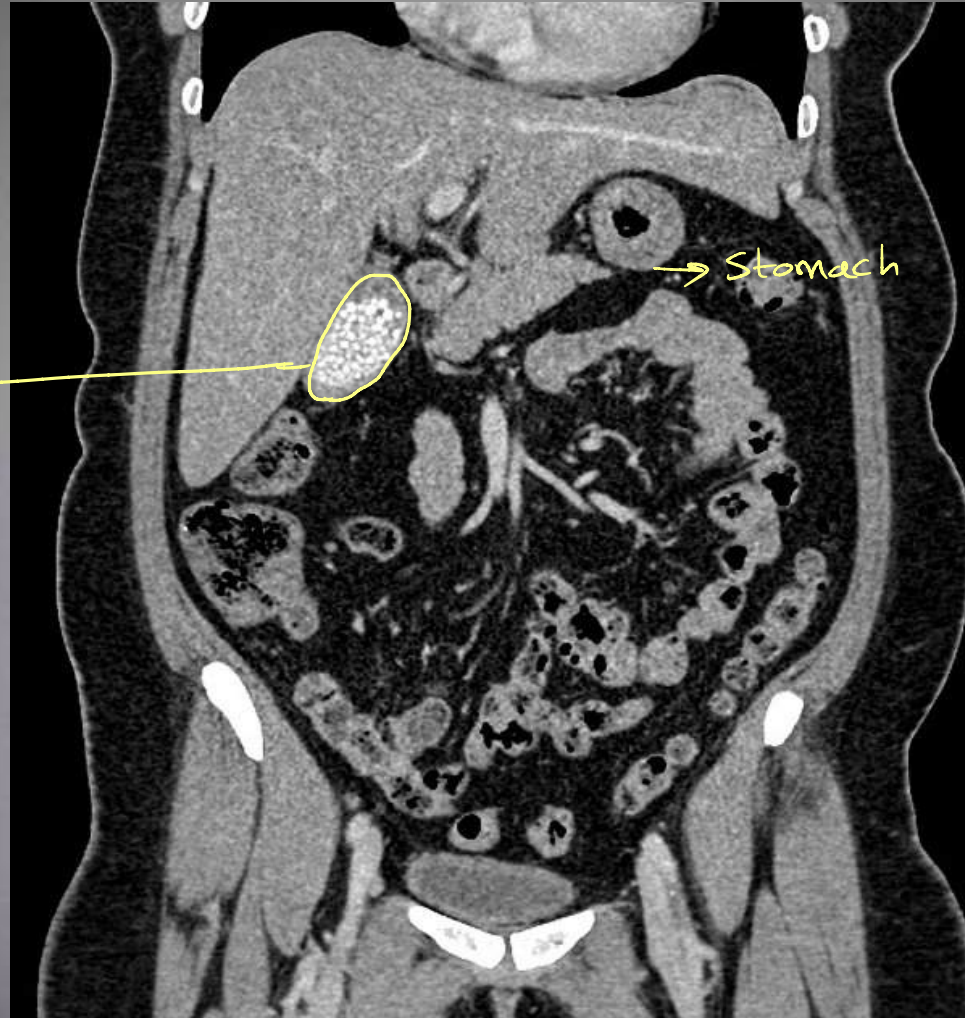
signs of inflammation:
dilated GB wall $>3\text{mm}$
Pericystic edema

abdominal CT scan
Coronary view

Multiple GB stones ←

* بصر CT بـ indication زي اصقالية
وجود Pancreatitis

عشان نشوف
MRCP → Biliary tree
من GB



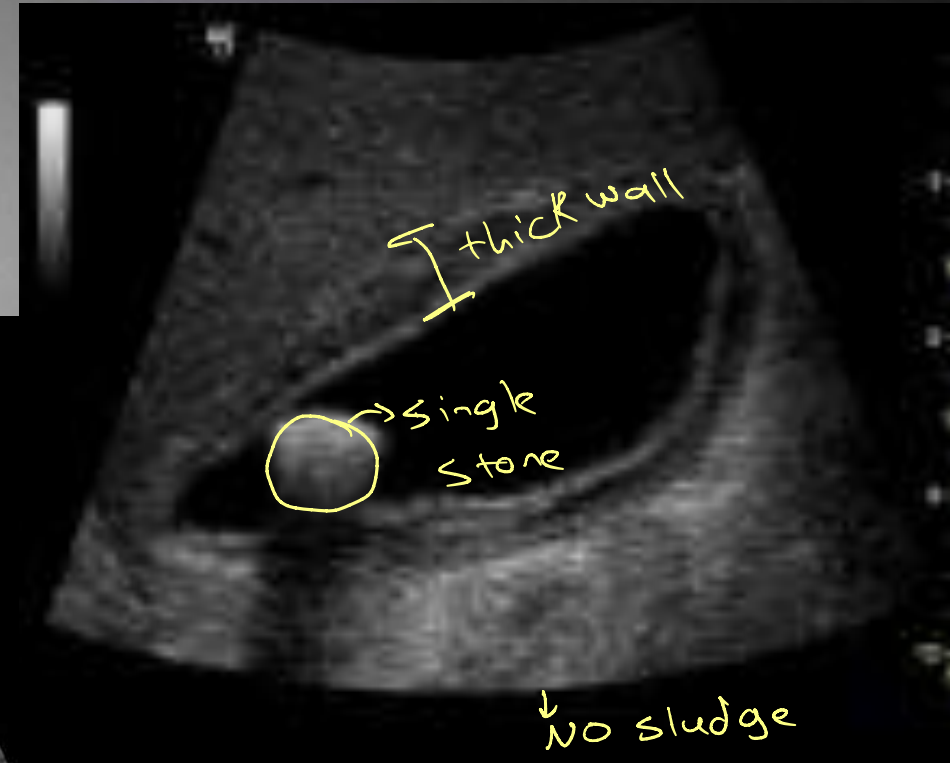
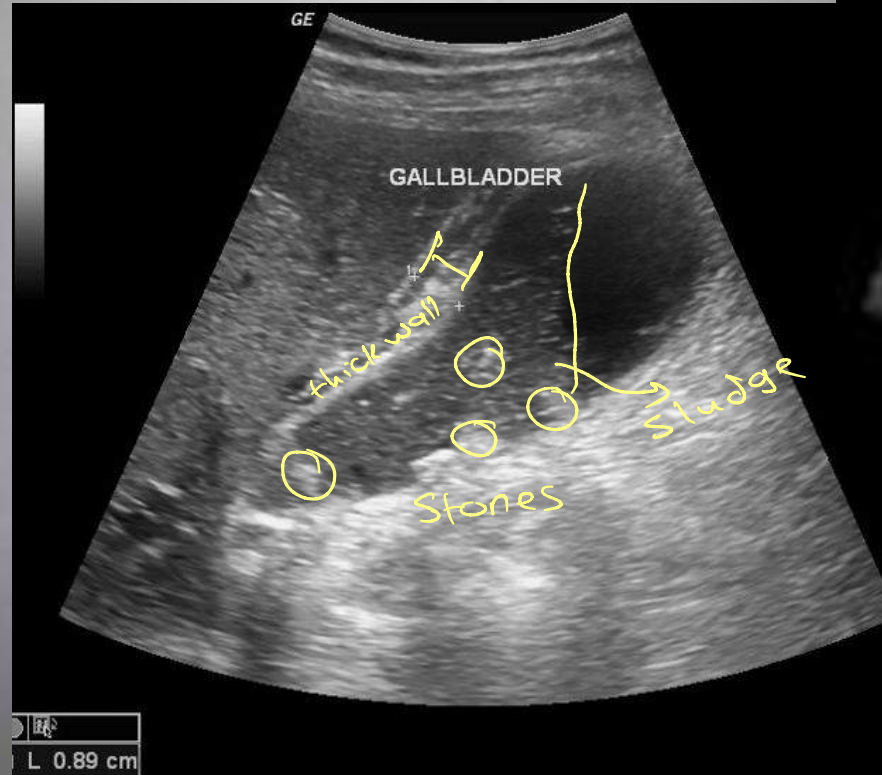
cholecystitis

- any form of inflammation involving the gallbladder and has many forms, including:

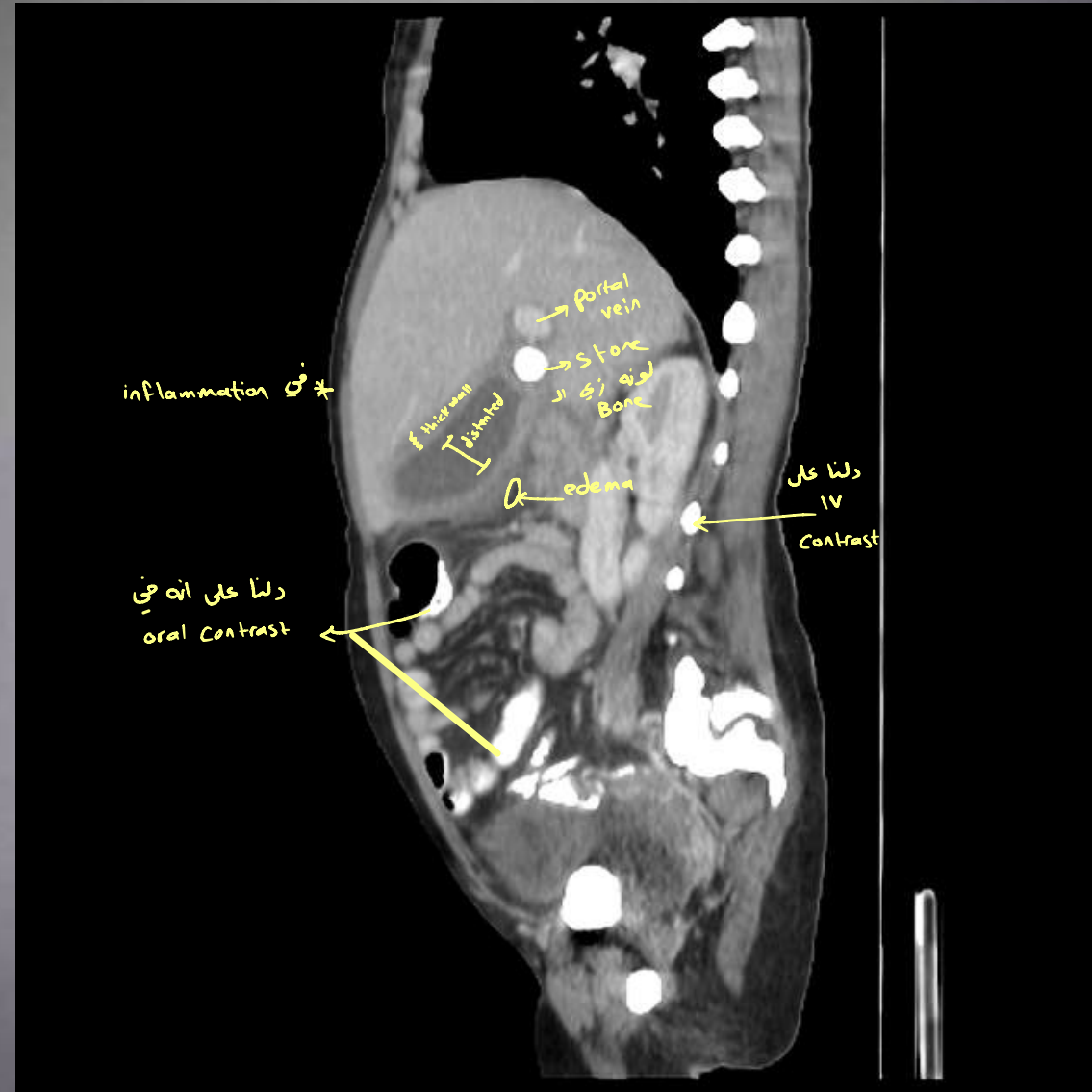
Acute calculous cholecystitis

Ultrasound features are:

- Distended gallbladder with gallstones.
- The gallbladder wall is thickened (greater than 3 mm) and edematous
- Pericholecystic fluid, and in some complicated cases pericholecystic abscess.



