

جَائِزَةُ الْحُسَيْنِ
بْنِ عَبْدِ اللَّهِ الثَّانِي
لِلْعَمَلِ التَّطَوُّعِيِّ

AL HUSSEIN BIN ABDULLAH II
AWARD FOR VOLUNTARY WORK



النادي الطبي
Medical Club



Radiology

Subject: GASTROINTESTINAL SYSTEM

Group no: D11

Done by: Hala Yaseen



هَذَا خُلِقَ اللَّهُ فَأَرْوَنِي مَاذَا خُلِقَ الذِّينَ مِنْ دُونِهِ بَلِ الظَّالِمُونَ فِي ضَلَالٍ مُبِينٍ

GASTROINTESTINAL SYSTEM

Dr. SHATHA TARAWNEH
MD, JBR

IMAGING MODALITIES

*GI

- Plain X-rays (Supine, erect, lateral decubitus) / emergencies
- Barium Studies (Swallow, Meal, Follow-through, Enema)
- Ultrasound → in most places, fast scan in ER
- CT of the abdomen
- MRI of the abdomen Cost + دود طویل, not first line of G-I-T / MRCP → in emergencies
- ERCP, Cholangiography
- Angiography → to ischemia
- Nuclear Medicine

←
Contrast
powder + water
= solution
بنفسي الكيوس يمشيه
و بنفسي الشا الحبوب
video imaging

X ray → fast
دائمه موجود بعلمعات
↓ Cost
بقدر اسهولت
↓ radiation

ABDOMINAL PLAIN FILM

X ray

- Convenient and useful initial investigation .
 - What to look for ??
- 1- Gas pattern normal air , intraluminal
 - 2- Extra luminal air
 - 3- Signs of intestinal obstruction 3, 6, 9
 - 4- Radio-opaque stones or calcification → renal , GB
 - 5- Skeletal abnormalities

May show:

- ✓ Liver shadow
- ✓ Hepatic flexure of the colon
- ✓ Part of the ascending colon
- ✓ Right kidney (sometimes visible)
- ✓ Gallstones (rare – only if radio-opaque)
- ✚ Gas here is usually colonic gas.

May show:

- ✓ Stomach gas bubble (key landmark)
- ✓ Splenic shadow
- ✓ Splenic flexure of the colon
 - Part of the transverse colon
- ✓ Left kidney (sometimes)
- ✚ Air–fluid level here usually represents the stomach.

✓ Cecum

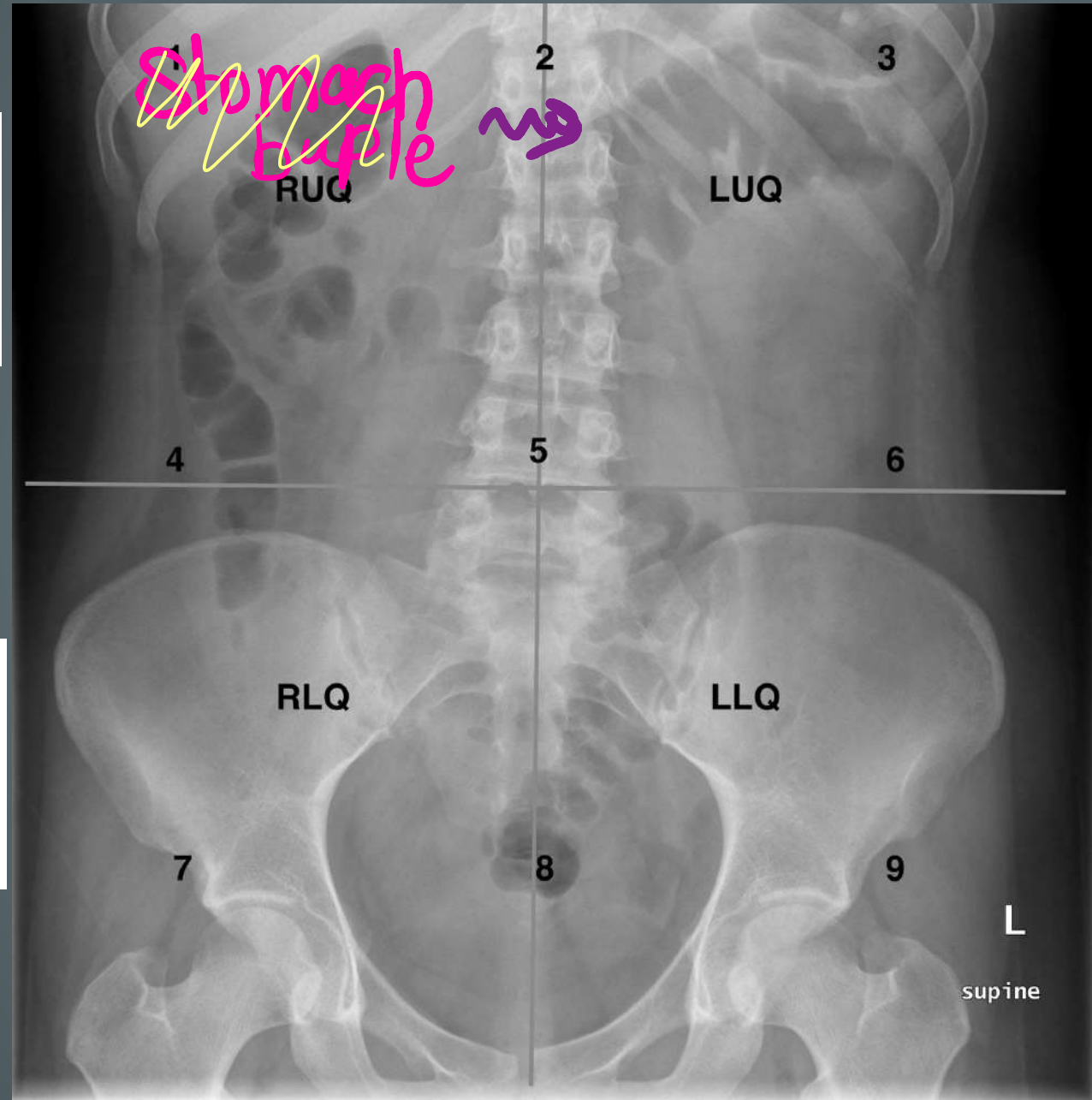
- Terminal ileum
- Part of the ascending colon
- Appendicolith (occasionally)
- Psoas muscle margin

✚ Marked cecal dilatation → think large bowel obstruction.

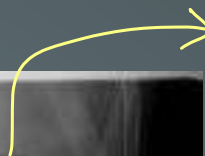
✓ Descending colon

- ✓ Sigmoid colon (very important)
 - Colonic gas
 - Fecal loading (common)

✚ Most common site for constipation.



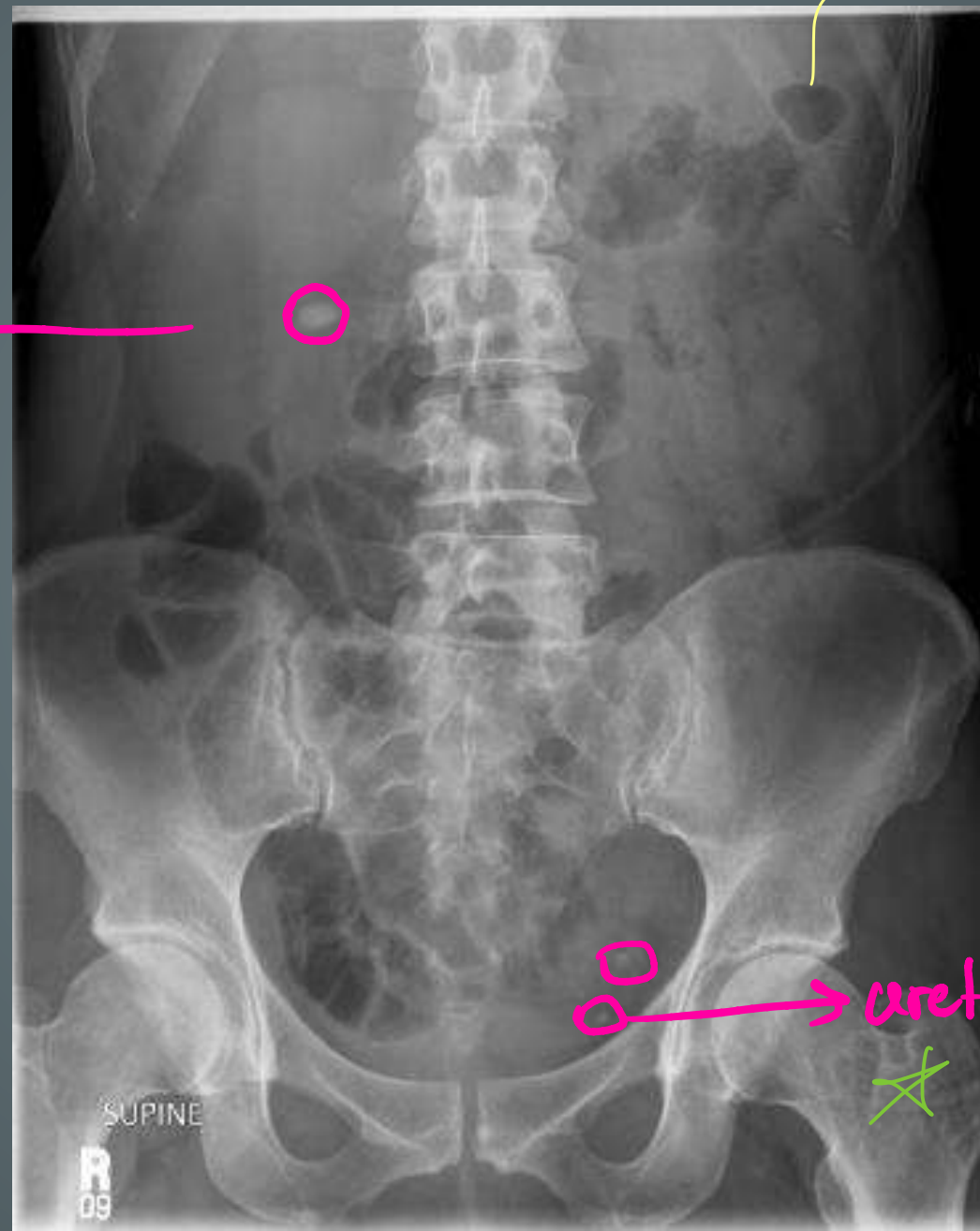
Kidney shadow



Stomach bubble



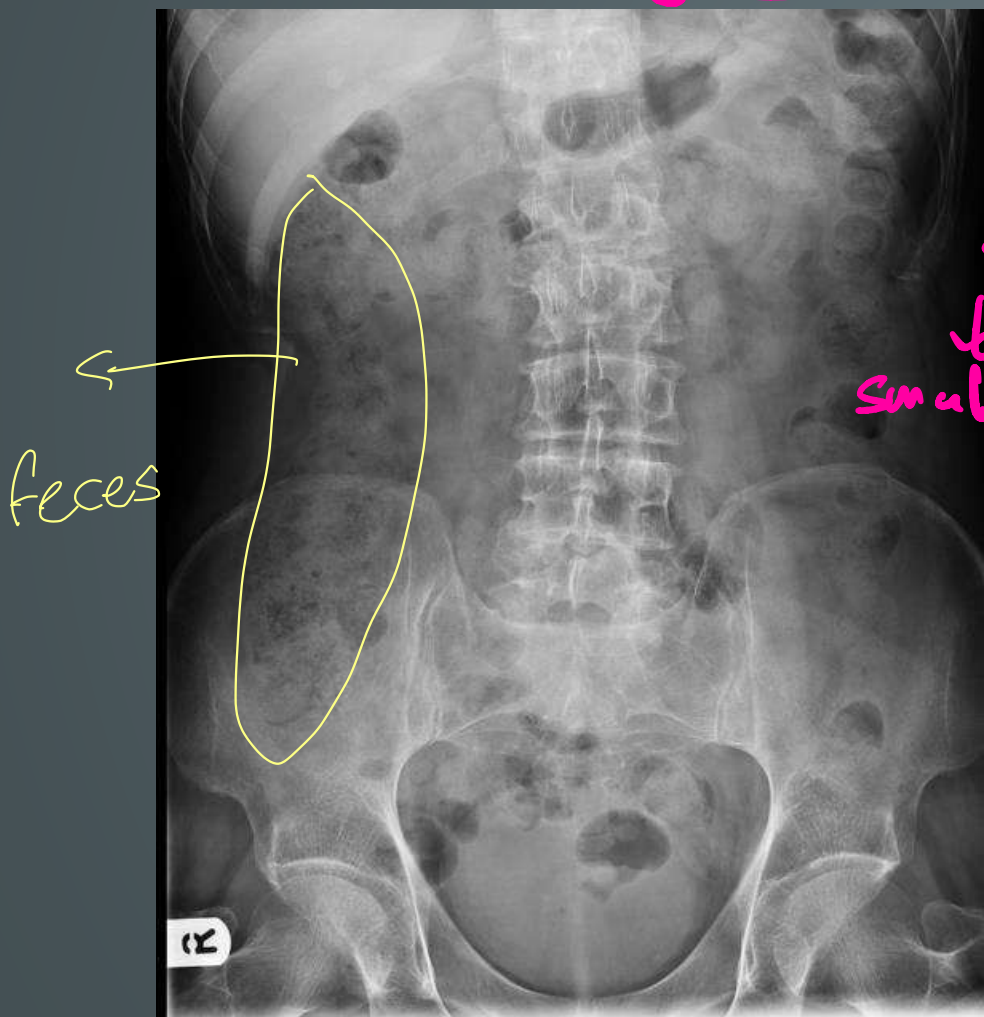
ureter stone



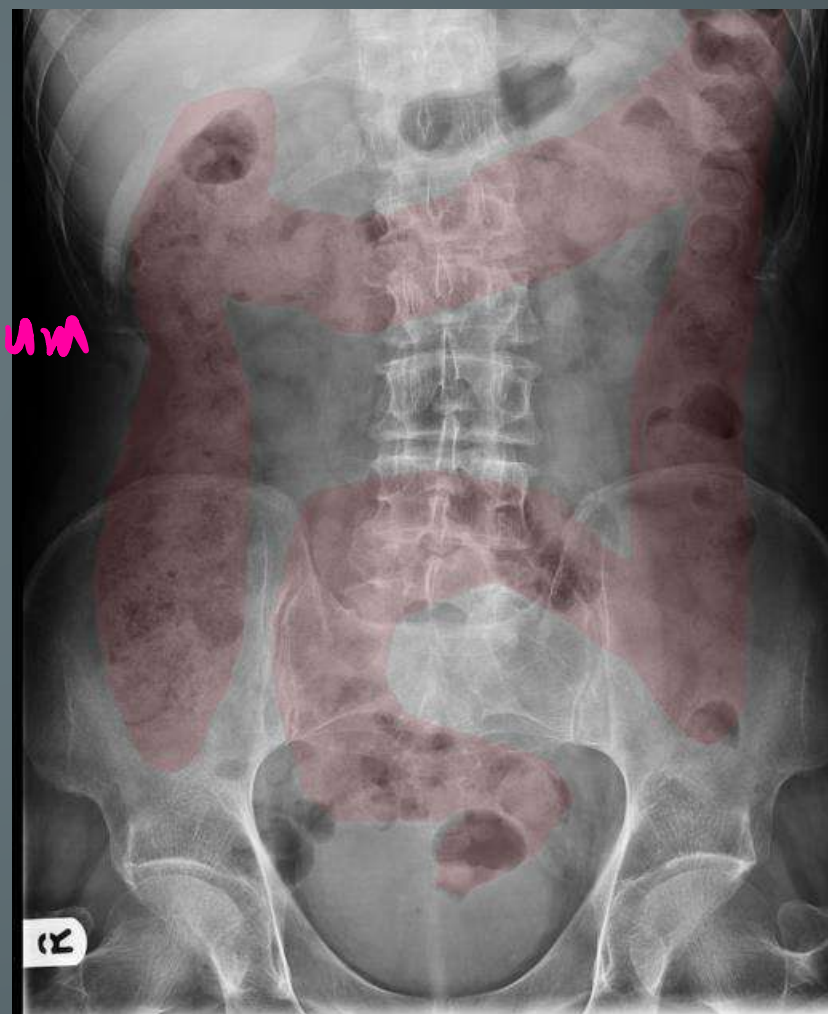
Small ← ضئلا كالم
Large → ضئلا كالم
كالم