- * abdominal CT
- * Sagittal view



88

- **Porcelain GB:**

- Curvilinear calcifications within chronically inflamed and fibrotic muscular wall.
- 90% associated with gallstones.
- Wall is thickened and gallbladder is contracted.
- Increased incidence of malignancy.



ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY

(ERCP)

MRCP → diagnostic only, More safe, non invasive

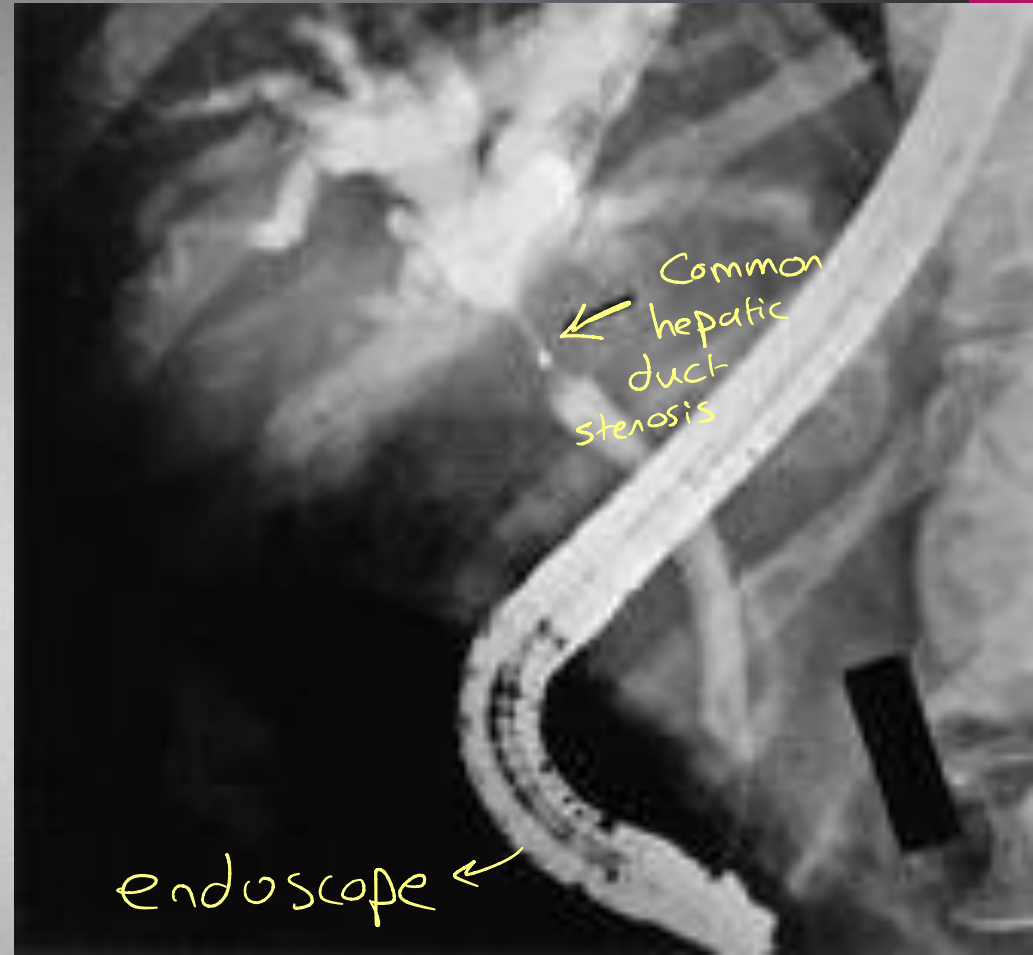
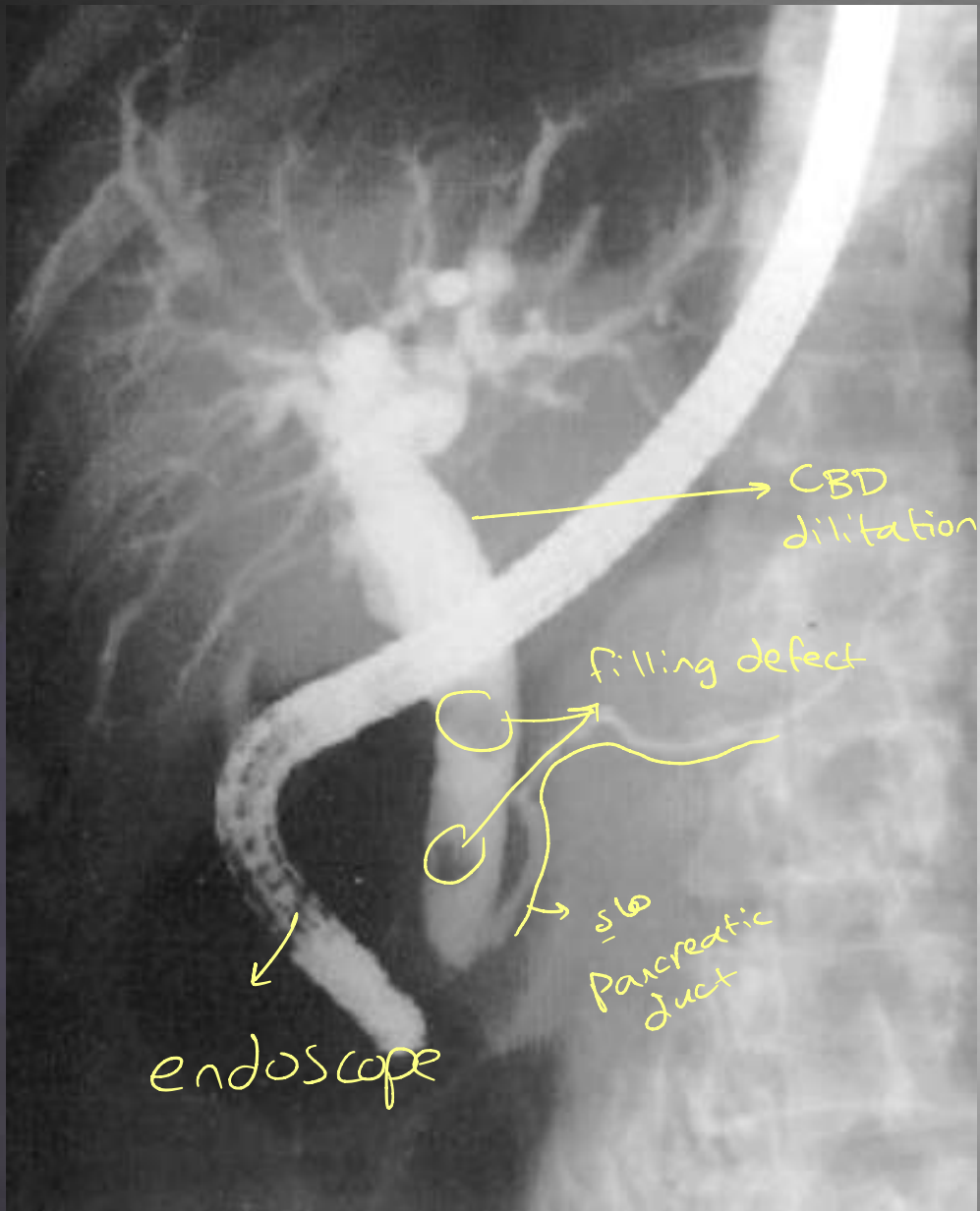
Indication: Diagnostic and therapeutic

- Obstructive jaundice
- Removal of known CBD stones
- Pancreatic tumors, that cause bile duct obstruction and jaundice

كيف صغله → An endoscope is introduced and advanced through the mouth into the ^{2nd part} (duodenum), with injection of contrast into the ampula of Vater, to demonstrate both the bile ducts and the pancreatic ducts.
لا يوصل هون منقطه Contrast

- therapeutic
- CBD stones can be removed through the endoscope by insertion of a catheter with a basket or balloon.
 - Malignant CBD strictures can also be stented.

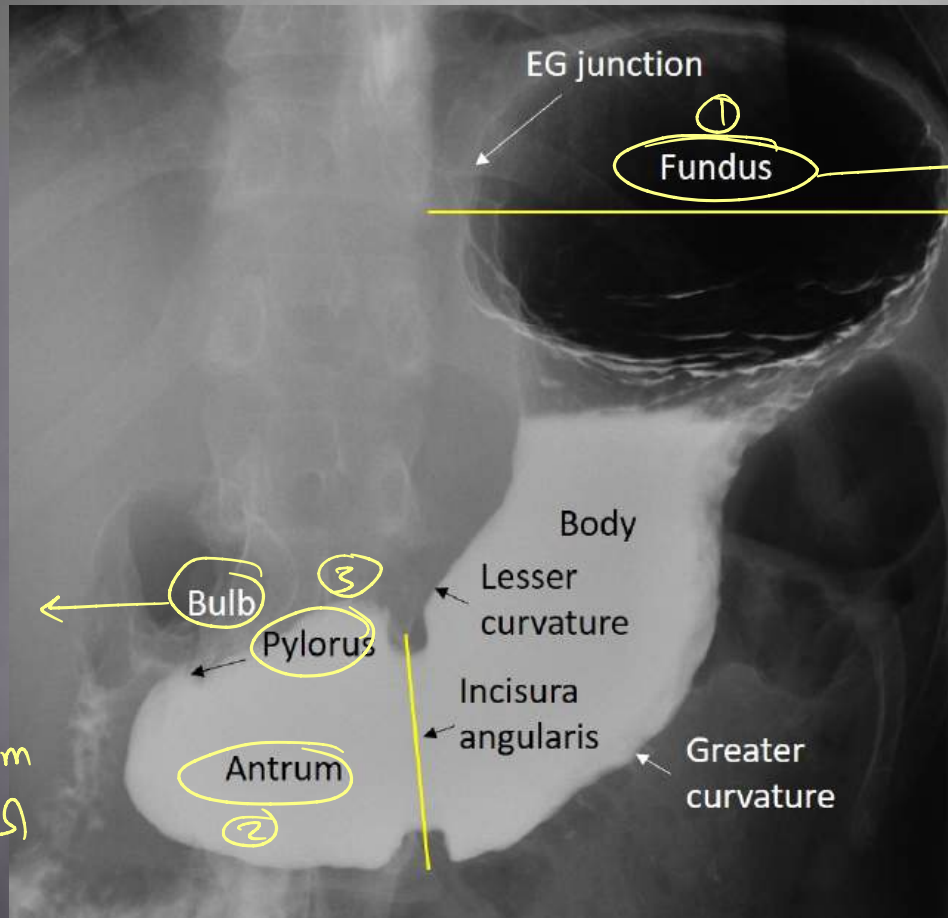
ERCP



Stomach

Barium meal
← لایق بیهوش
Stomach

1st part
بداية deodenum / اول 2 سم
deodenum متصل مع
الحمة عبر medial wall
تبعه



anatomically
پیلوس من عند
EG Junction
angularis

Gastric carcinoma ✱ The malignant gets enhanced cause its highly vascular

- MC gastric malignancy.
- Upper GIS- Lobulated filling defects .
- CT abdomen → يَسْتَوِفِي وَامِد
فِي الشَّيْنِ

① Diffuse / local wall thickening.

or

② Lobular mass

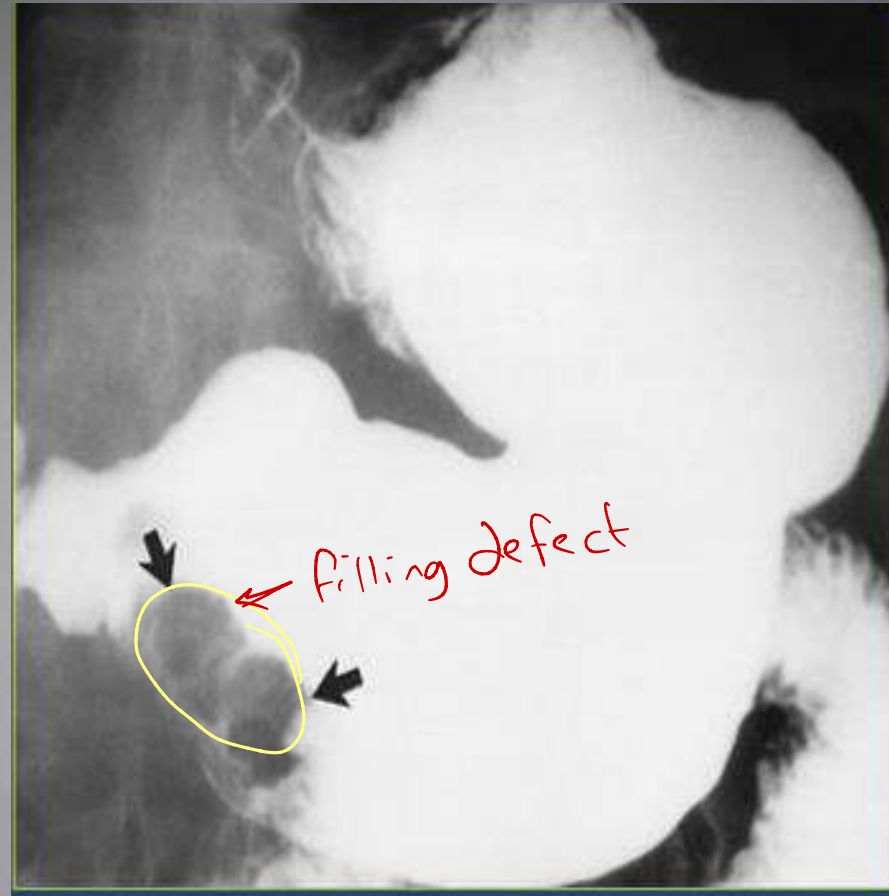
- +/- Ulceration

- Enhancement

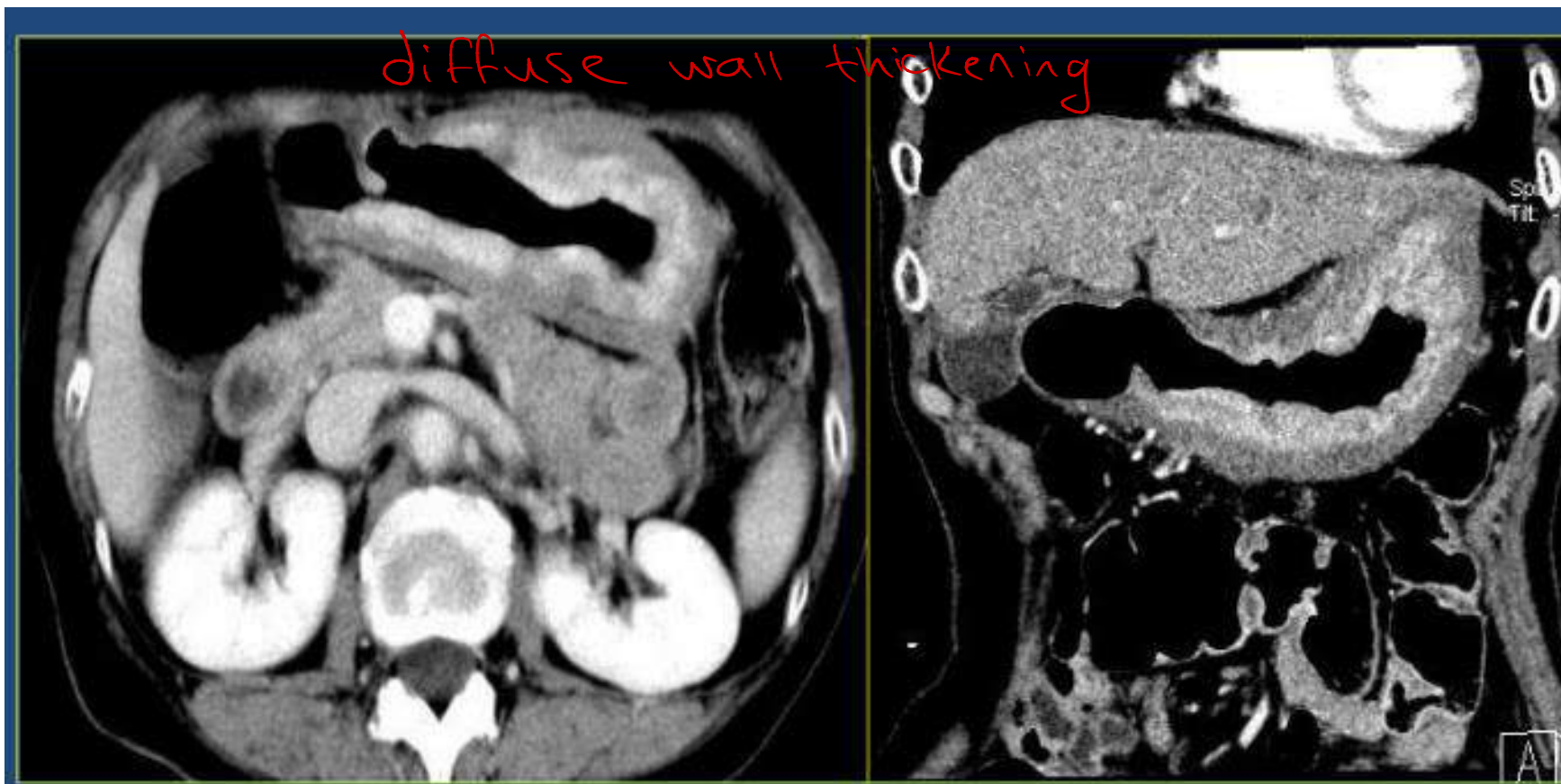
- Local lymphadenopathy

+ check on mets.

Barium meal
filling defect
large mass malignancy
CT abdomen



فنتقيس ال wall
وهي distended
فأبرزت تكون
Collapsed
والرقم فأبهر
ليتجاوز 10 mm
ولا يكون abnormal



CT abdomen

مشی شایعین
mass احنا یس
thick wall

الانتشار واصل aorta کان

۴۲

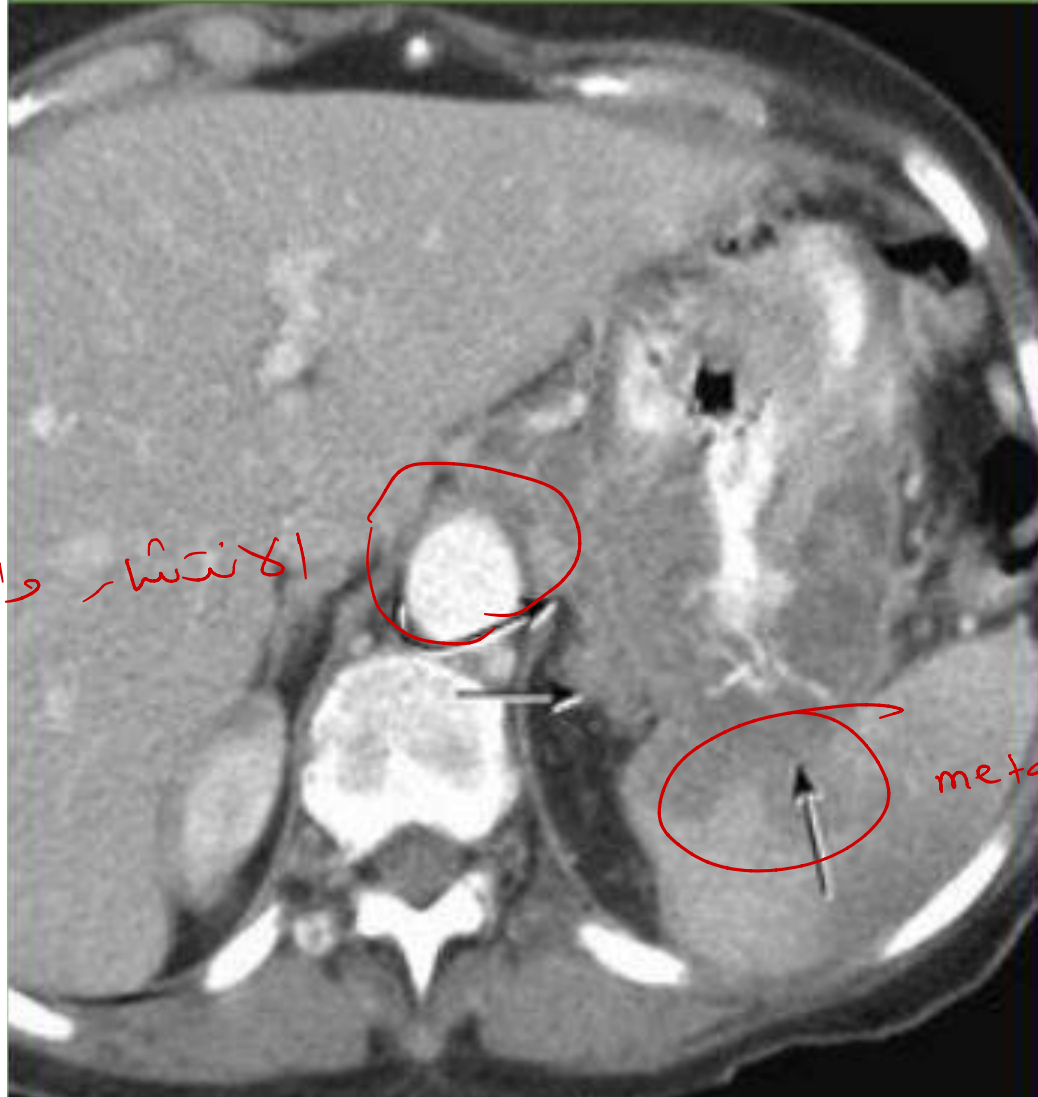
محکم بکوز عنا thick wall

بس مشی بسبب سرطان

بل Gastritis

لکن بسبب invasion

منشأ کو انه سرطان

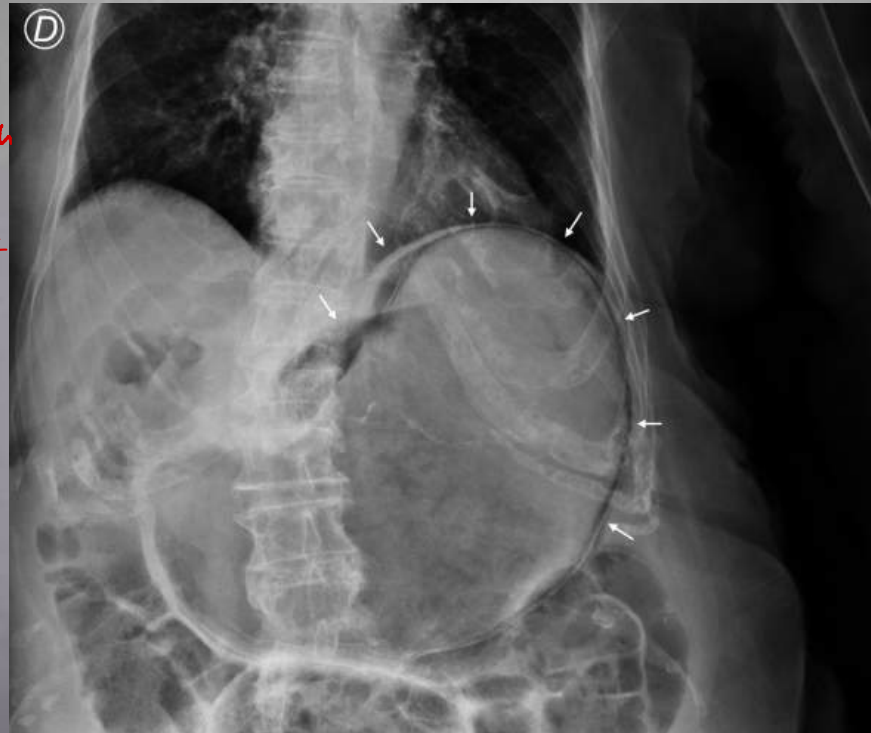


metastatic to spleen by invasion

EMPHYSEMATOUS GASTRITIS

حكة الركوة كل الحالات
ال EMA مهمة للارتقاء

- Emphysematous gastritis is a cause air in the stomach of gastric emphysema. EMA
- Most cases are brought about by caustic ingestion, alcohol abuse, surgery, trauma, or ischemia
high doses of NSAID