GAS SHADOWS

normal



3, 6, 9
↓ ↓ ↓
Small large Secum



→ Air
within the
bowel

Recognizing small and large bowels

Large bowel

- .Peripherally located.
- .Haustral markings do not extend across the wall.
- . Spaced widely apart than valvulae conniventes

خارجي
مشتا
حامل

Small bowel

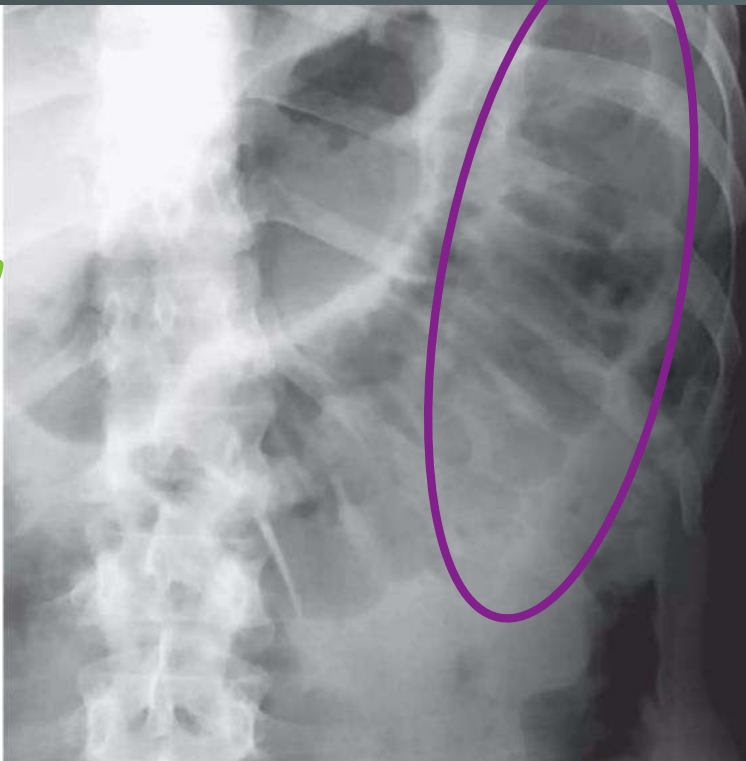
- .Centrally located
- .Valvular marking extends across the lumen
- . Spaced much closer

خارجي
حامل

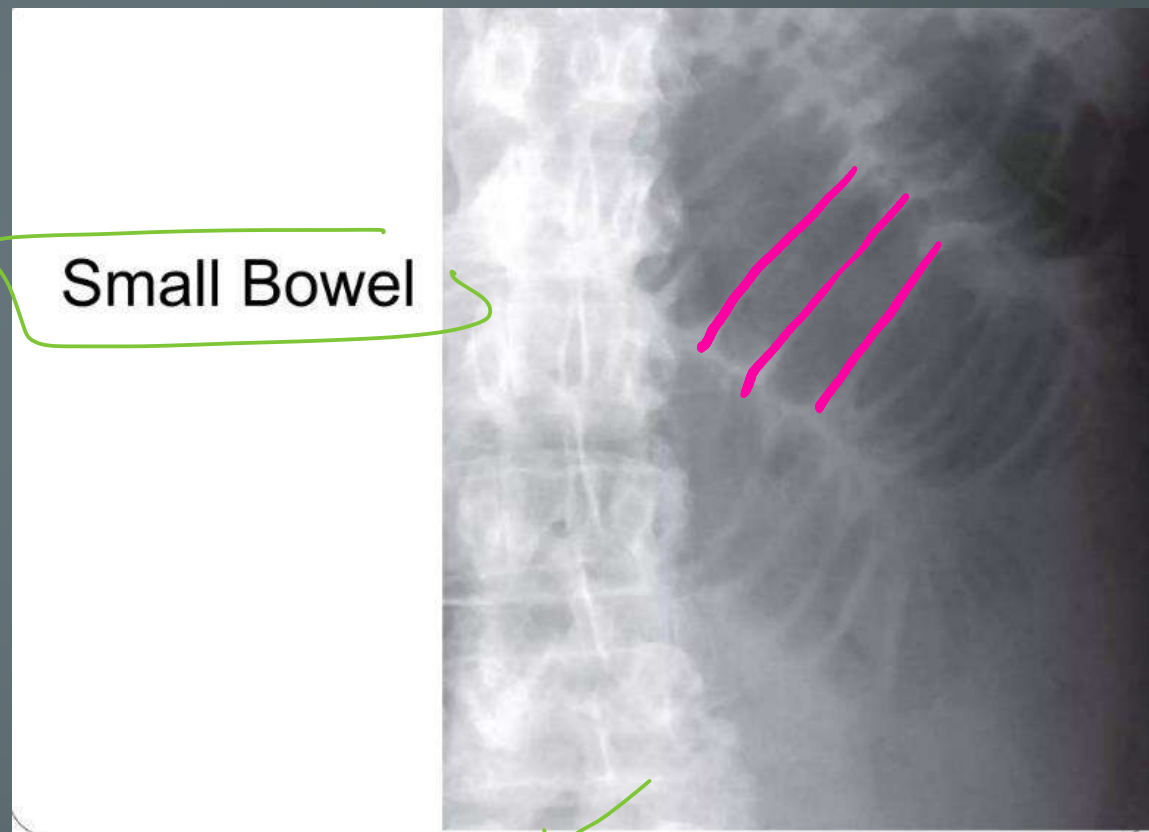
A rough rule of 3-6-9 is followed to determine the diameter of small and large bowel. *in cm*

Large Bowel

منتهيلين
عملات
فوق
بعضها



Small Bowel



ABNORMAL GAS PATTERNS

Causes of Extra-luminal gas:

- ★ • Post Abdominal Surgery/ERCP ✓ most common
- ★ • Perforation of viscus (eg. bowel, stomach) ✓
- ★ • Gallstone ileus ✓
- ★ • Cholangitis (infection with gas forming organisms) ✓
- ★ • Abscess ✓

Free ?
Free

bowel
مولى

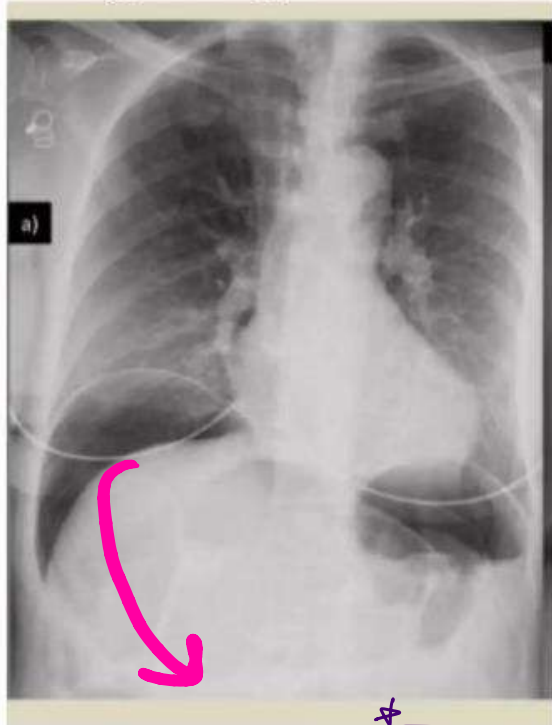
Chest Not Abd Pneumoperitoneum

بخطبه يوم السبت ١٥، ٢٠ دقيقة

An erect CXR (not AXR) is the best projection to diagnose a pneumoperitoneum (gas in the peritoneal cavity).

* lat. decubitus → if pt. can't stand.

Recognizing abnormal Air



Pneumoperitoneum (crescent sign)

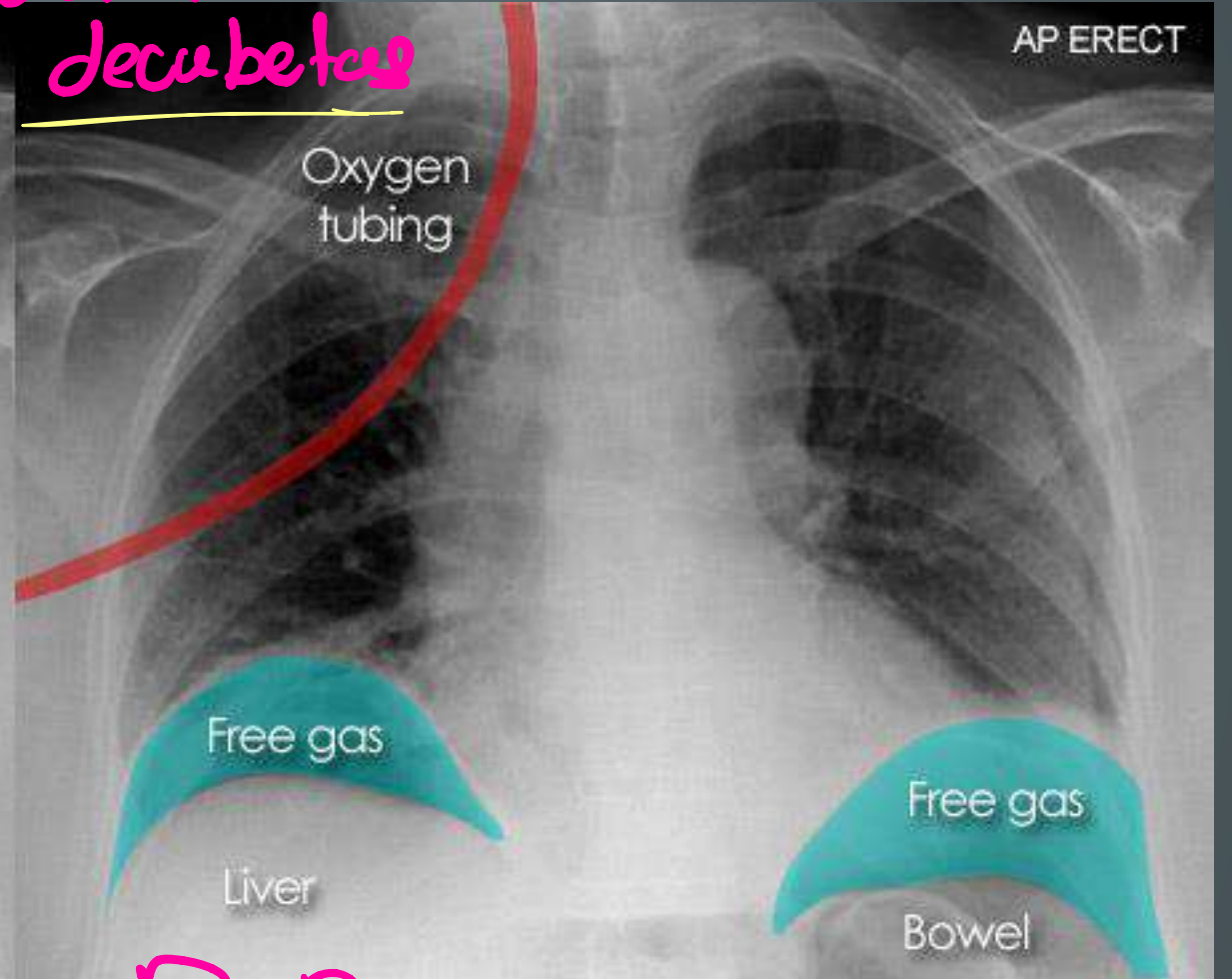
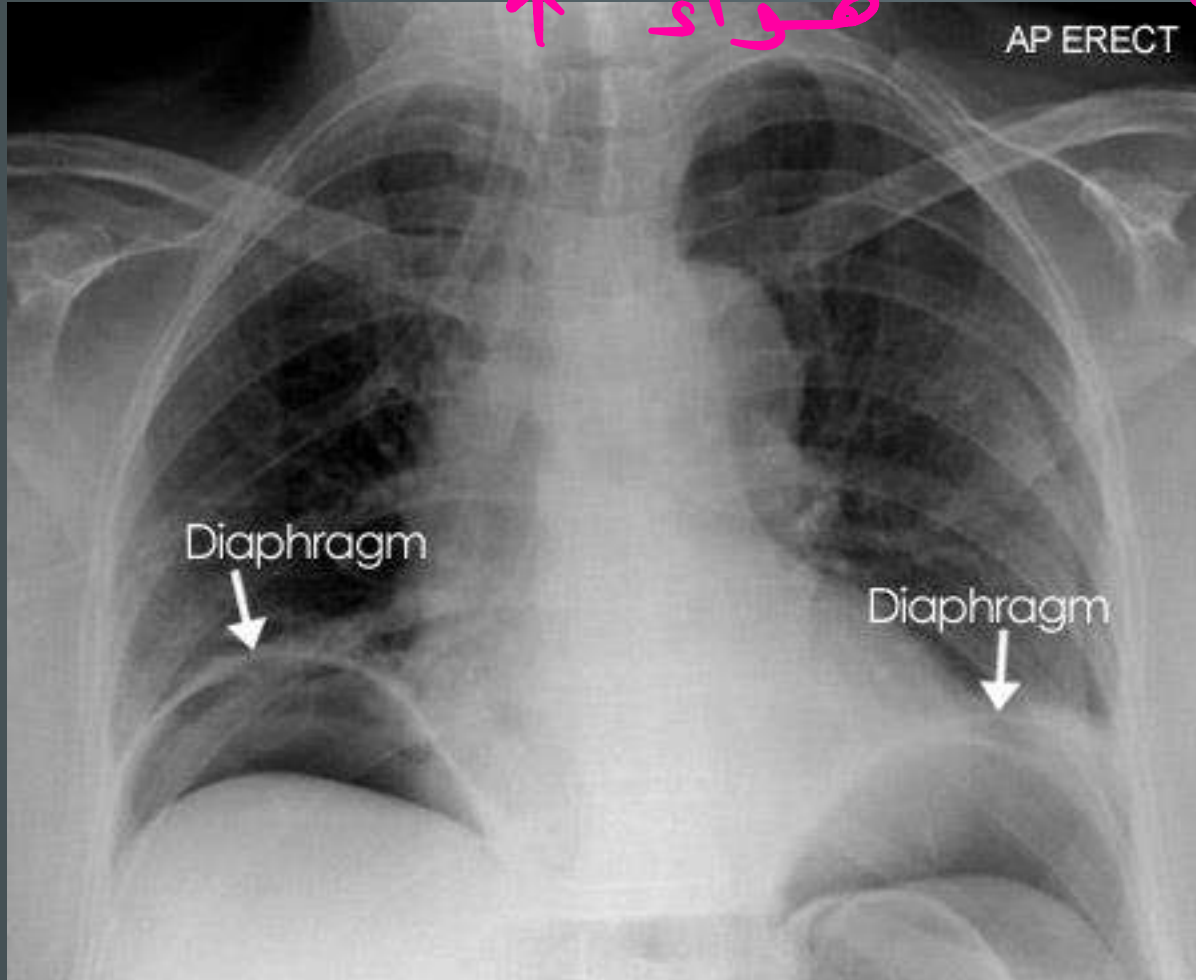
منزوحنا ما اشته فاه بغيره



* Falciform ligament sign

- pt. Comes with severe acute Abd. Pain. *

پنلٹ مریضنا علی جنب ہے
← AP ERECT
↑ صواب
← AP ERECT
↑ صواب



P-P →

Xray ULTRASOUND (waves

- ✓ High-frequency sound waves to characterize tissue.
- ✓ Available readily.
- ✓ Flexible
- ✓ Convenient and less cost.