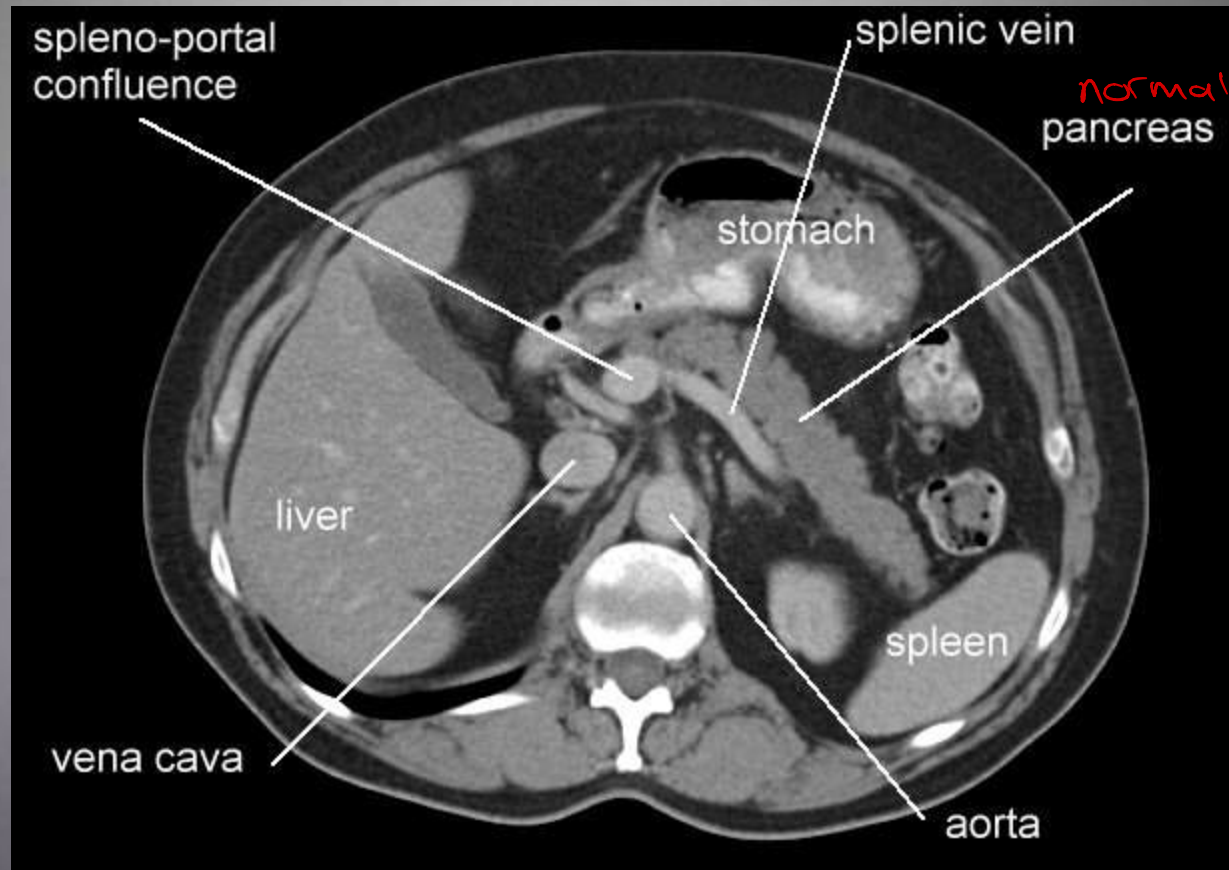


Pancreas

- Pancreatitis-
- US, CT, MRCP, and ERCP are all used in the diagnosis and evaluation of inflammatory diseases of the pancreas.
- The role of diagnostic imaging in acute pancreatitis is quite different from its role in chronic pancreatitis.
- In cases of suspected pancreatitis, imaging is used to establish an ^①etiology (gallstones, etc), and assess for possible ^②complications that would require intervention.
- In chronic pancreatitis, imaging allows for the classification of the morphological changes, which determines prognosis and potential interventions.

هدف التصوير
للـ acute pancreatitis
1+2

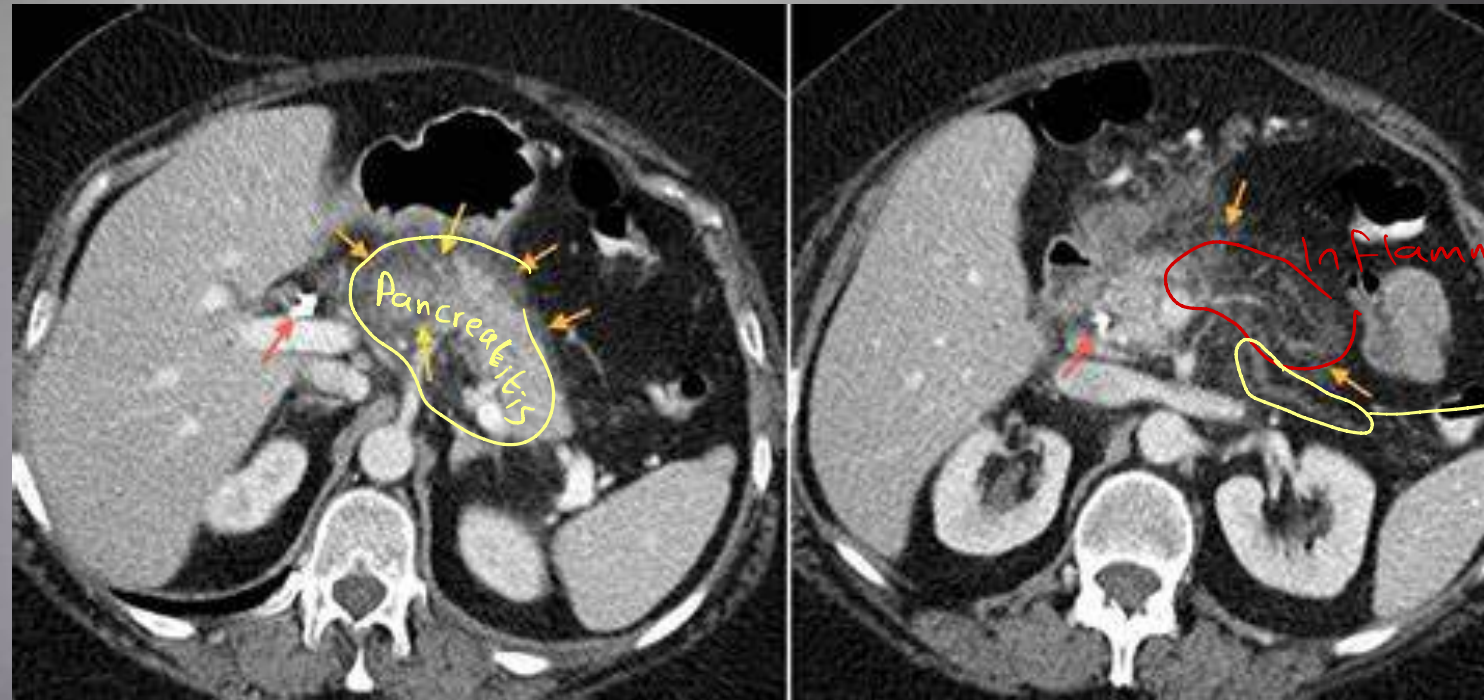
Normal pancreas



Acute pancreatitis

- Common causes of acute pancreatitis include :

alcohol abuse,
choledolithiasis,
hypertriglyceridemia, and
hypercalcemia.



fat stranding
نَدْل على
وجود
inflammation

Chronic pancreatitis

→ Calcifications فسوف

- Chronic pancreatitis presents with different diagnostic and therapeutic challenges compared to acute pancreatitis; the role of imaging may be interventional as well as diagnostic.

findings: Chronic pancreatitis is characterized by parenchymal atrophy, ductal calcifications, and ductal dilatations and strictures.





- Irregular duct contours
 - Alternating areas of stricture & dilatation
 - Intraductal calcifications

Calcifications -> Chronic Pancreatitis

LIVER

- Cirrhosis
 - Causes of cirrhosis include:
 - a) alcohol, b) alpha1-antitrypsin, c) postnecrotic (hepatitis), d) metabolic disease: Wilson, hemochromatosis, glycogen storage disease, e) PBC, PSC, f) congestive heart failure.
 - Cirrhosis increases risk of developing hepatocellular carcinoma

عشان هيل
نخوفنا

Imaging findings in cirrhotic liver

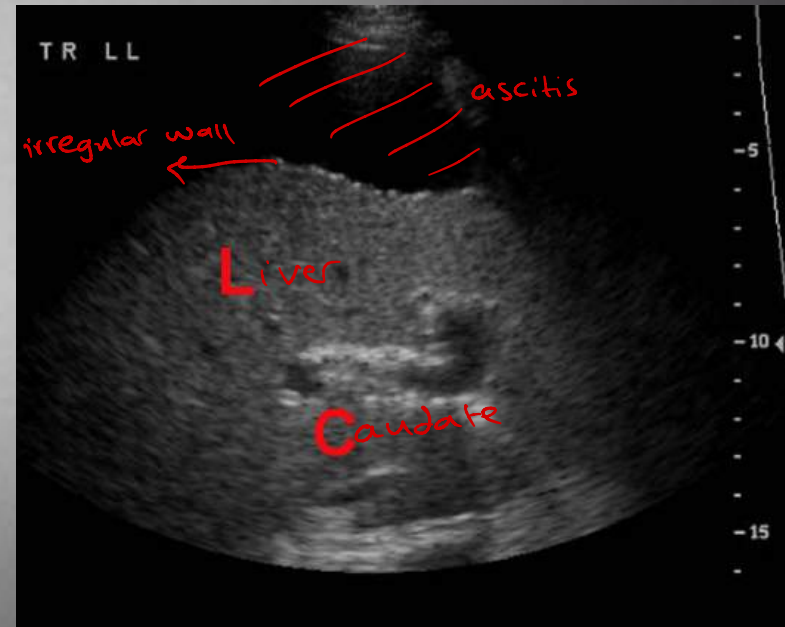
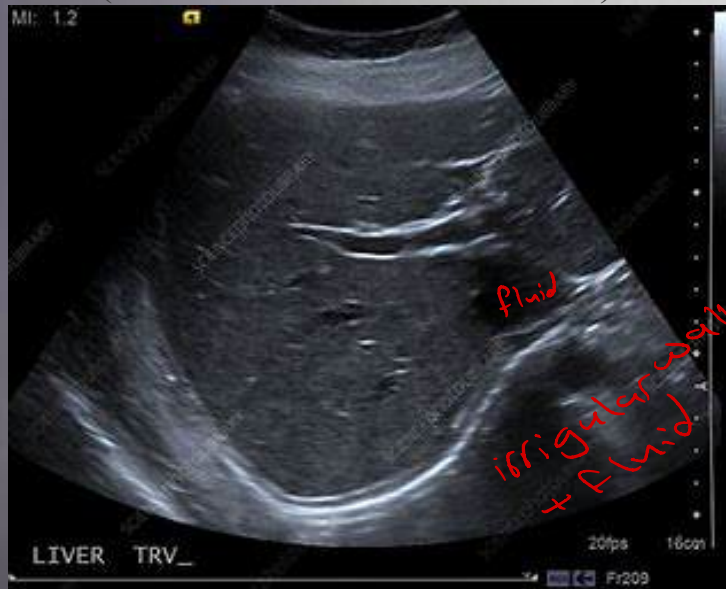
بالأول يكون
enlarged

بعدئذ يهبط
الوقت

يصغر حجم

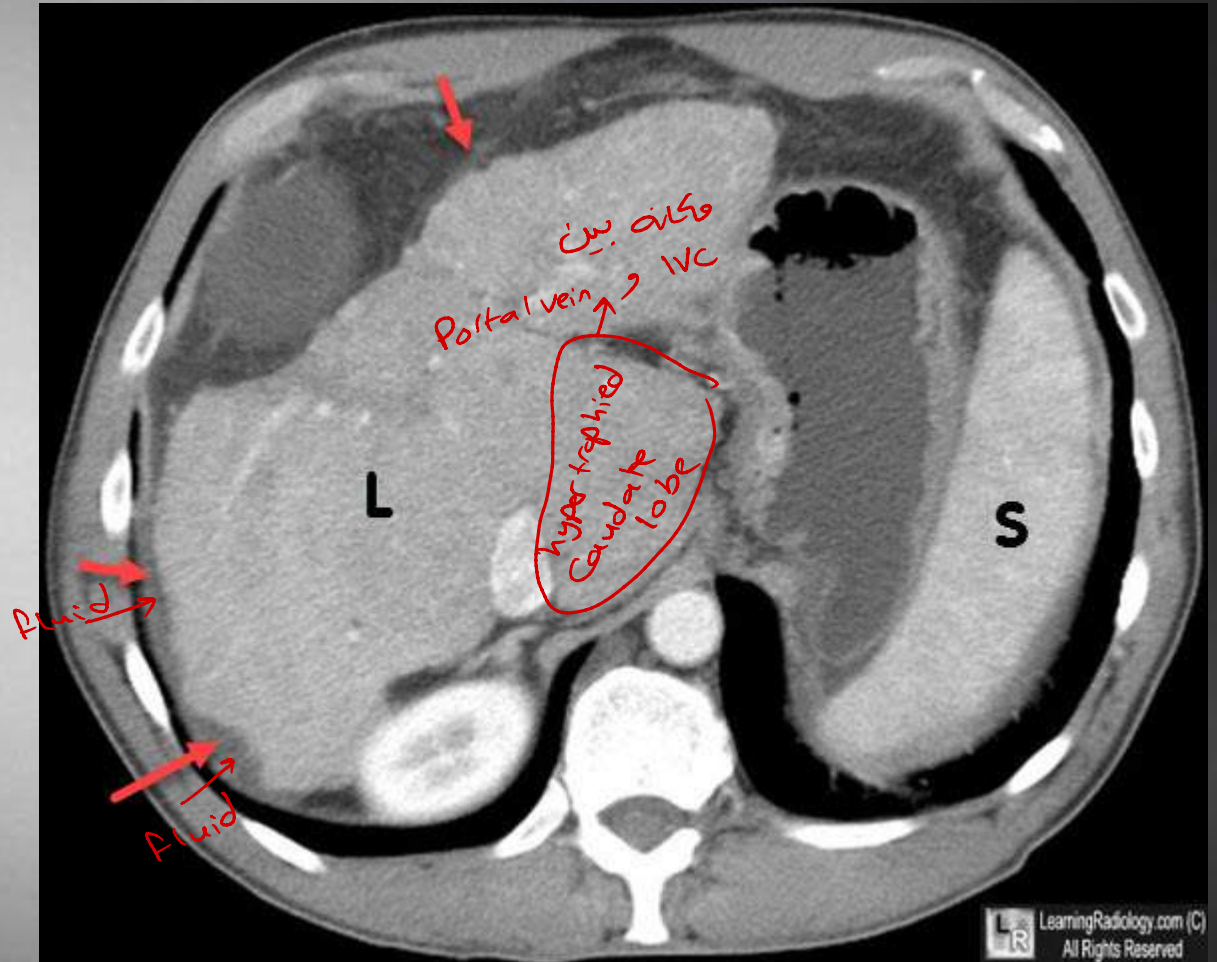
cirrhotic liver

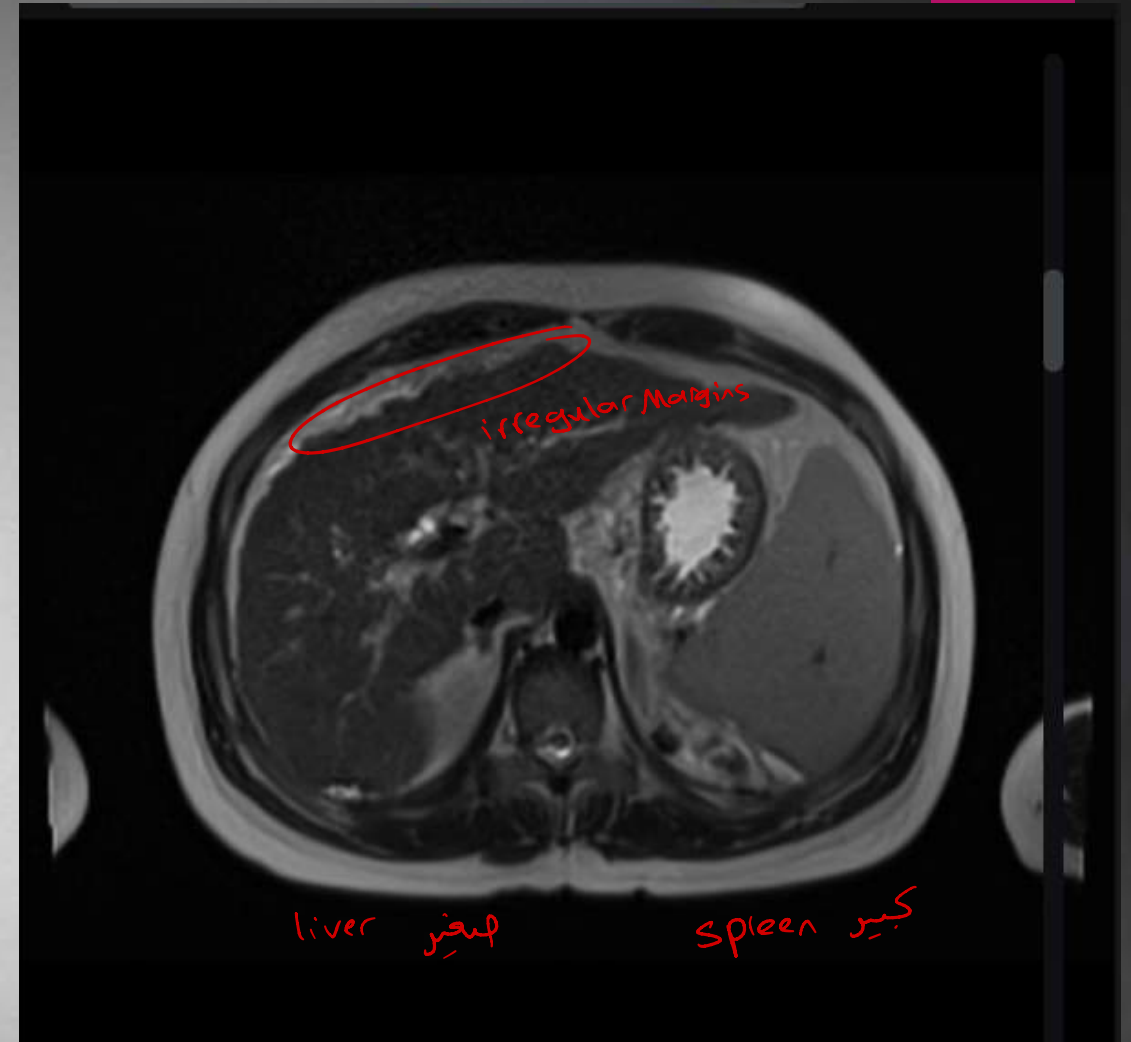
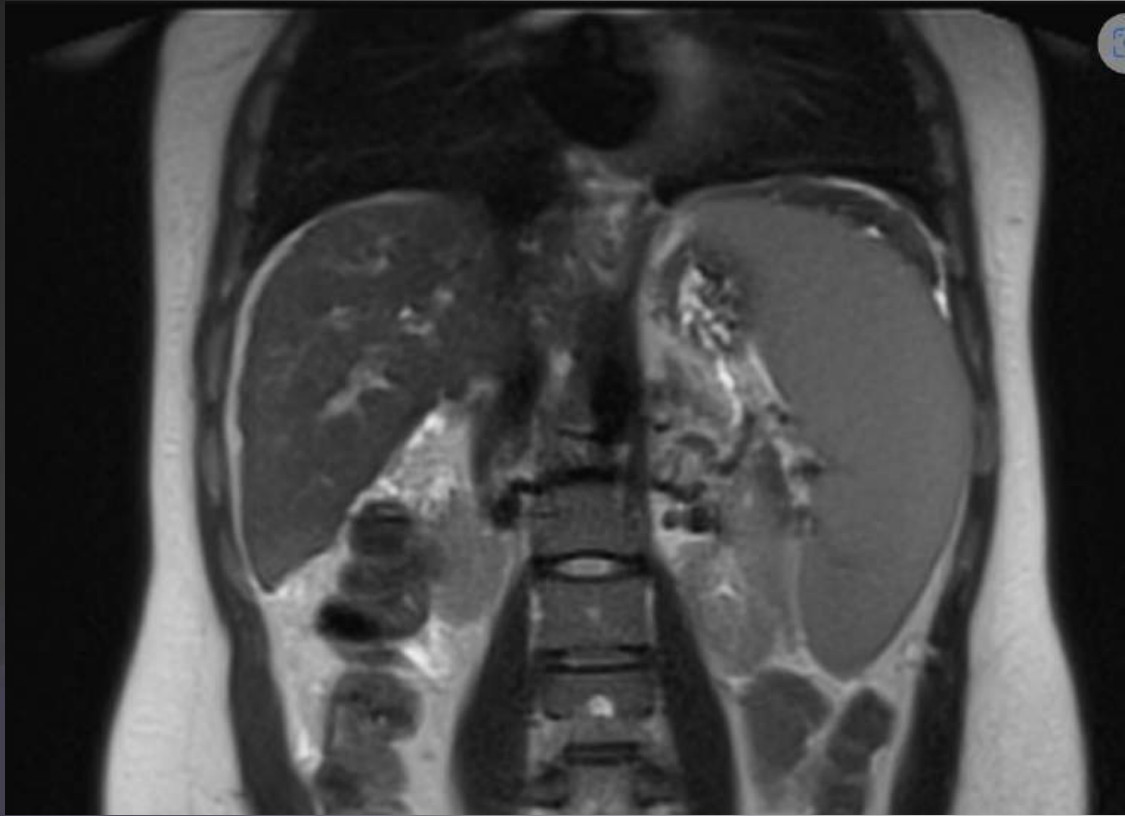
- U/S: advanced cirrhotic liver appears to be nodular, irregular, and contracted with relatively enlarged caudate lobe
- (Normal vs cirrhotic liver)



Contrast CT
irregular liver margins

- Noncontrast CT: depending on the extent of fatty infiltration, fibrosis, and regenerating nodules, the hepatic parenchyma may have either homogeneous or heterogeneous decreased attenuation.
- Contrast CT: areas of fibrosis and regeneration may become isodense to parenchyma. The surface of the liver may be very nodular in cirrhosis.