* Tumor
* Fast

No Rad
least

* curved probe
low frequency
deep penetration

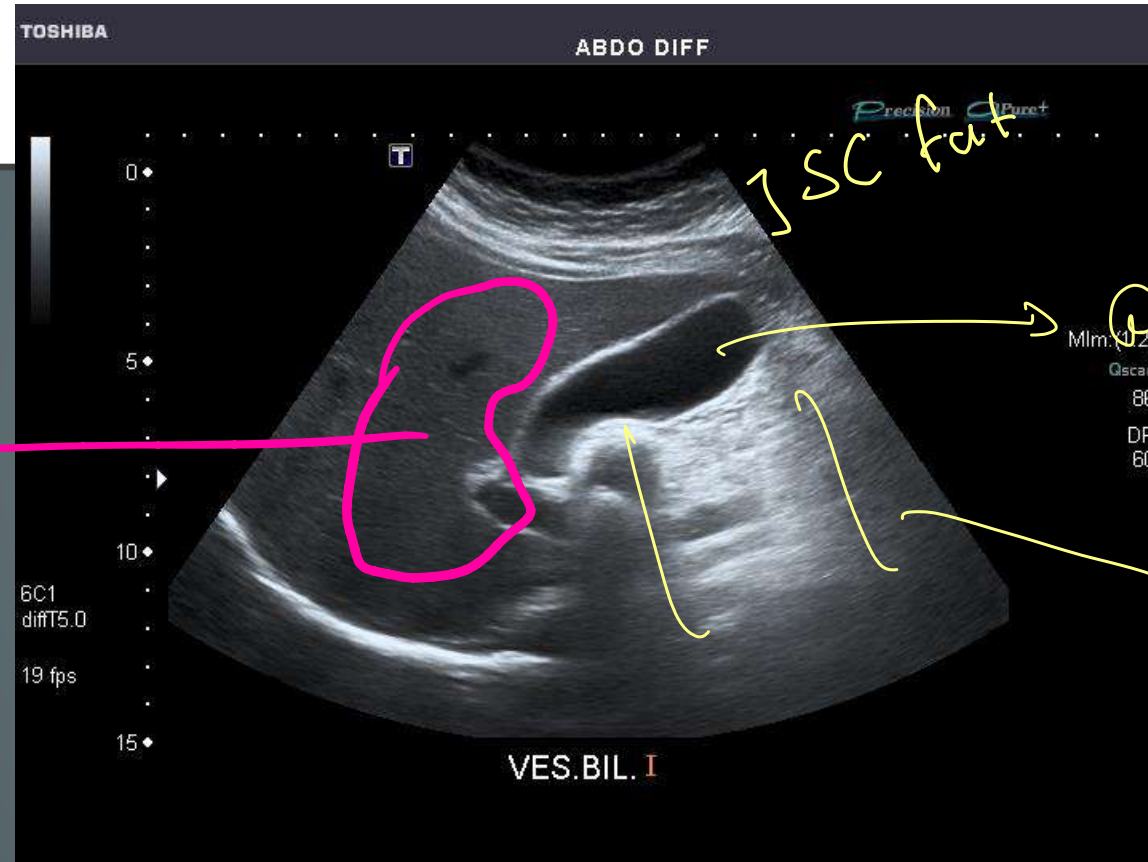
* linear →
superficial
structures, masses
* curved →
deep, low
more used

جنگل
و بزرگ
(دیتا است)

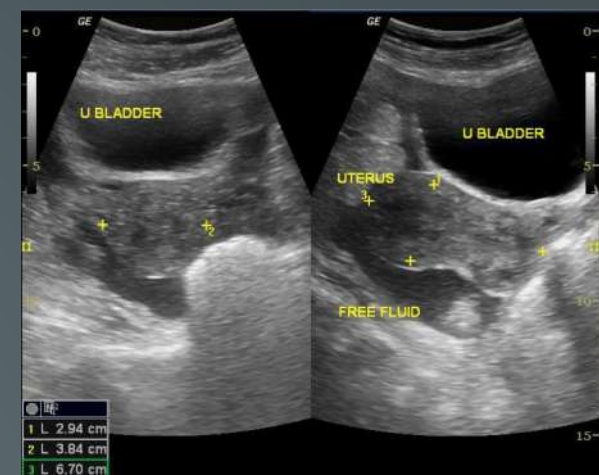
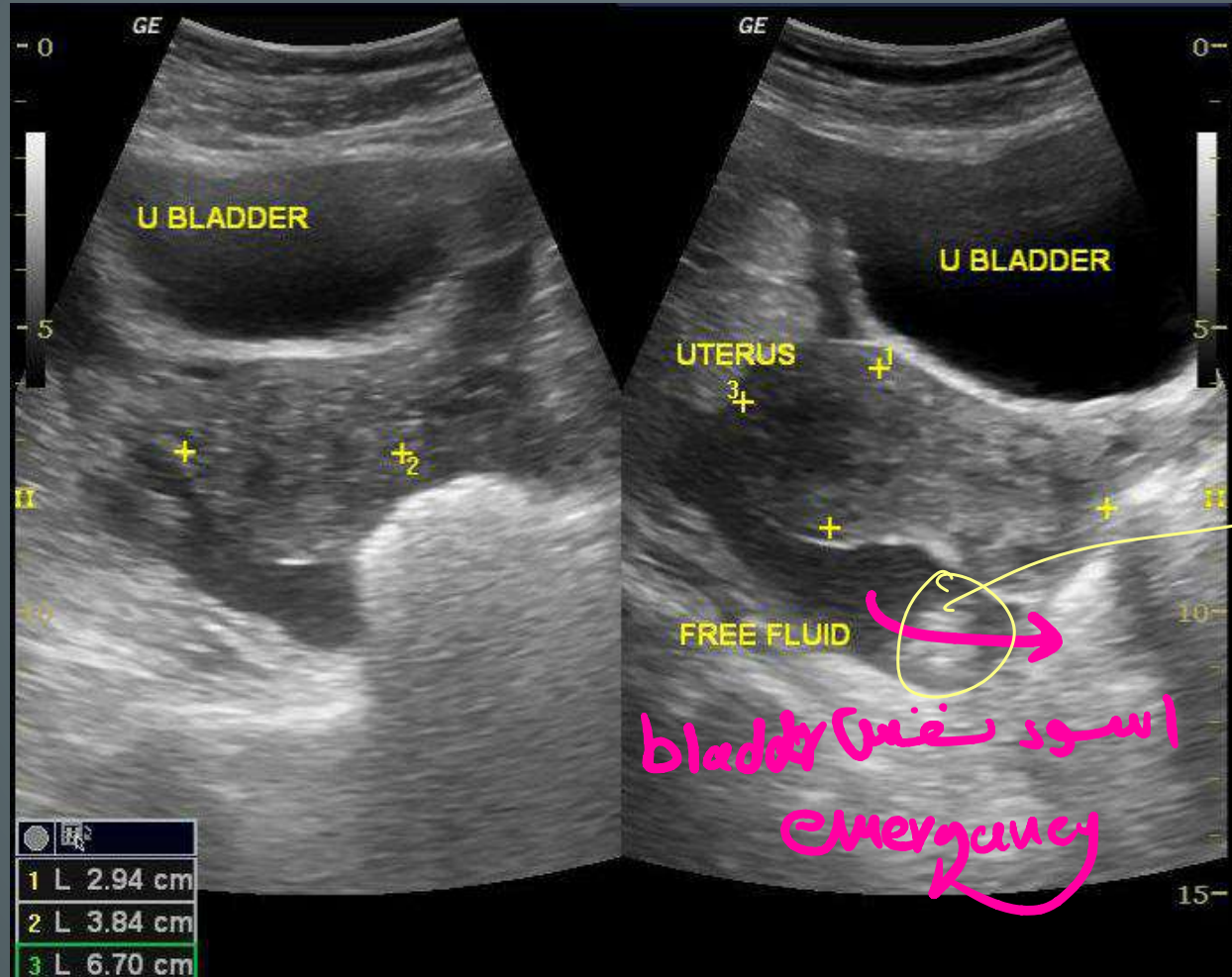
Normal

Smooth
~~Smooth~~
Liver

copy



Trauma →
Fast US
focused



خواب
Clot
از trauma

• می بیند خون
اکم انه fluid
موت و بیزه بار CT.

BARIUM STUDIES

- Diagnostic tests used to assess GI system using X-ray imaging in the setting of administration of contrast agents .
- Contrast agents commonly used: *to GEJ*
- Barium sulfate *CI in post-surgery, perforation, obstruction, safe in chest*

مع بقدر استخدمه
- **Gastrografin (water-soluble)**

بدل اربarium بس فعلاً بنستخدم
- **Non-ionic contrast**

Gastrografin (water-soluble) : WHENEVER BARIUM IS CONTRAINDICATED.

- Non-ionic contrast : is used in barium swallow studies in infants.

→ only cause aspiration pneumonia

Barium meal to stomach

Follow through → until ileocecal valve

Why Gastrografin?

- Water-soluble
- Safe if it leaks into the peritoneal cavity
- Rapidly absorbed

Upper GI Series

Barium Swallow

→ to esophagus

Barium Meal

→ Stomach and duodenum

Barium Follow-through

→ Small bowel

Small bowel enteroclysis

Small bowel enteroclysis is a fluoroscopic contrast study of the small intestine in which contrast material is introduced directly into the duodenum or jejunum via a nasoenteric tube.

Lower GI series

Barium enema

rectally

* Barium safety

→ in chest is safe

→ in Peritoneum may
cause chemical peritonitis

* if pt. has obstruction, Suspected
perforation in the bowel, post surgery
or infant → we give them non-ionic contrast.

BARIUM SWALLOW

Non
ionic

← امفال

بالبيات

مخاضه
Contrast

- Examination of the pharynx, esophagus and proximal stomach (reflux).
- Barium sulfate - single/double contrast
- Non-ionic (infants)

Single

double → قبلها } meal
بشبه خوار *

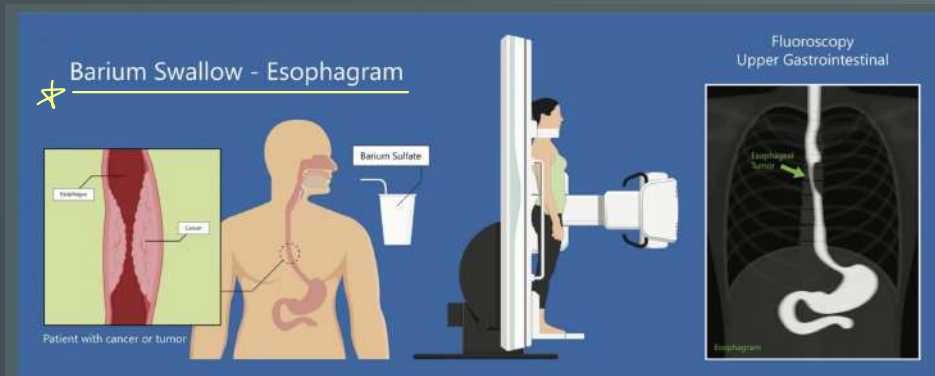
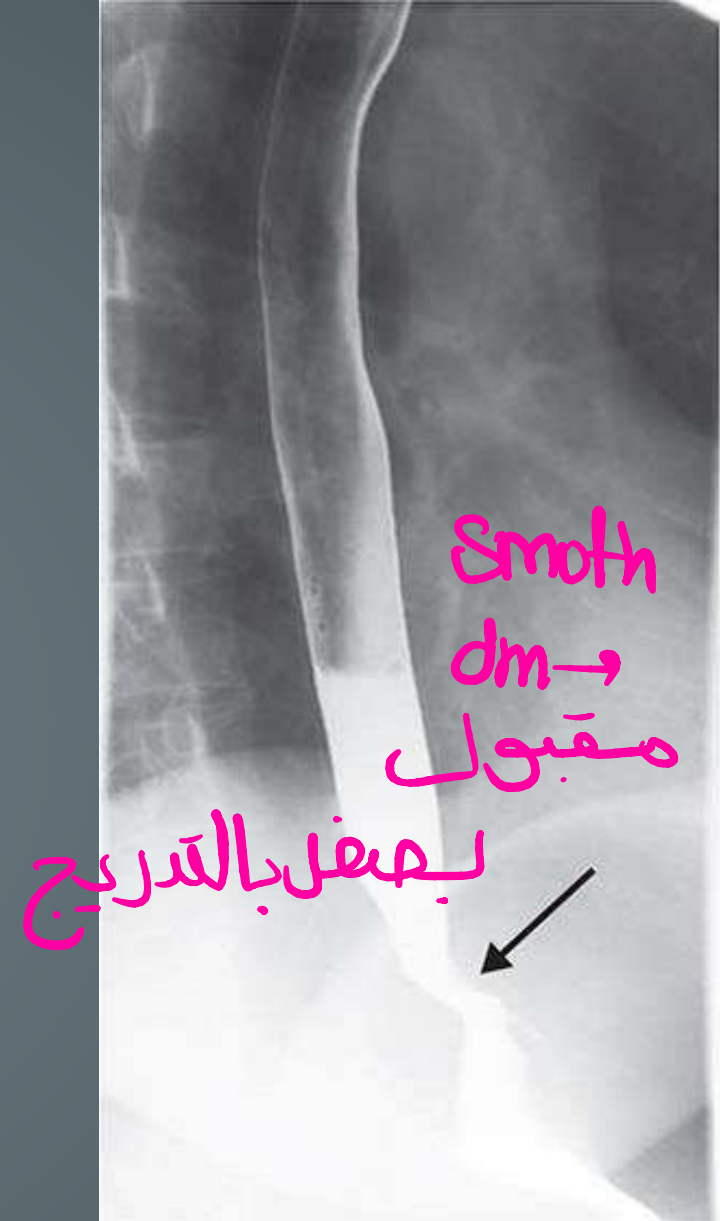
Indications

- ✓ Dysphagia (tumor, webs, diverticulae, strictures)
- ✓ r/o hiatal hernia
- ✓ GERD
- ✓ Inability to pass endoscope
- ✓ Persistent vomiting
- ✓ r/o fistula

وعوب مشرب
مورفيدو

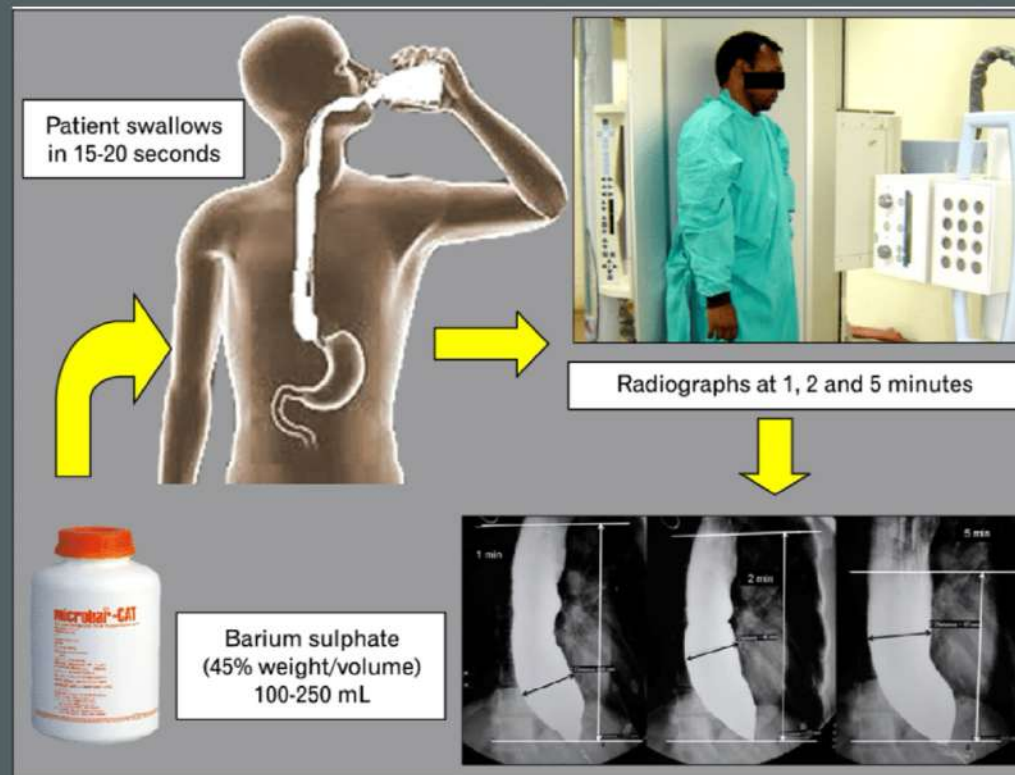
NORMAL SWALLOW

- Smooth outline
- No focal dilation or stenosis
- No Outpouchings
- No filling defects (causes ??)
- Smooth tapering
- Gastroesophageal junction ✓
- No Reflux ✓
- No Leak ✓

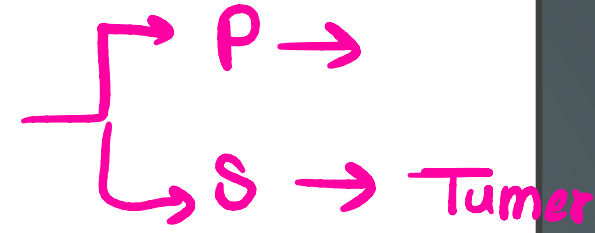


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Introduction to Diagnostic Radiology:
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PATHOLOGIES TO LOOK FOR IN BARIUM SWALLOW



ACHALASIA



Barium Swallow

a failure of organized esophageal peristalsis that causes impaired relaxation of the lower esophageal sphincter, resulting in food stasis and often marked dilatation of the esophagus.

•Dreaded Complications: →

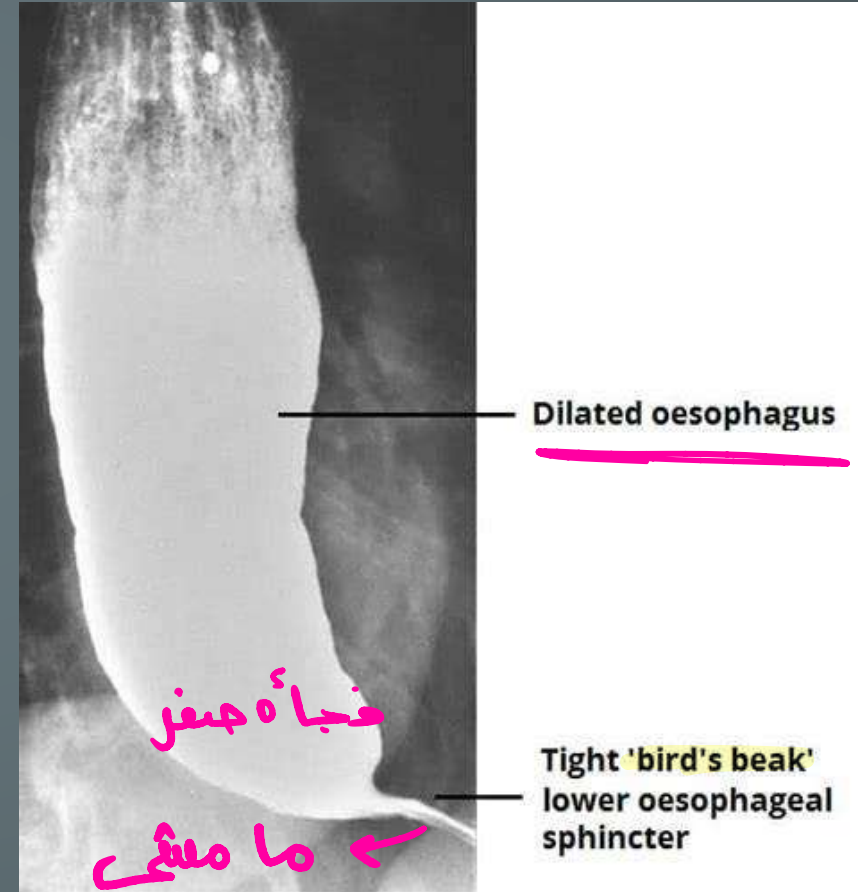
•esophageal carcinoma ✱

- thought to occur because of chronic irritation of the mucosa by stasis of food and secretions

•aspiration pneumonia:

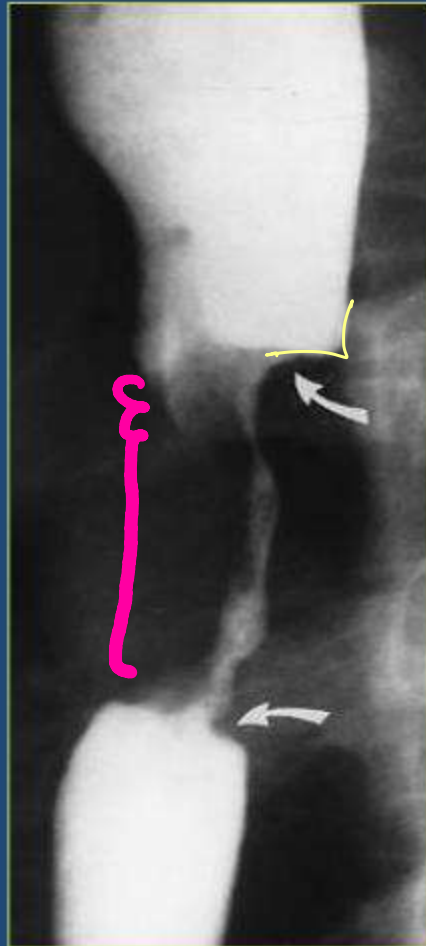
- the chronic presence of fluid debris in the esophagus makes patients very prone to aspiration

•candida esophagitis ✱





Soft -
Tis
Mass
مايستين
Brium



✧ Shouldering
aggressive Carcinoma



Malignant Stricture

- Abrupt narrowing with irregular mucosa
- The prominent shoulders are characteristic of tumor



BARIUM MEAL

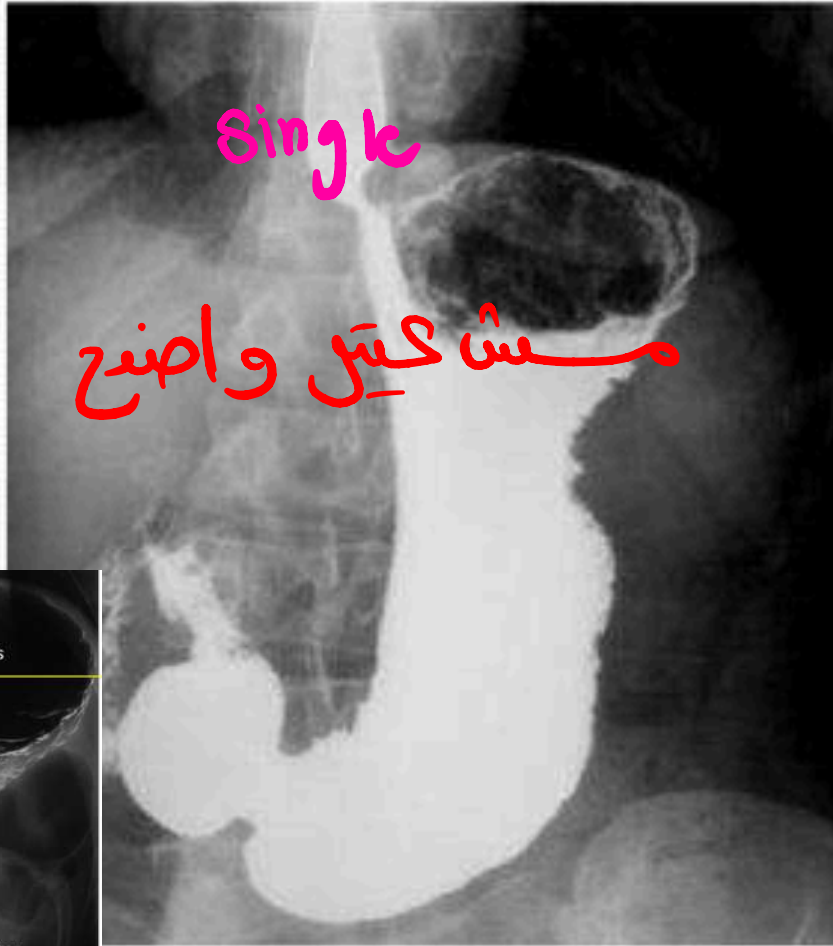
- Examination of the stomach and duodenum.
- Single contrast.
- Double contrast is obtained by introduction of gas into the stomach using effervescent powders and barium. (Mucosal details)

Indications :

- ❖ Gastro esophageal reflux **GERD**
- ❖ Gastric or duodenal ulcer
- ❖ Hiatus hernia
- ❖ Suspected gastric tumor

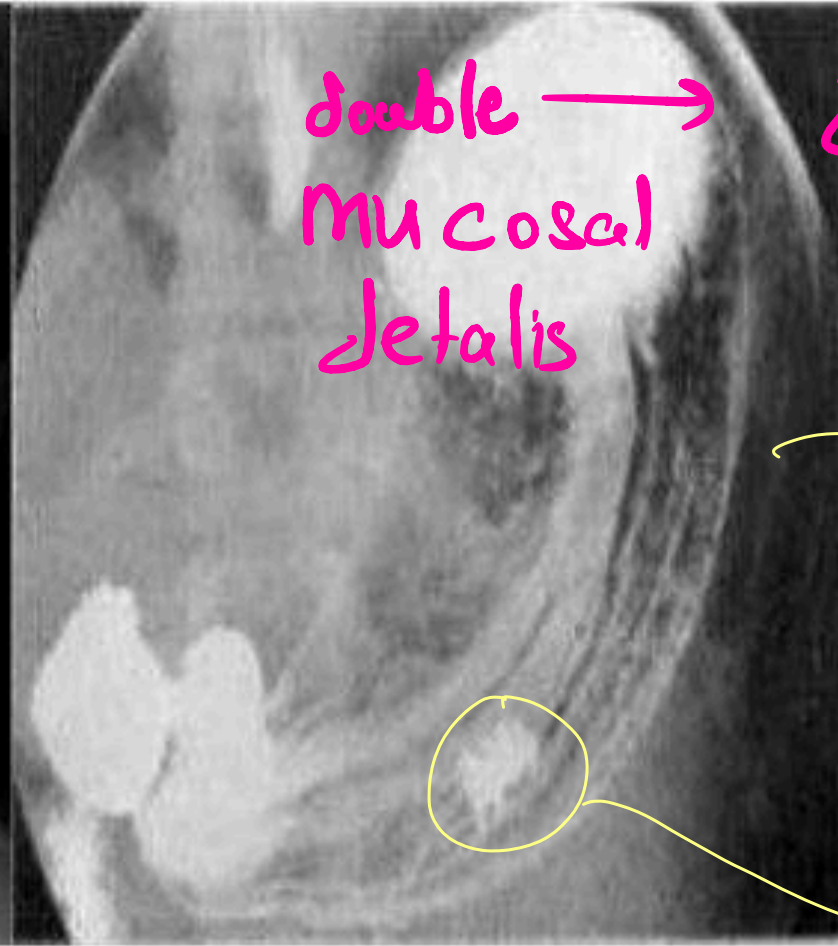
Double
Cont.

Barium meal (Single & Double)



Single

مش کس واضح

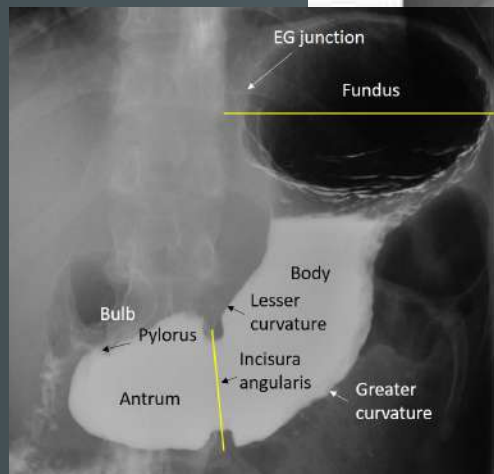


Double →
Mucosal
Details

انزعاج
منها

مخون بطني
Granules
و جد بهم - قمار

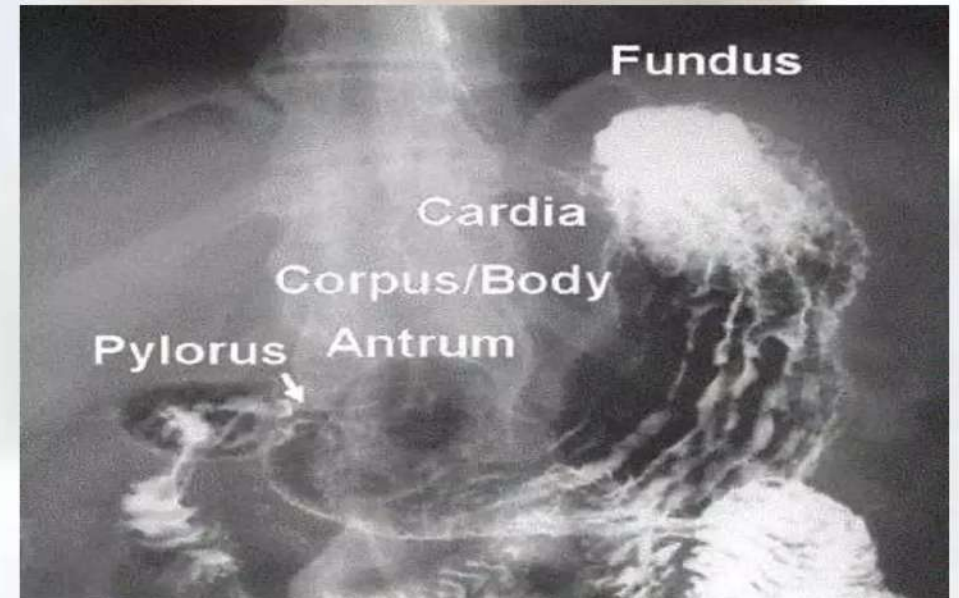
Abnormality?



NORMAL BARIUM MEAL

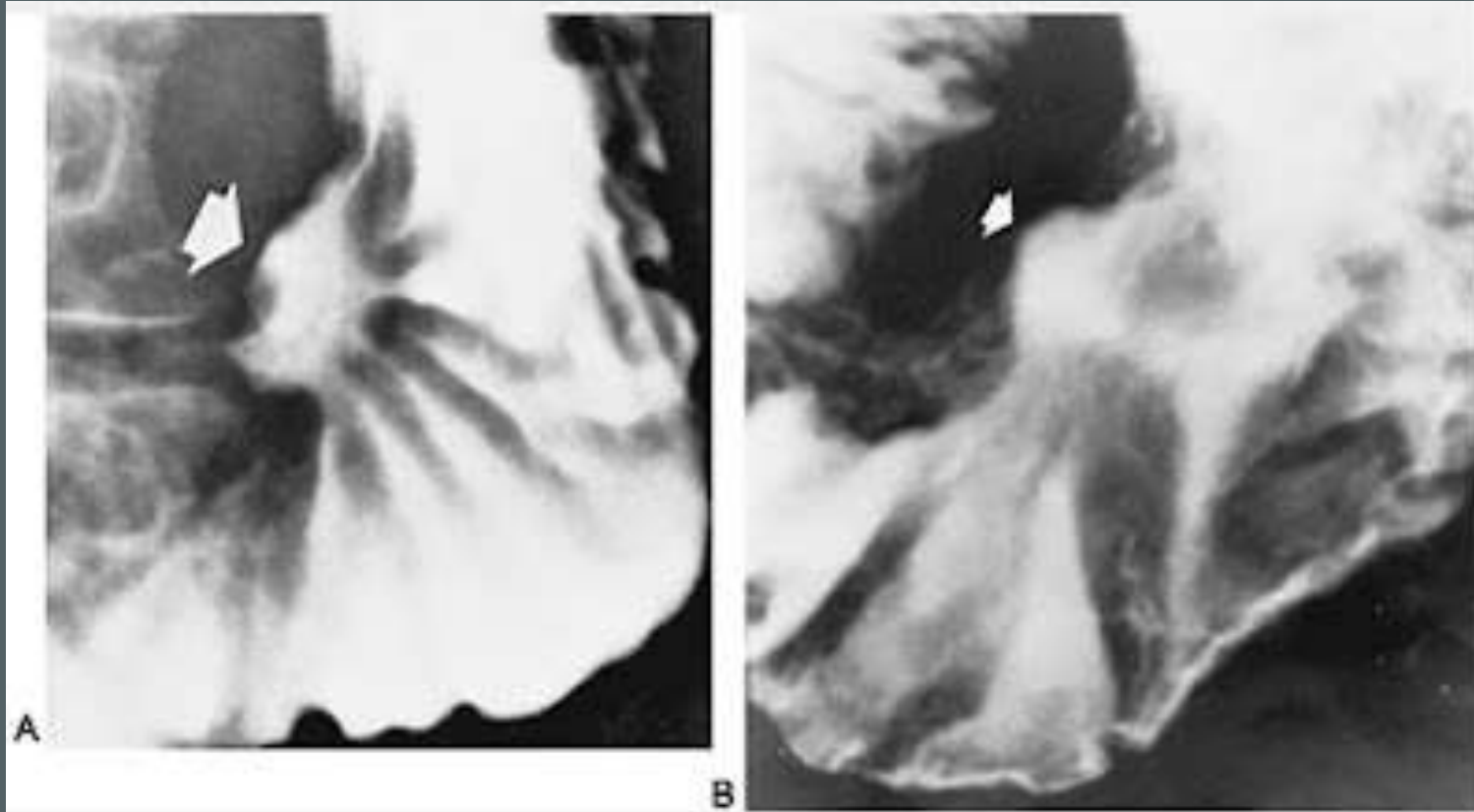


SINGLE contrast



DOUBLE contrast

?