SP

MRI

اذا فيه Bone
ايضا تابع CT ←

- Small liver with a lobulated border and hypertrophy of the caudate lobe.
- Splenomeagly

Cirrhotic liver

Small bowel

کيف لَمِيز . سَهِي
وَبَيْن large bowel

Jejunum → feather
like structure

Normal Small Bowel



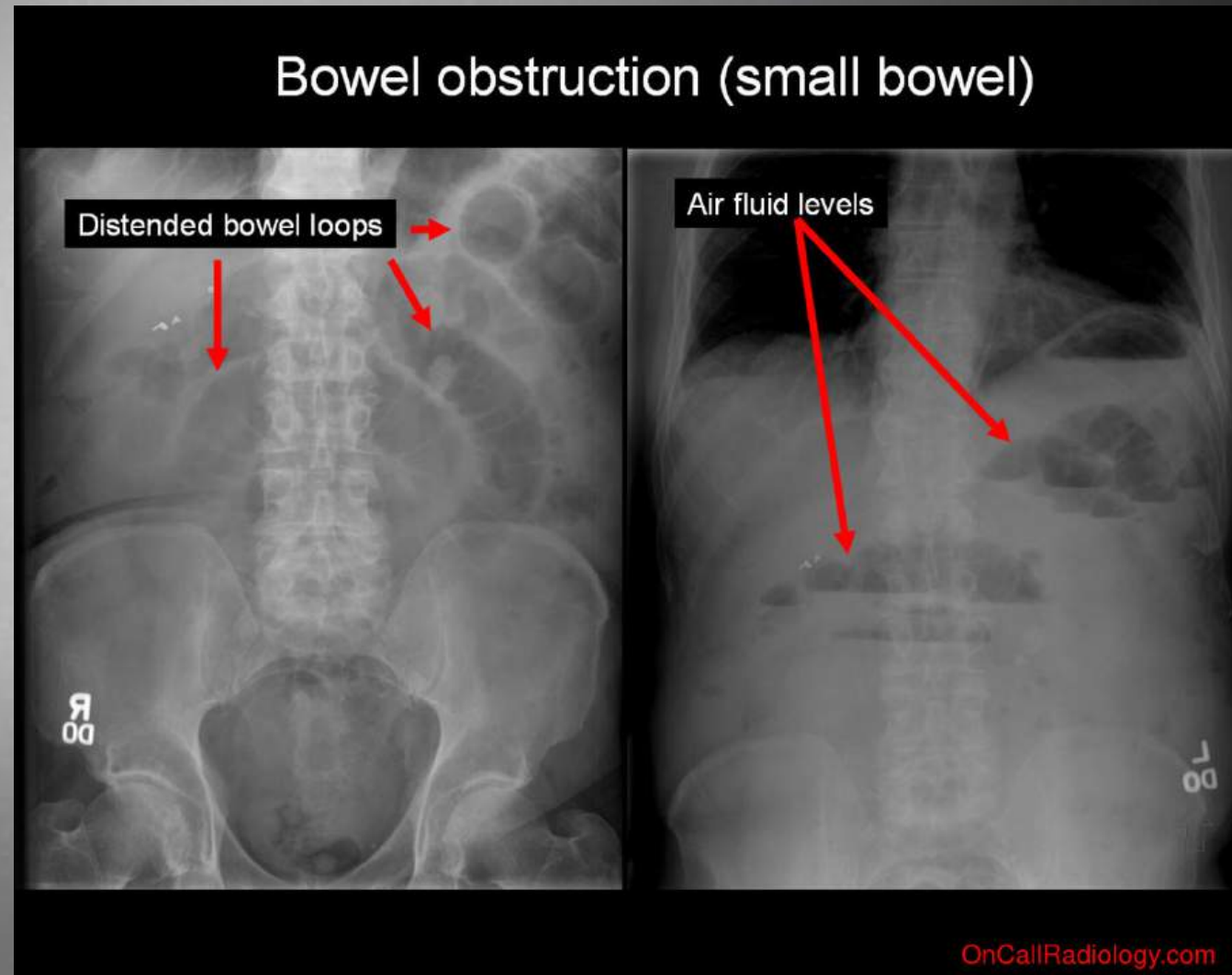
Smooth
appearance
of ileum

"Feathery-
appearance" of
jejunum

ما مَقْشُوفَهَا → adhesions
على CT بس
مَعْرِفْ صَ Hx اِنْه خَاصِل
عَلِيَّة صَ قَبْل

Small bowel obstruction

- Small bowel obstruction
- The upper limits of normal for the diameter of the small bowel lumen is **3 cm**. When the luminal diameter is larger than this, it is **DILATED**.
- The differential diagnosis for a dilated bowel lumen is **mechanical small bowel obstruction vs. adynamic ileus**.
- **Ninety percent (90%)** of SBO are caused by adhesions or hernias. Less common causes include volvulus, intussusception,



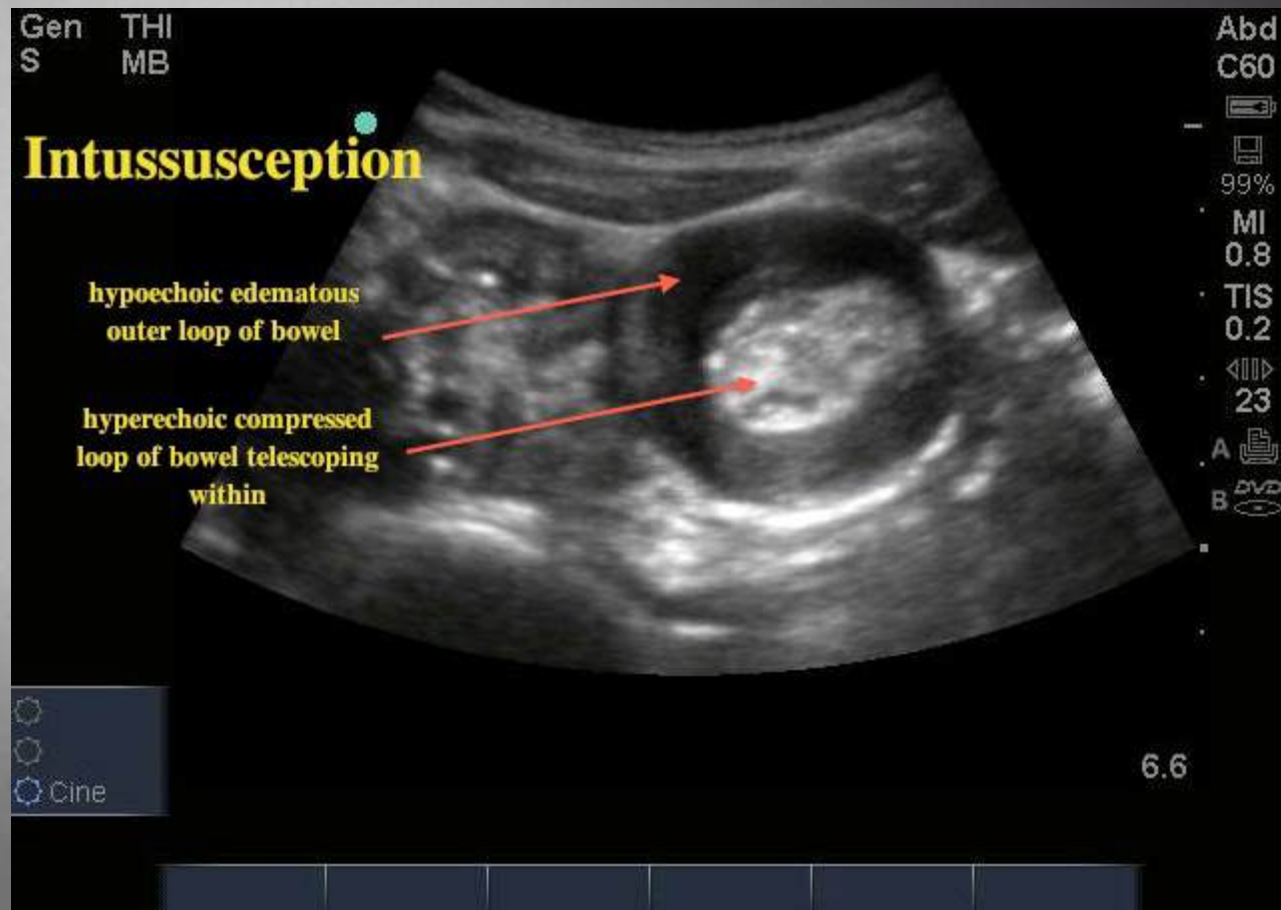


Pseudokidney sign → if I placed the probe → بطن شکم → بطن شکم
طویل → شبه کلیه

Intussusception

Target sign is seen on US. & CT

- Intussusception is the telescoping of bowel to form inner loop (intussusceptum) and outer loop (intussusciens). It is much more common in young children, usually idiopathic in nature. In adults, the lead point is often a mass.





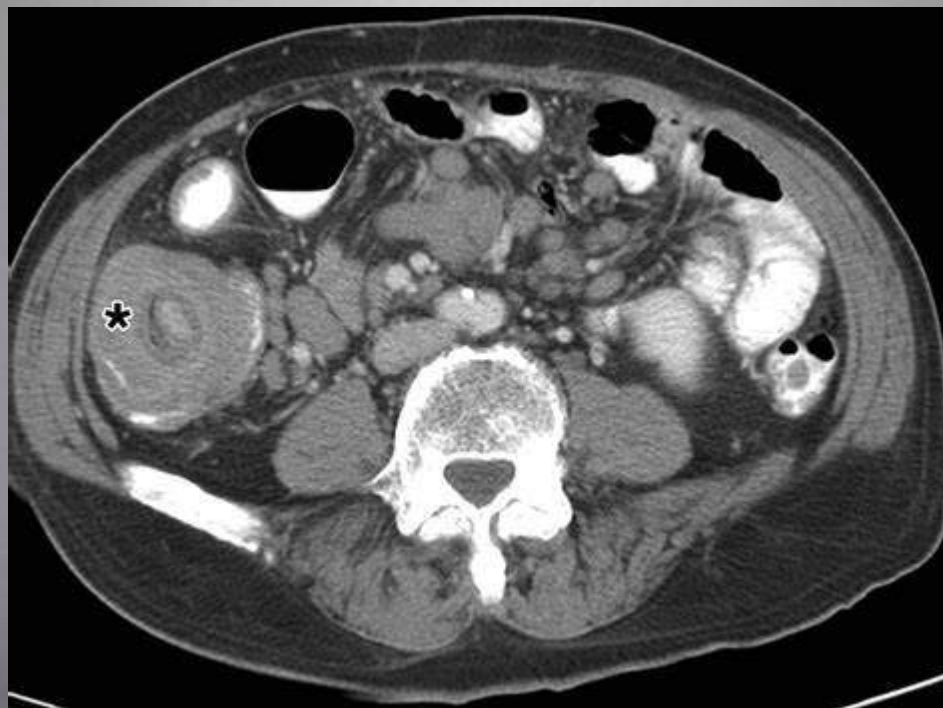
enema



CT

target Sign

Most common site?
ileo caecal valve/
ileo colic



Large bowel obstruction

complete
incomplete; there is air in the rectum

- Bowel obstruction may be complete or incomplete 6:
- complete or high grade obstruction means that no fluid or gas can proceed beyond the obstruction
- incomplete, low grade or partial obstruction means that fluid or gas are still able to proceed



Large Bowel

The large bowel is gas filled and distended down to the level of the distal descending colon-sigmoid.
Small bowel collapsed.