- (A) Small, slender folds radiating to the edge of a benign ulcer. (B) Thick folds radiating to an irregular mound of tissue surrounding a malignant gastric ulcer (arrow)

BARIUM FOLLOW-THROUGH

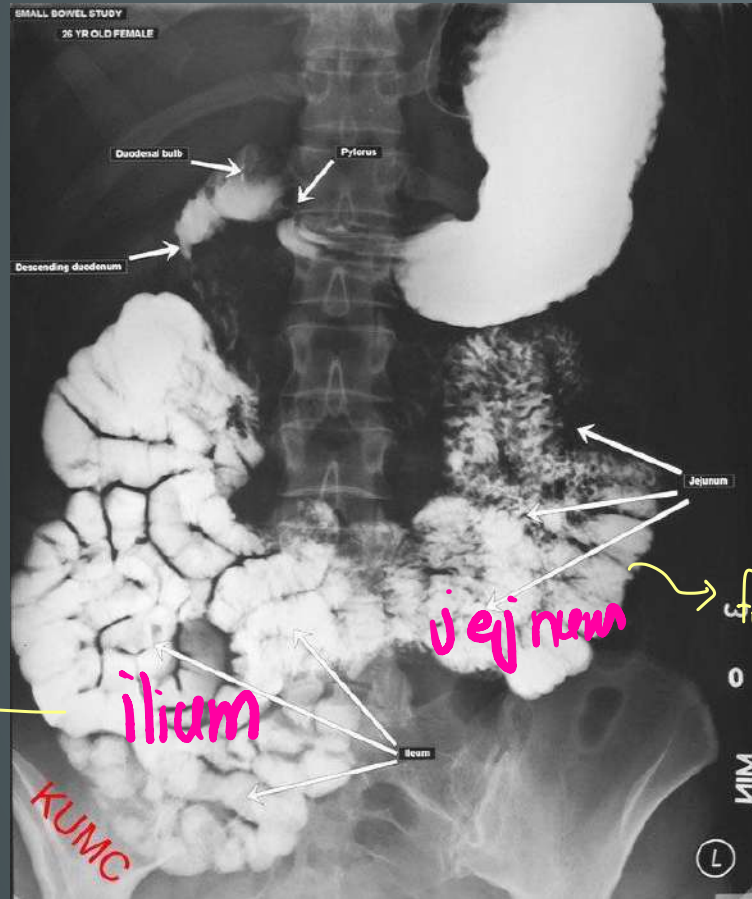
↓
Small bowel

* To ileocecal valve
or Junction →

ماون بوقت التهويز

* depend on pt.
transient time, so
it's very variable.

ممكن يقع 15, 20, 30 دقيقة
عسب, ايم اوصل او ICV, خلاص
بوقت تهوير.



- Examination of the small bowel with
* contrast traversing through the small
bowel into the large bowel.

• Indications:

- Small bowel pathologies as: tumors,
inflammatory bowel diseases,
obstruction.

IBD

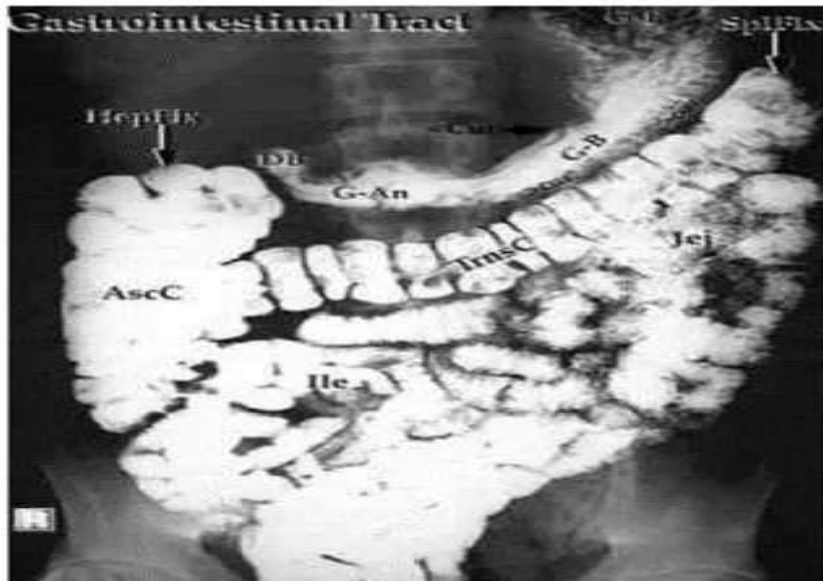
→ Crohn's

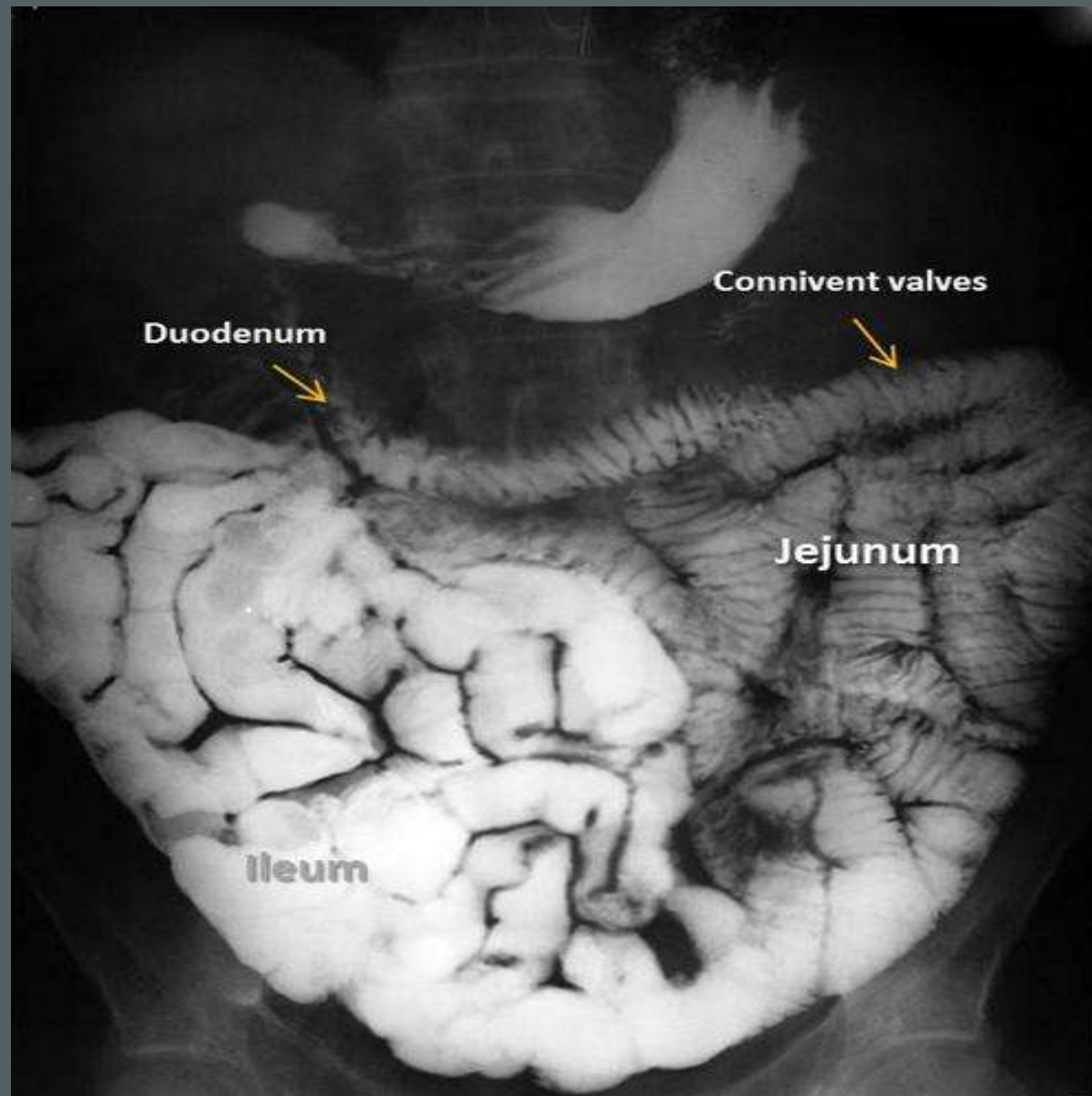
موهت شخض بس

اعرف Abno.

Barium follow-through

- Used to evaluate the small intestine
- Contrast medium appears white on x-rays, showing internal lining of the bowel
- X-ray images taken as the contrast moves through the intestine, commonly at 0 minutes, 20 minutes, 40 minutes and 90 minutes
- ✳ Test completed when barium is visualized in the terminal ileum and Caecum





?



Narrowing?



* Also to
ileo cecal
Junction, but
retrograde.
(from rectum)

BARIUM ENEMA

rectum to

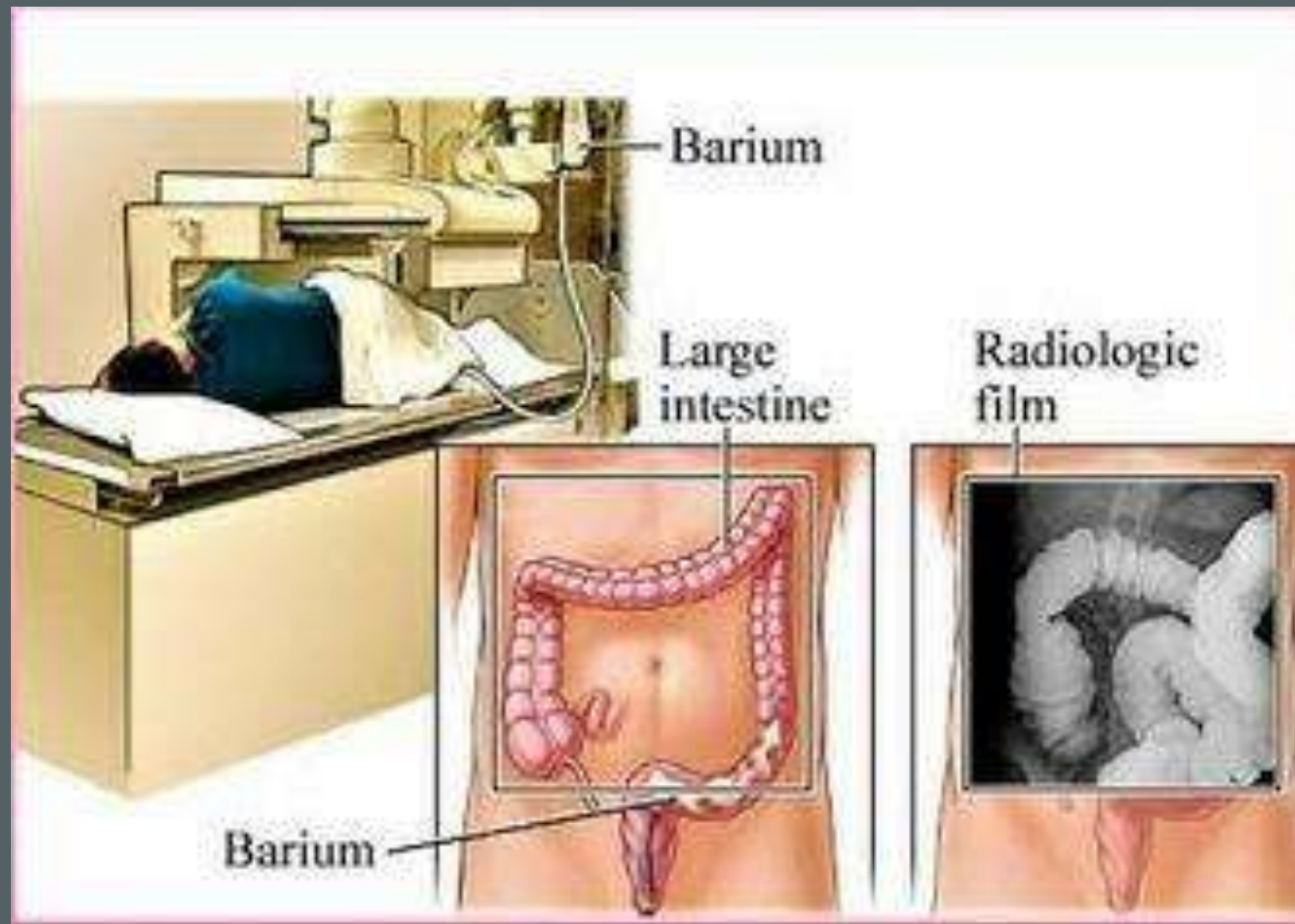
- Examination of the large bowel with double contrast (Barium and air).
- Introduction of contrast into the rectum through a Foley's catheter.