* بالافتحان لو سفت
Findings ما اليا دخل ركن على Ema و هنتها

Large vs small bowel obstruction

Plain Films: Abdominal X-Ray (AXR)

Findings: Small (SBO) vs. Large Bowel Obstructions (LBO)

- Look at caliber, lines, and location to differentiate SBO vs LBO
- Air fluid levels on upright x ray are neither specific nor sensitive and cannot help distinguish ileus, enteritis, or partial from complete SBO



Small Bowel Obstruction

SMALL	LARGE
3cm max diameter	6cm max diameter
Lines all the way across the bowel (Plicae Circulares)	Lines not fully across (Haustra)
Central	Peripheral

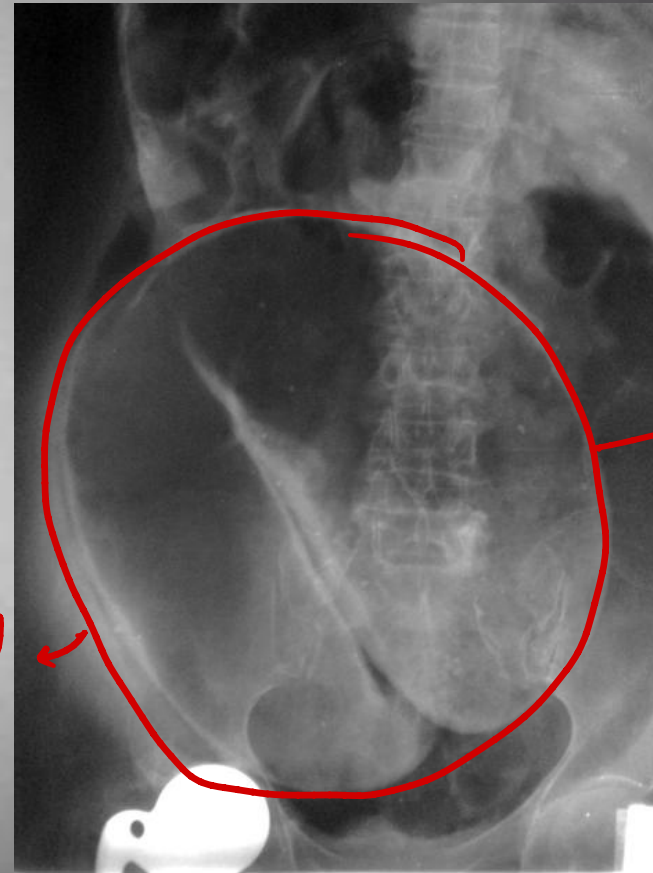


Large Bowel Obstruction

Volvulus

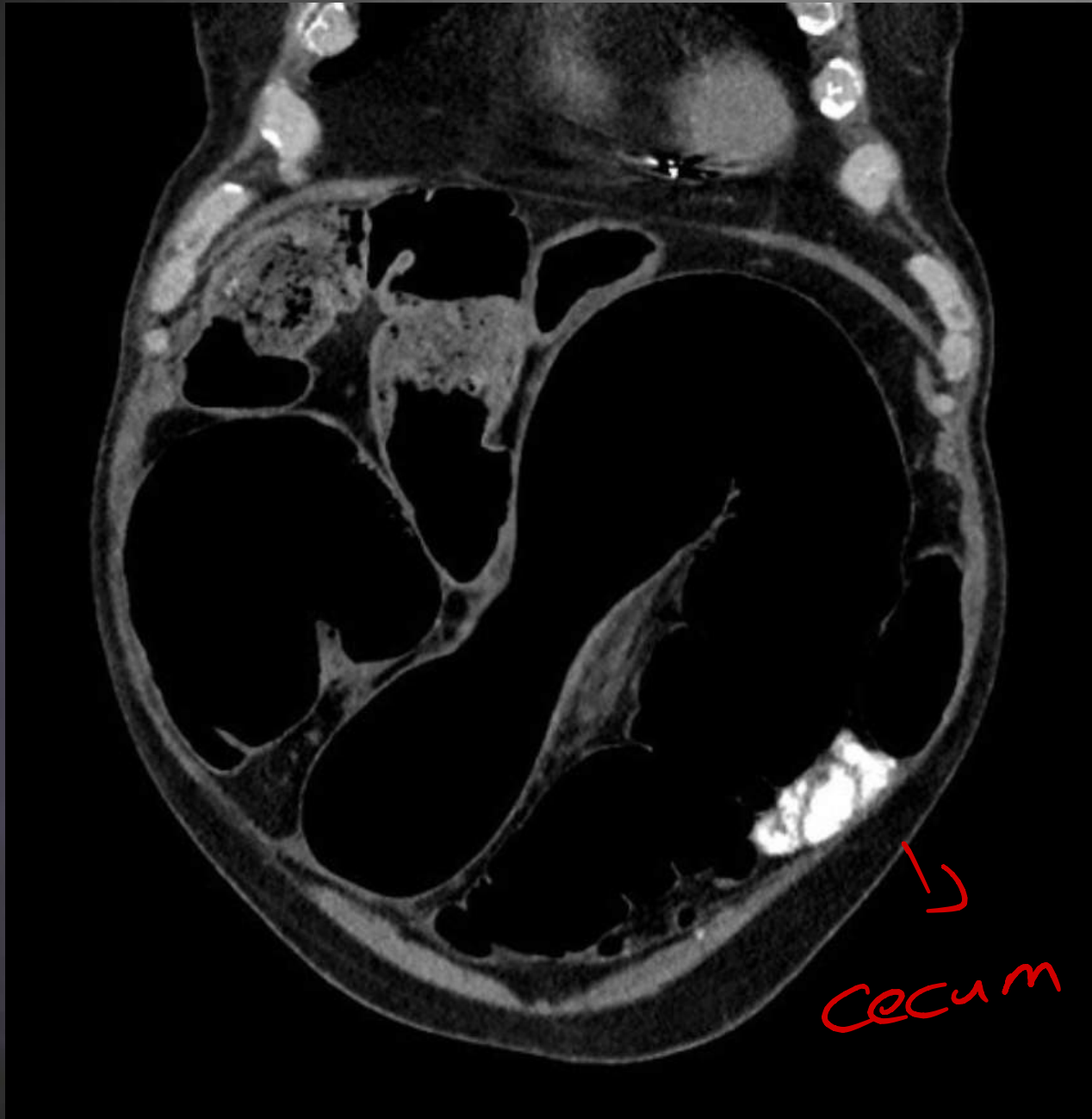
- **Sigmoid volvulus** is a cause of large bowel obstruction and occurs when the sigmoid colon twists on its mesentery, the sigmoid mesocolon.
- Abdominal radiographs will show a large, dilated loop of the colon, often with a few gas-fluid levels. Specific signs include:
- coffee bean sign 5

Sigmoid



Coffee
Bean Sign

Markedly dilated loop of colon with a coffee-bean shape. Its apex points toward the right upper quadrant.



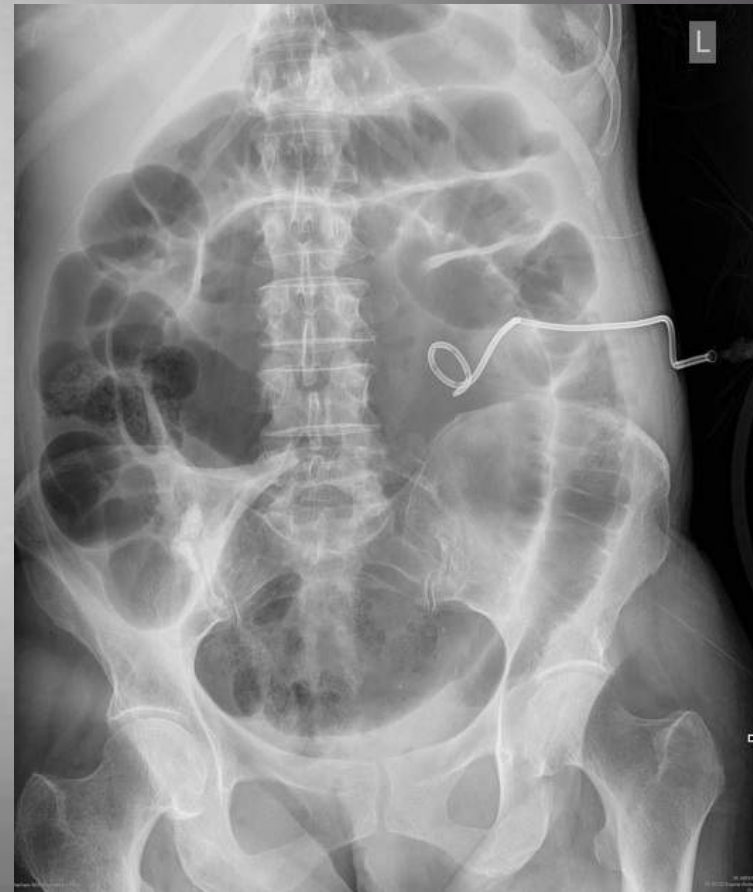
- Volvulus of the distal sigmoid colon, best appreciated on the coronal images.

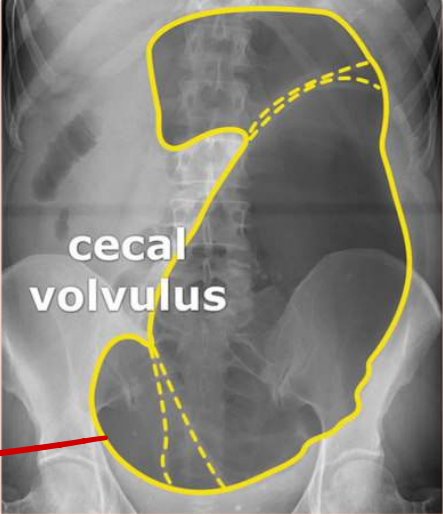
Cecal volvulus

- **Cecal volvulus** describes torsion of the cecum around its mesentery which often results in obstruction.

If unrecognized, it can result in bowel perforation and fecal peritonitis.

إذا ما
تَشَخَّصُو
1+2



Abdominal X-Ray Appearance		
Site	RLQ ↗ LUQ	LLQ ↗ ↖ RUQ
Haustra	+	-
Coffee-Bean sign	±	+++
Obstruction	± SBO	± Colonic obstruction
Air-Fluid levels	1 (if seen)	Few (if seen) منشوف فيه اكثر

Pneumoperitoneum

احسن صورة الاله
Chest X ray + erect ←

Pneumoperitoneum

(Air in the Peritoneal Cavity)

Causes of a Perforation

- Gastric or duodenal ulcer
- Bowel dilation (SBO, LBO, ileus)
- Bowel ischemia
- Perforated diverticulitis, appendicitis
- Trauma
- Iatrogenic (injury during surgery, endoscopy, colonoscopy)

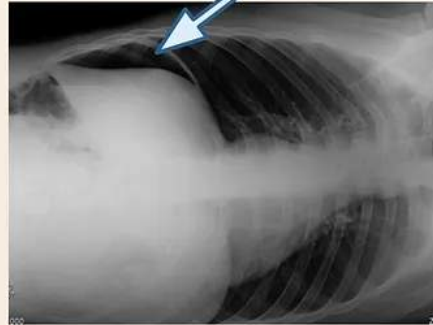
What to Look for on Imaging to Diagnose

- Air outside the lumen of the GI tract (air is black on Xray & CT)
- Air will be in **anti-dependent** (anterior when the patient is lying flat, superior when upright, i.e. under the diaphragms)

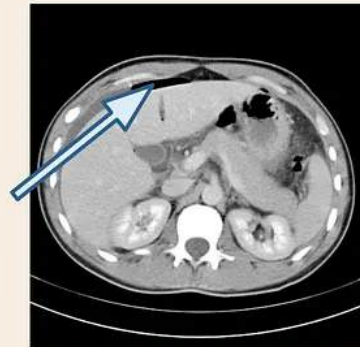
X-ray Findings



air under
diaphragm
sign



CT Scan Findings



Images from Radipedia.