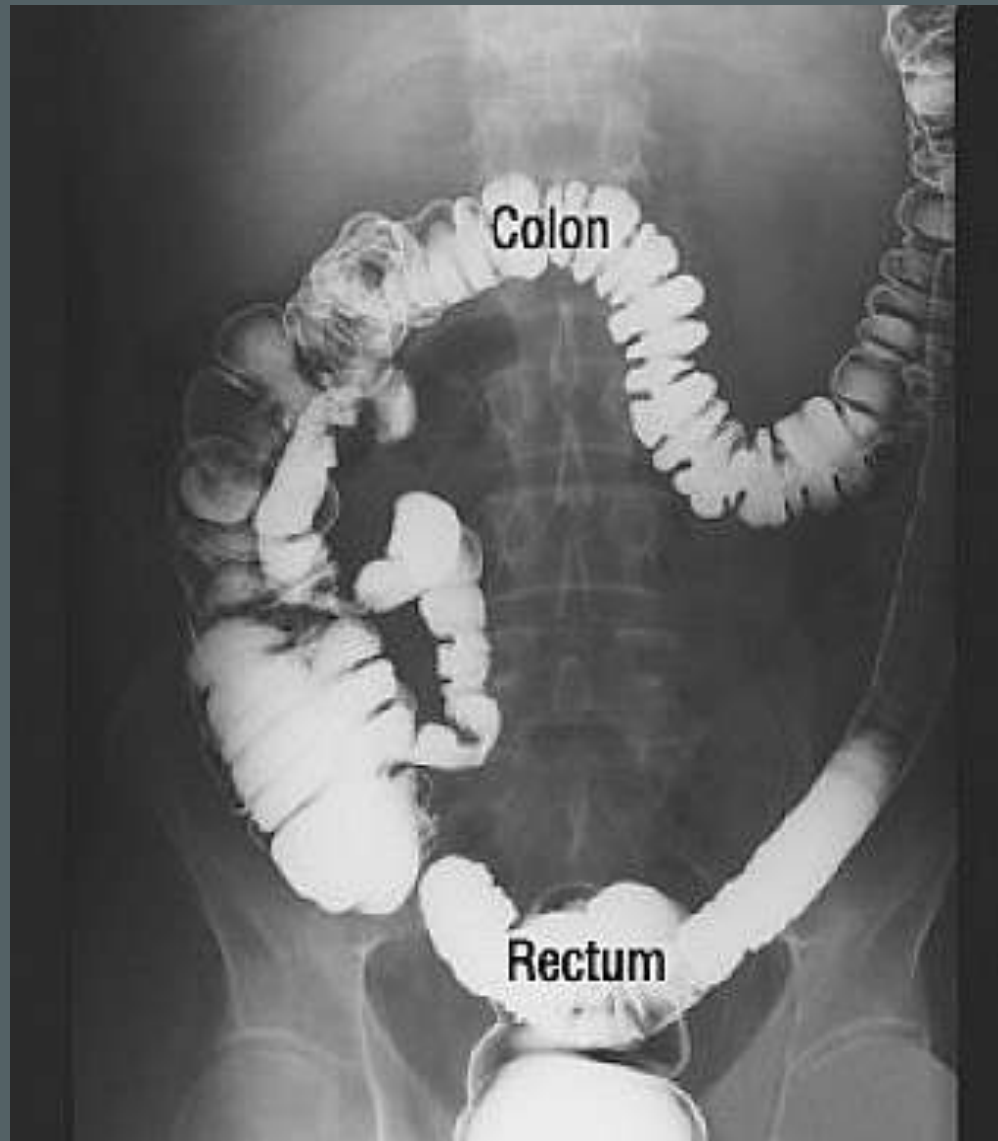
Indication :

- * ➤ Investigation of abdominal mass
- * ➤ Large bowel obstruction / volvulus.
- * ➤ Diverticular disease
- Suspected colonic tumor

Large bowel
22 obs

* بالحقن

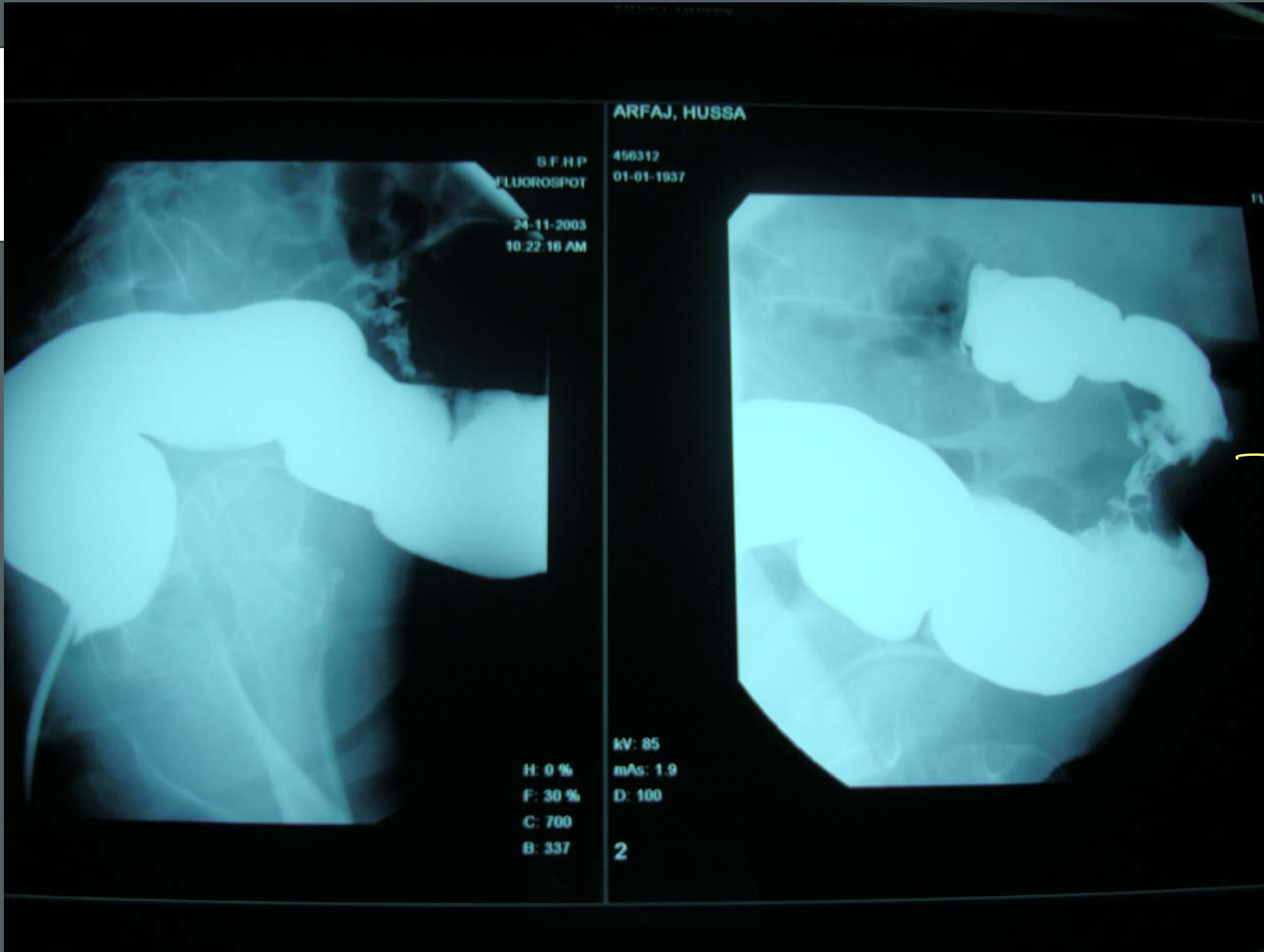




Normal
Colon



→ Irverticulosis

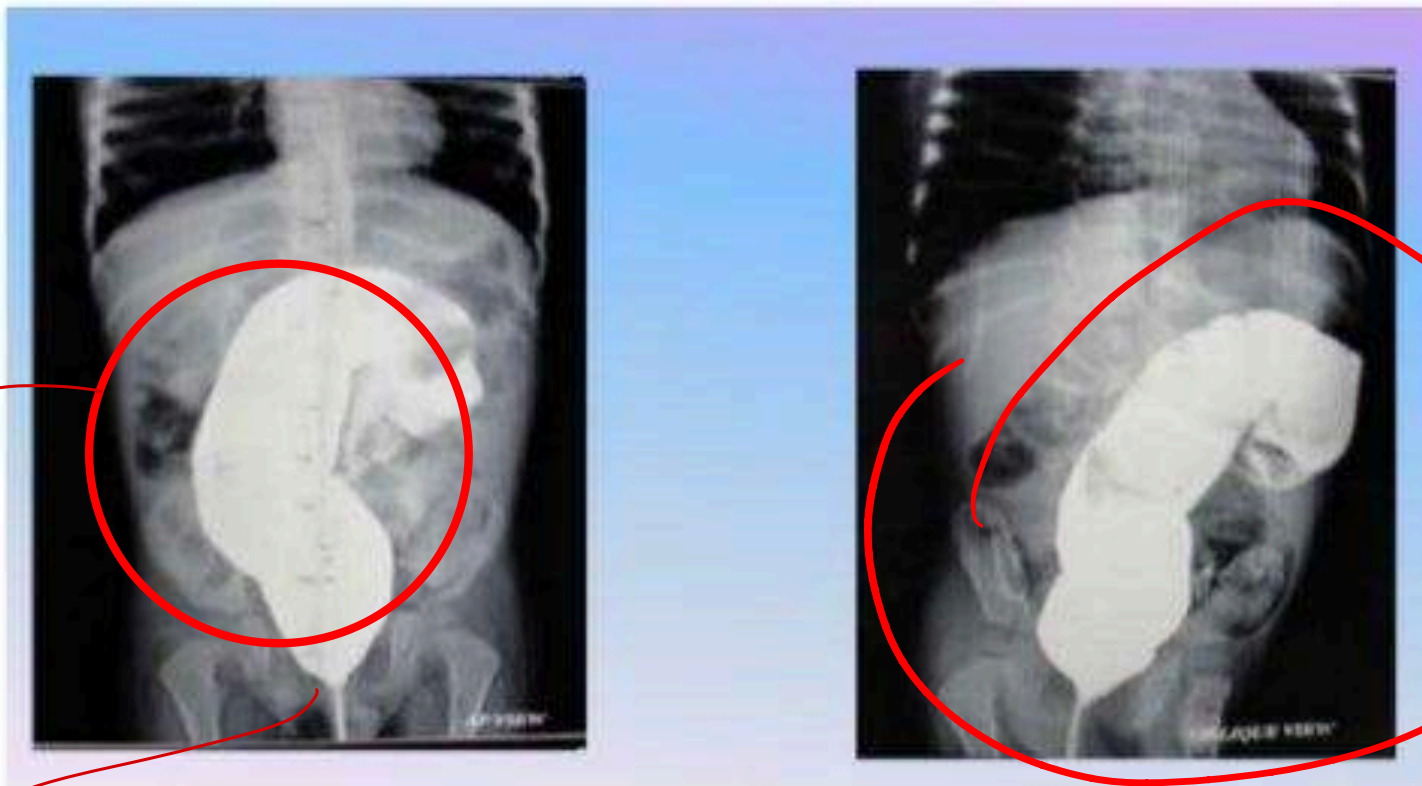
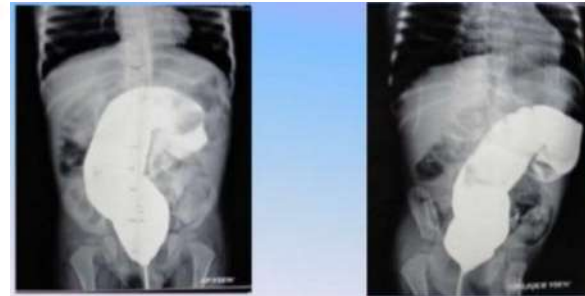


→
Stricture
narrowing
Shouldering

Hirschsprung's disease

no ganglia
no mass of meconium

Barium enema



Dilated proximal

narrow

CT OF THE ABDOMEN

کریا کرتے ہیں + Contrast استعمال کرتے ہیں اور اس میں Asthma اور Allergy کا ہونا ضروری ہے۔
X-ray کی بجائے Thickness پر مبنی ہے

• An imaging modality that uses x-rays to build cross-sectional images ("slices") of the body.

• Unenhanced / with contrast → oral or IV → most common
non-ionized

• Precautions and preparations: contrast allergy? Asthma?
Medications ? KFT? Fasting?

• Indications: Vomit کا زخم عیالہ کا ہونا ضروری ہے۔ Aspirin

✓ abdominal pain, flank pain, pelvic or inguinal pain

✓ suspected abdominal or pelvic masses or fluid collections

✓ primary abdominal tumors or metastatic spread

✓ infections and inflammatory conditions of the abdomen and pelvis including abscesses

✓ bowel obstruction and/or mesenteric ischemia

✓ abdominal and pelvic trauma

✓ postoperative follow-up

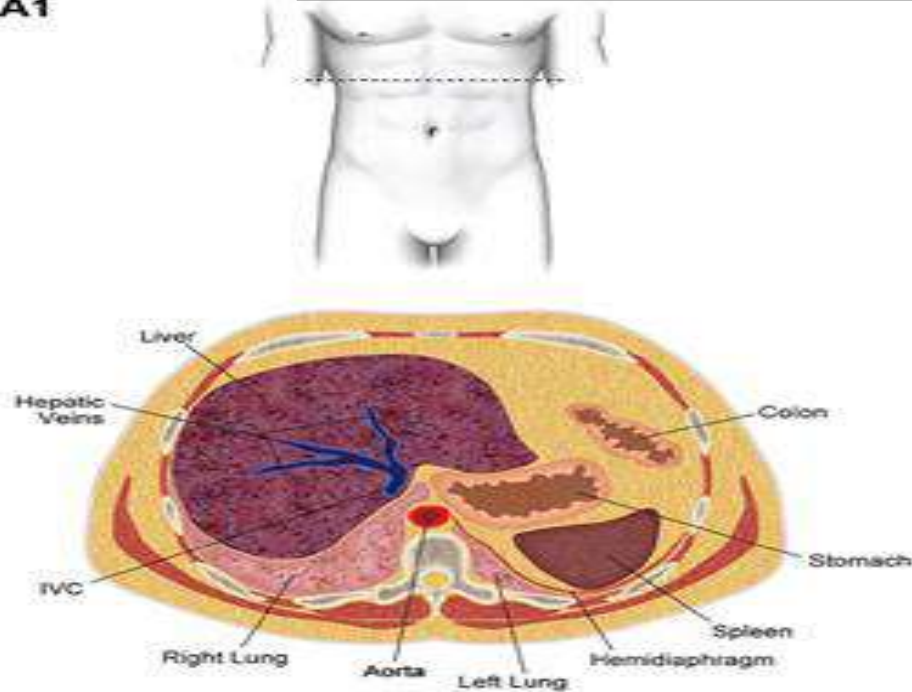
بہتر ہے کہ اس کے ساتھ ساتھ
"آنت کی حرکت" کا جائزہ لیا جائے
مسائلہ الیہ

CT ANATOMY OF GIT

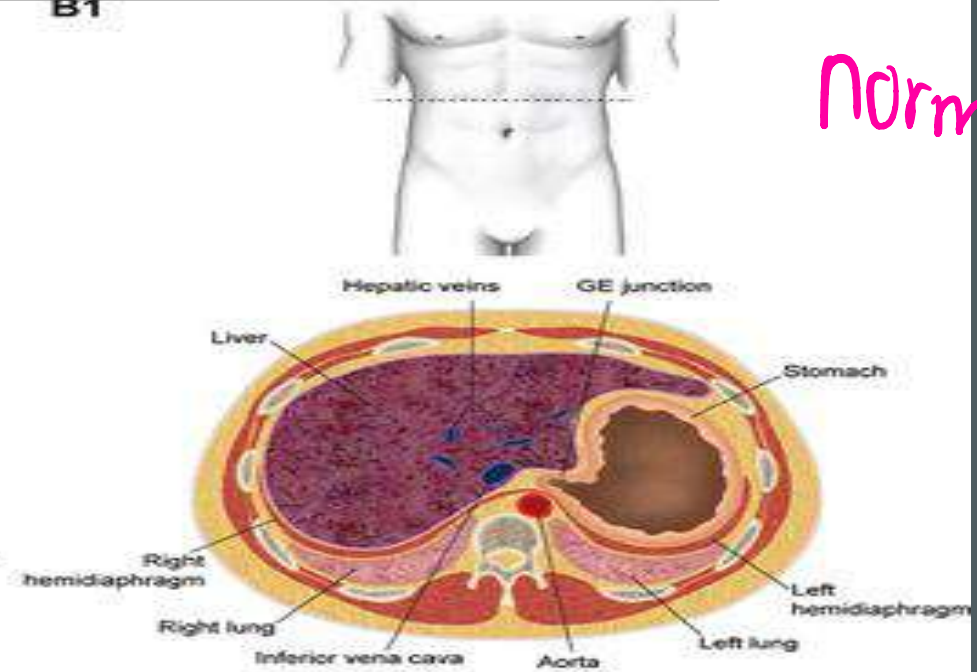
الطعام

Normal

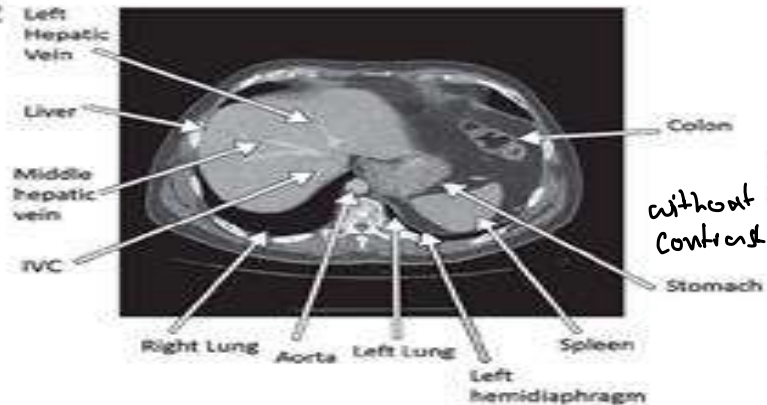
A1



B1

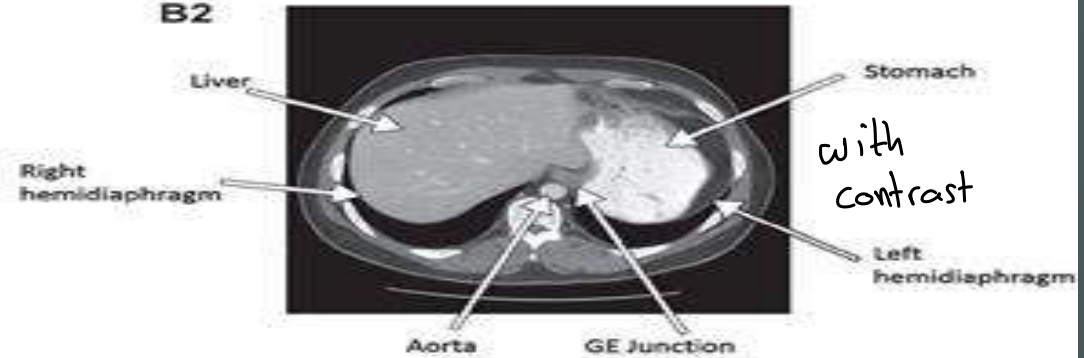


A2

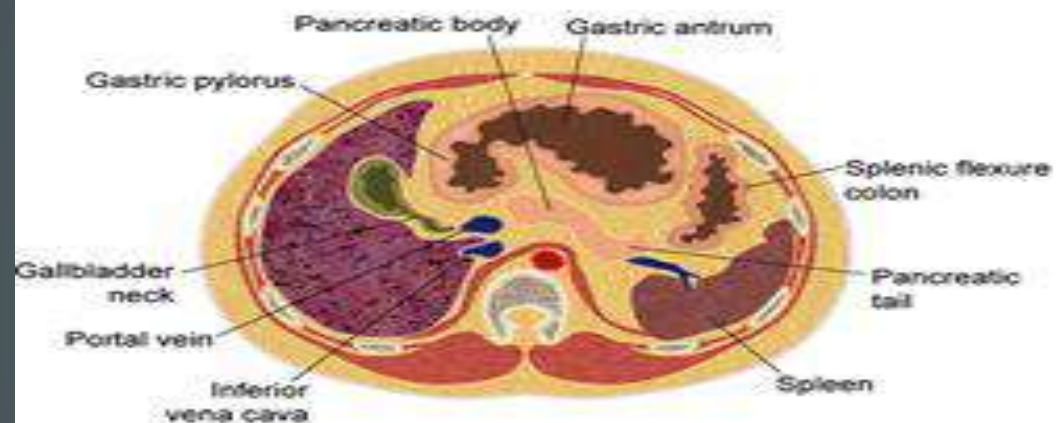
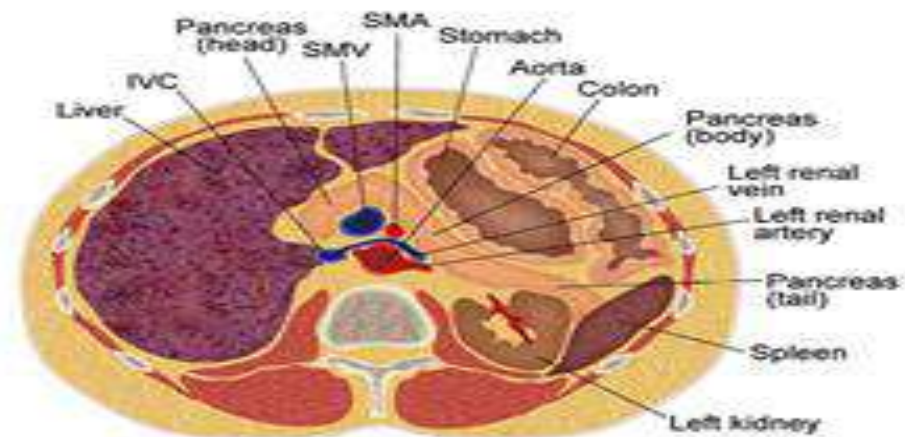
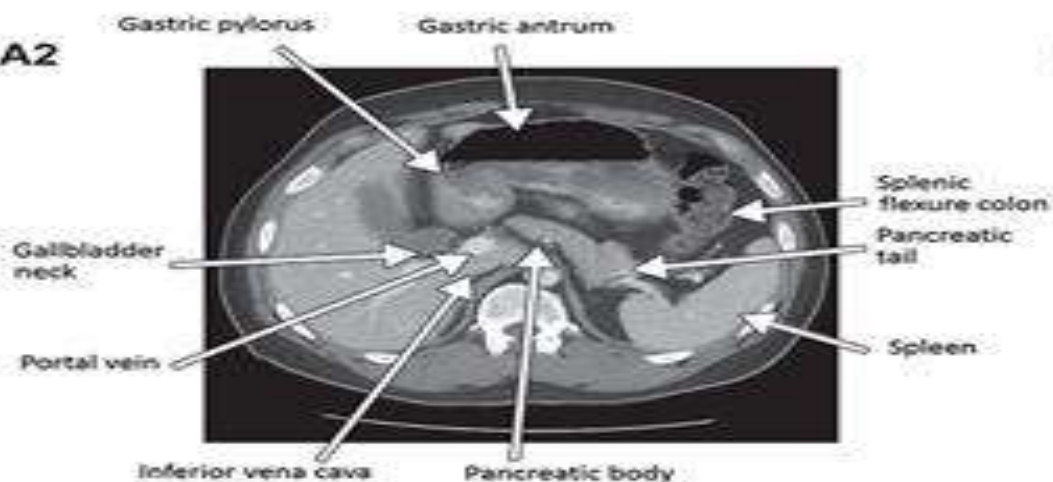
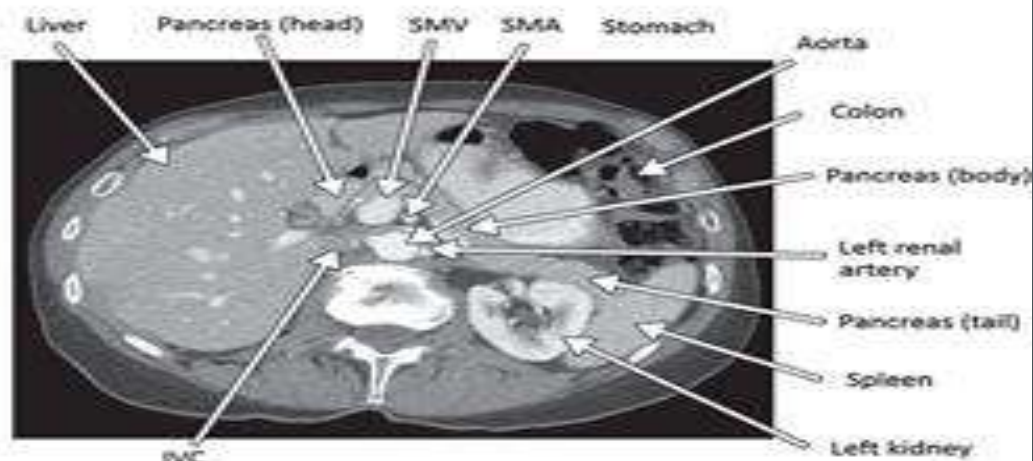


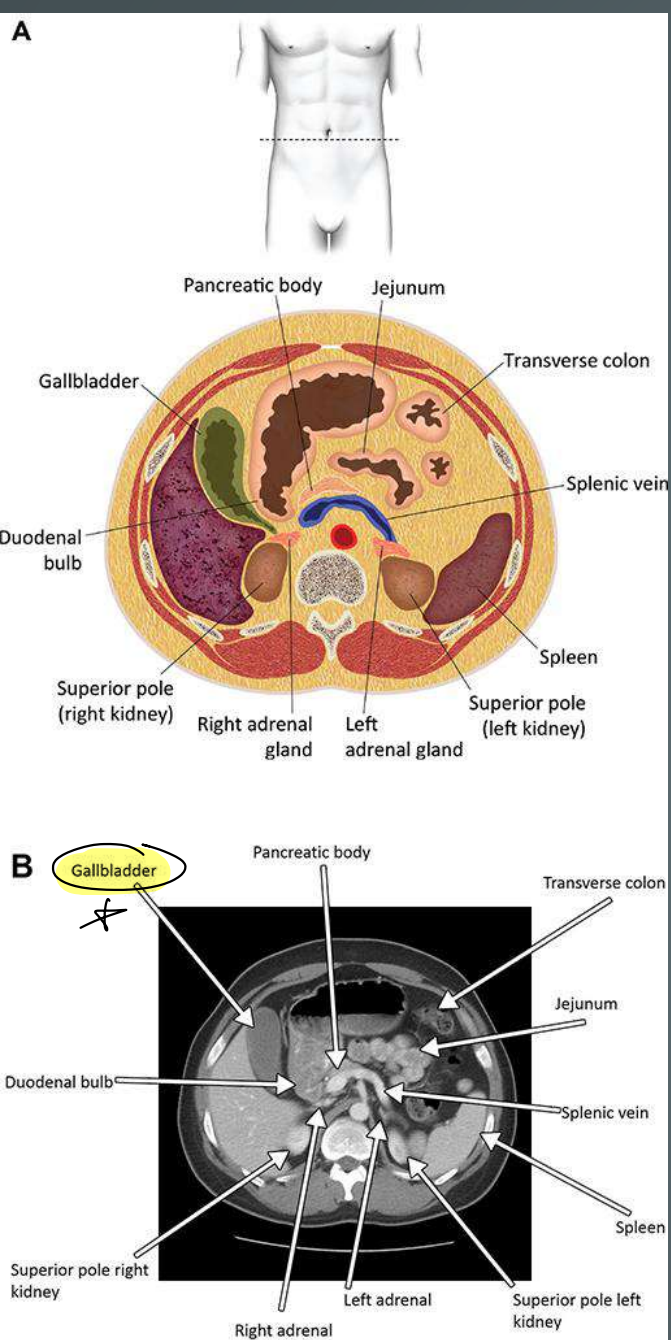
without
contrast

B2

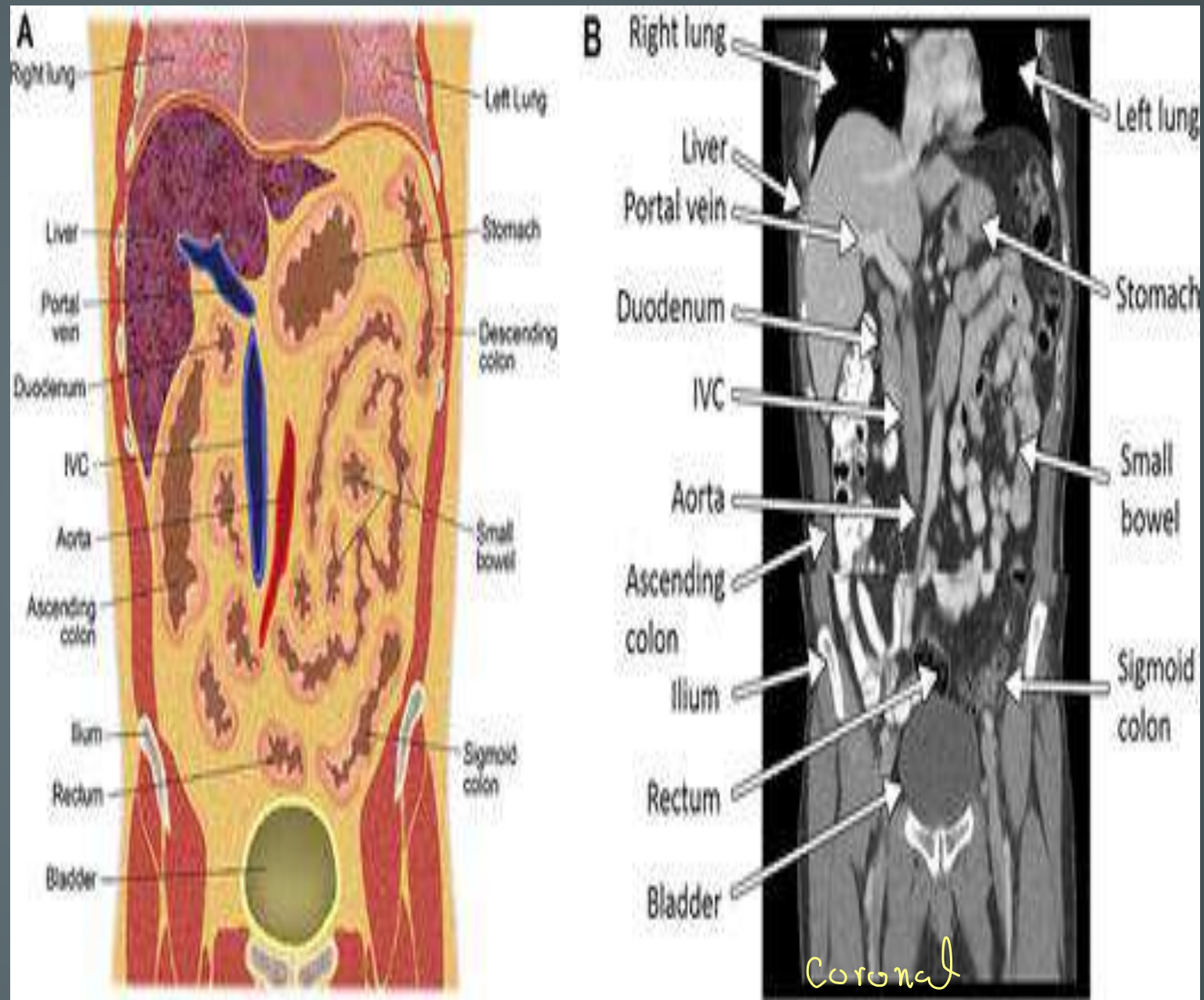


with
contrast

A1**B1****A2****B2**



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MRI OF THE ABDOMEN →

- ✓ • Outstands CT, with less risk of radiation for assessment of several solid abdominal and pelvic organs
- ✓ ✱ Assessment of vessels (MRA)
- ✓ ✱ Assessment of biliary tree (MRCP)

افضل من
CT
- details

biliary tree

* من داتا موهو ده

ultrasound ←
best for
stone
لأنه مو الكال بين
على الـ Key

GALLBLADDER & BILIARY SYSTEM

gallstone → ultraso..
MRI Cino Cino →

- Gallstones:

- Types of gallstones:

US ← ✱ ❖ 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.