signs

- Rigler sign

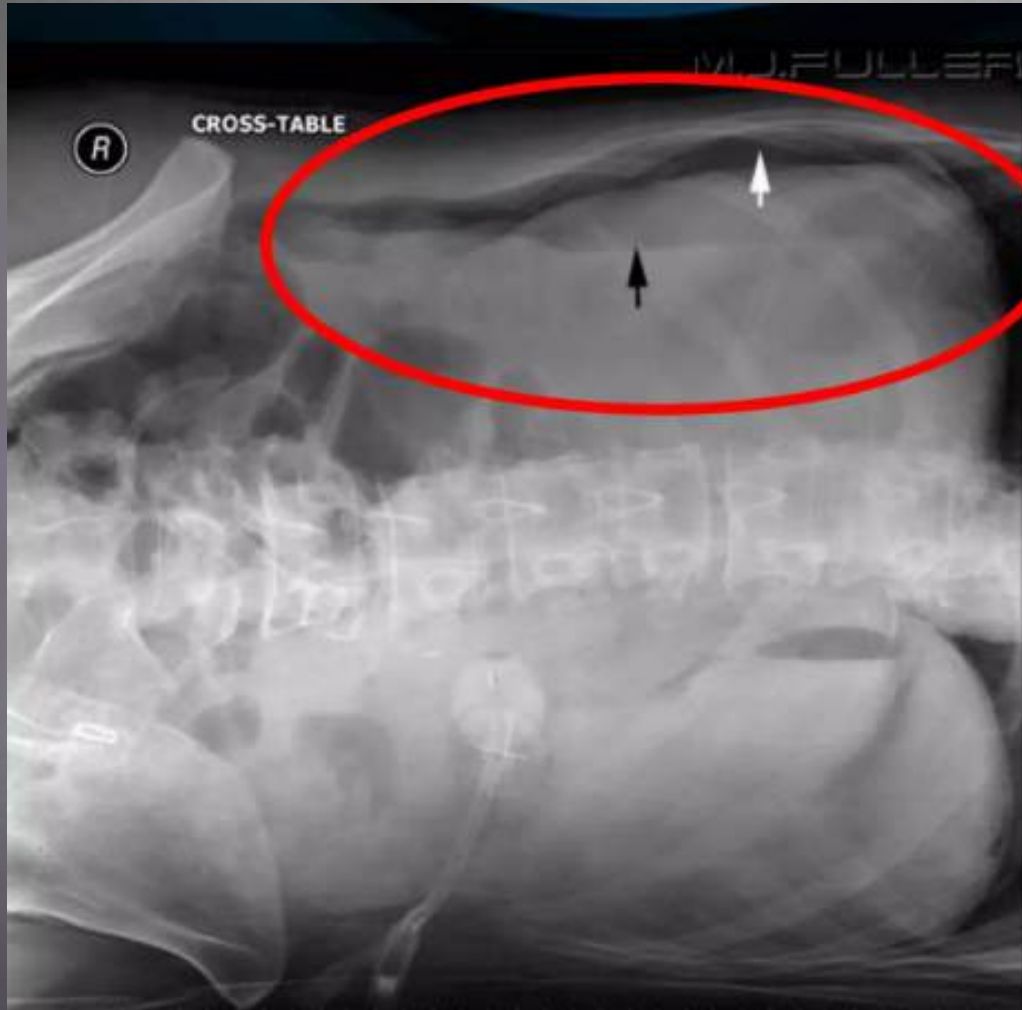
gas جوا Bowel و gas برا
لفظطو على wall فبفس كثر
واضح و جسن



- Supine
- Bowel wall **outlined by intraluminal & extraluminal air** (extraluminal = free peritoneal gas)
- **Both sides** of bowel wall can be seen (red arrows)

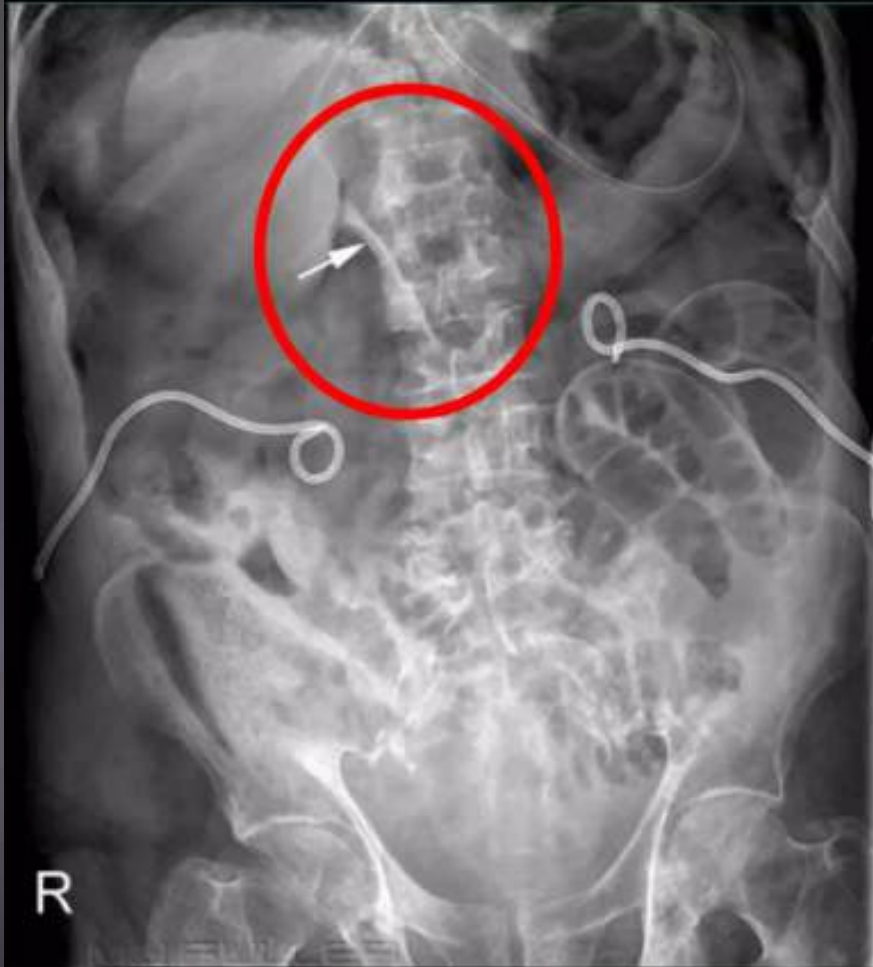


Decubitus abdomen sign



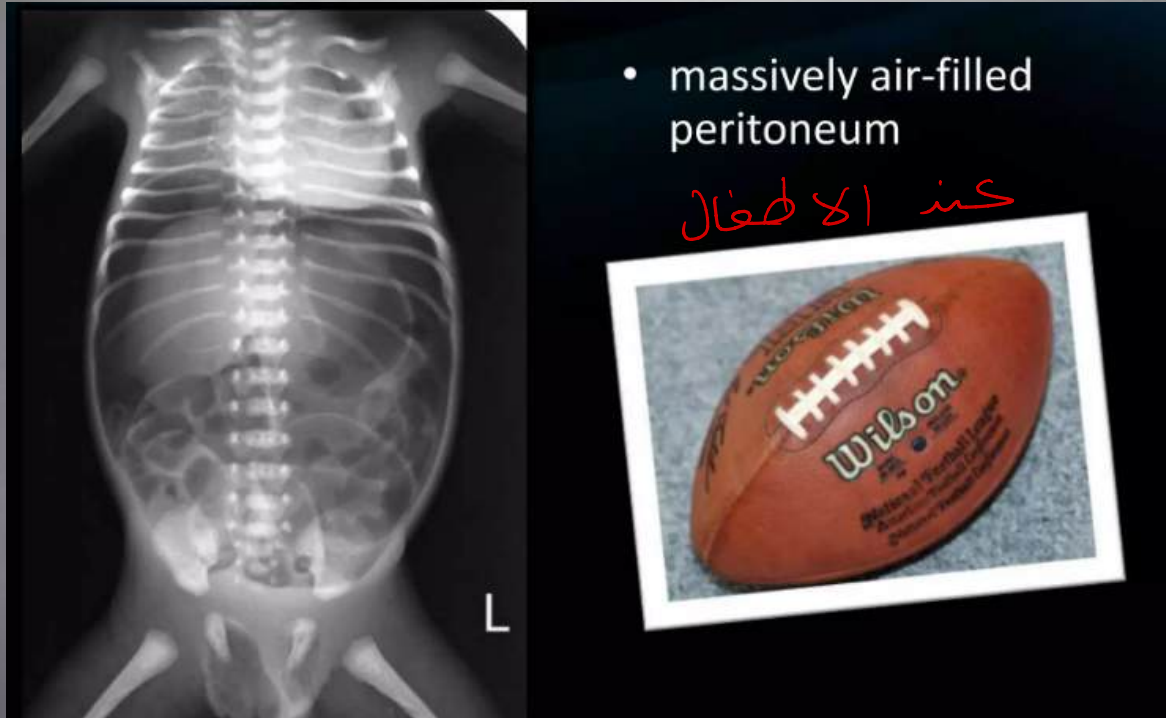
- Left lateral decubitus
- Air-fluid level
- **White arrow** = *free air* between the abdominal wall and the liver
- **Black arrow** = *free fluid* in the peritoneum

Falciform ligament sign



- Supine
- Falciform ligament
 - connects the anterior abdominal wall to the liver
 - extends inferiorly beyond the liver → becomes round ligament
 - becomes **outlined with air** in a patient with free abdominal gas

Football sign



Continuous diaphragm sign



- massive pneumoperitoneum → sufficient air beneath the diaphragm
- left & right hemidiaphragms contrasted by the free gas appear as a **continuous structure**

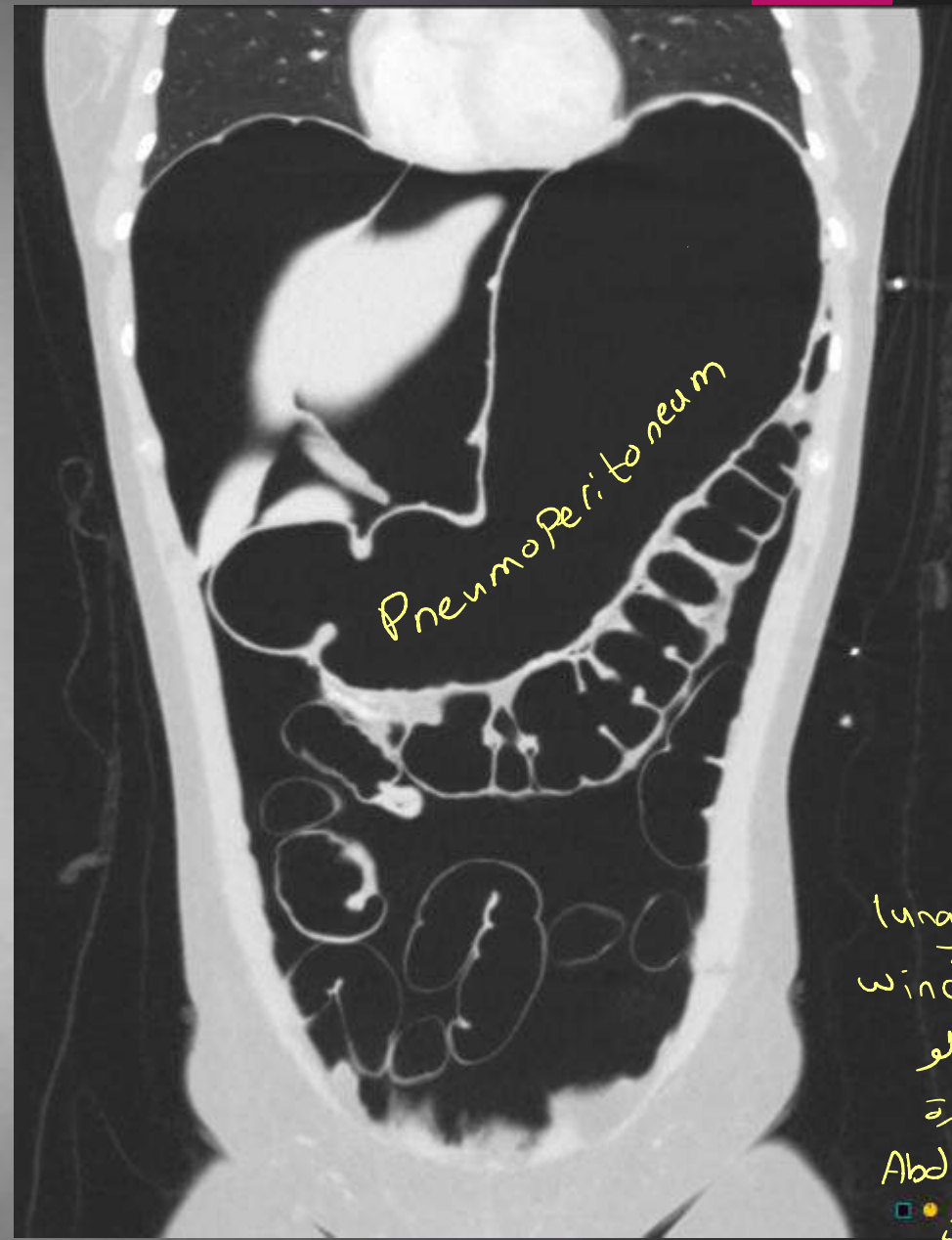
ستو باين لفرق
عن diaphragmic
spaces
يعني ؟
falciform
ligament

CT w contrast
Portovenous phase

air

liver ضاوي

Pneumoperitoneum



lung
window
حنو
الصورة
Abdomen
عنان
نشوف air