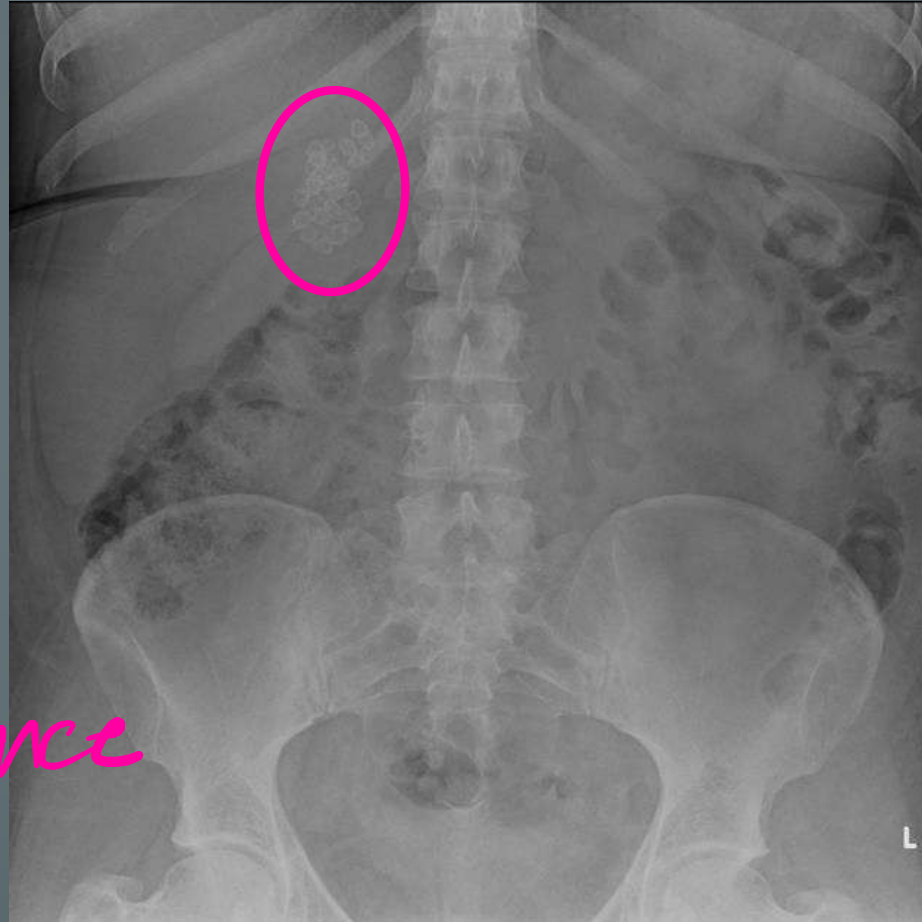
CC
The predisposing causes include:

- Obesity, diabetes, liver cirrhosis, and blood disorders such as sickle-cell anemia.

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.

*Cholecystitis → emergency



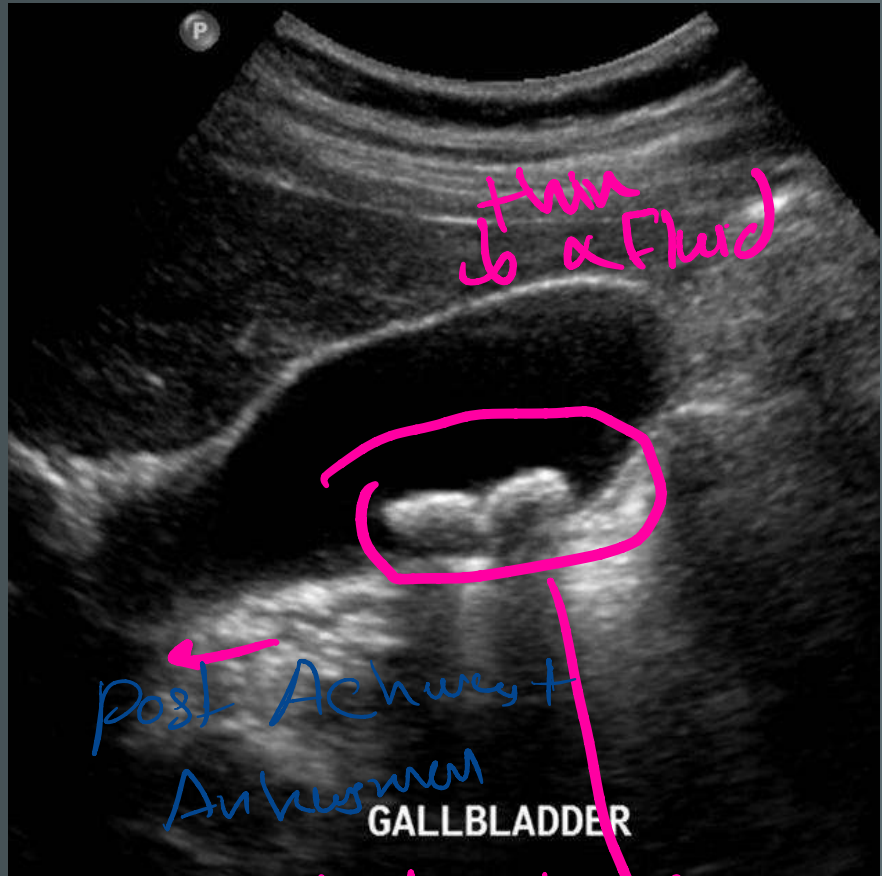
X-ray

*US →

to check
if there is
a cholecystitis.

to rule it out

only shadowing
if stone is — ?



No cholecystitis
Stone

ultrasound → echogenic
with — f



+ Shadow

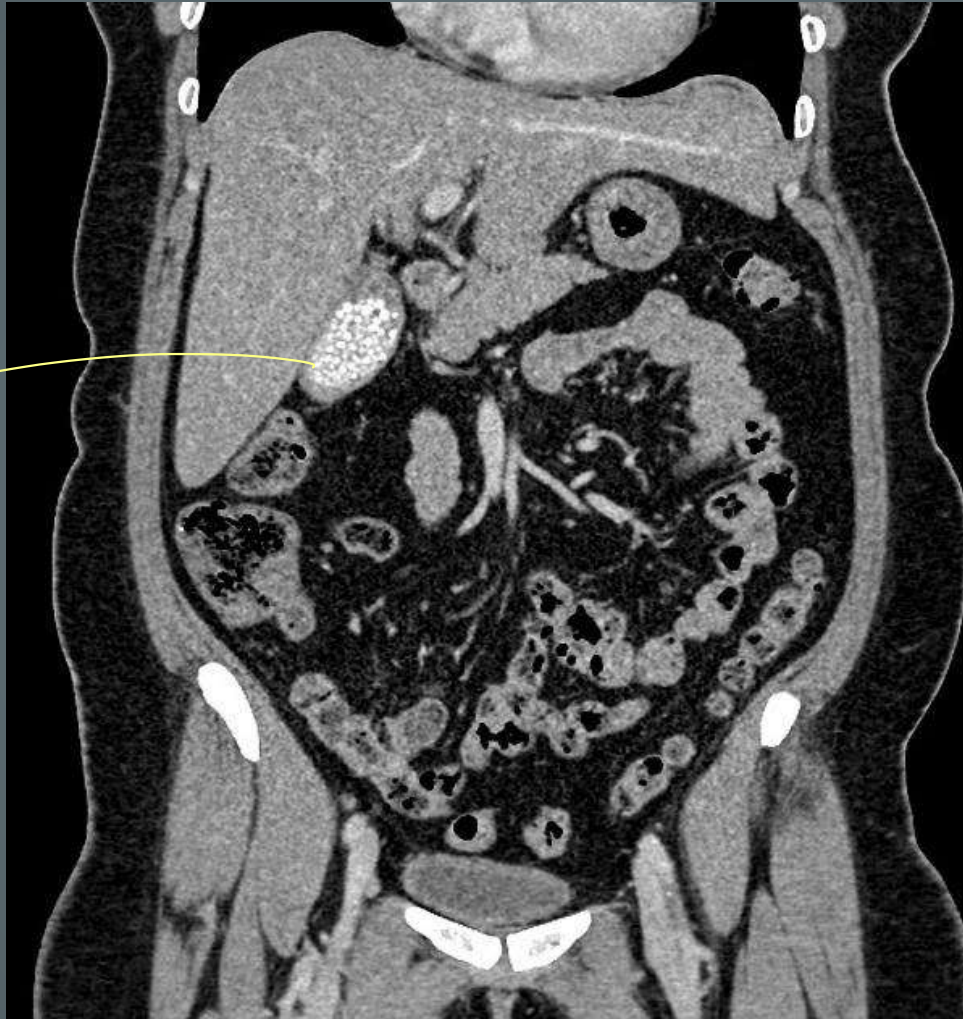
Size
Funds Plnic → Ob

Copy



Coronal CT

Hyperdensity ←



Bile normally contains:

- Cholesterol
- Bile salts
- Phospholipids

Sludge forms when:

1. Cholesterol supersaturates bile
2. Gallbladder doesn't contract effectively → stasis
3. Mucin layers trap precipitates

This results in low-motility, concentrated bile where cholesterol crystals and calcium salts precipitate.

Ultrasound (gold standard)

Findings include:

- Low-level echoes in gallbladder
- Without acoustic shadowing
- Moves/slows with changes in position

Sludge tends to layer and shift with gravity.

Note: If it doesn't move or casts shadow → think gallstones.

CHOLECYSTITIS

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

Caused
by stones
most commonly

Acute calculous cholecystitis

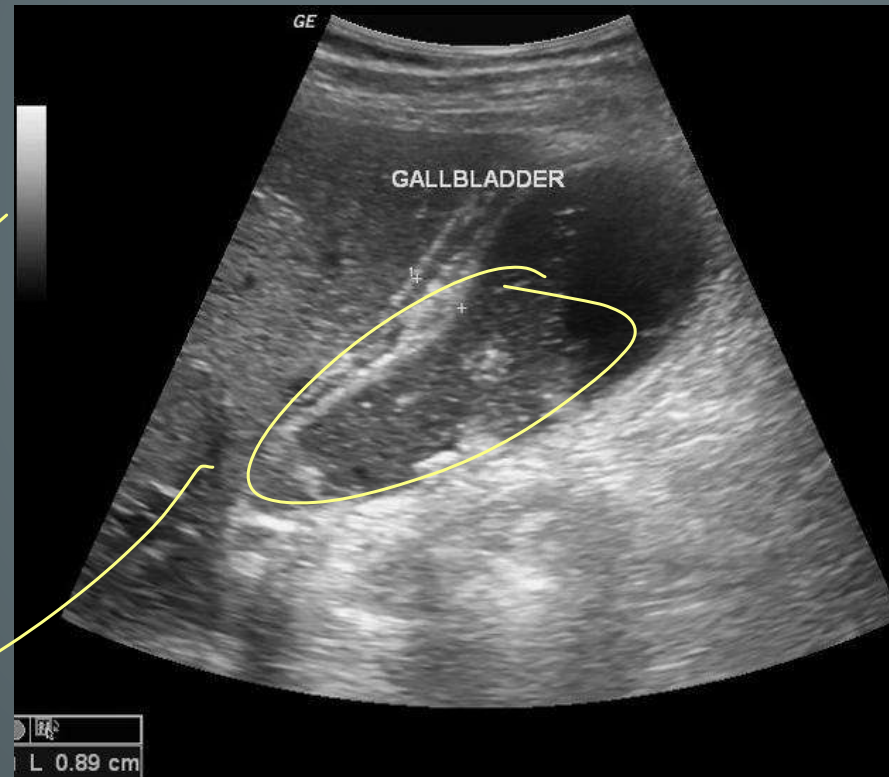


Acute calculous cholecystitis

Ultrasound features are:

- ❖ Distended gallbladder with gallstones. (1)
- ❖ The gallbladder wall is thickened (greater than 3 mm) and edematous. (2)
- ❖ Pericholecystic fluid, and in some complicated cases pericholecystic abscess. (3)

not clear
bile → infected



Pericholecystic fluid

sagittal
CT

✓ * ↑ thickness
* wall
more
prominent

GB stone



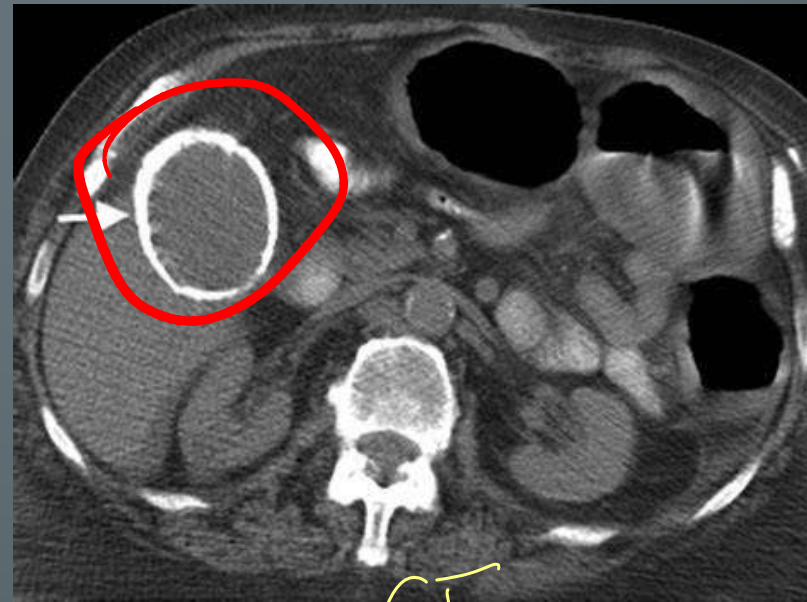
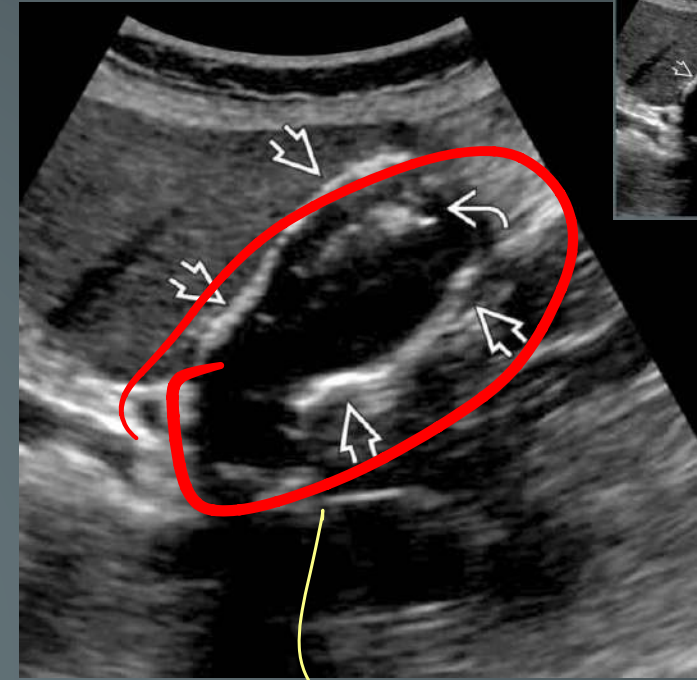
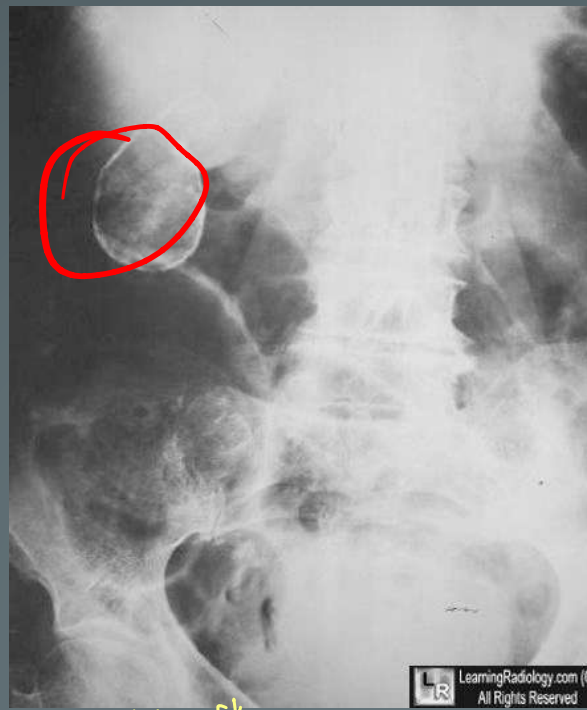
• Porcelain GB:

- Curvilinear calcifications within chronically inflamed and fibrotic muscular wall.

★ 90% associated with gallstones. ✓

★ Wall is thickened and gallbladder is contracted. ✓

★ Increased incidence of malignancy. 40



→ shadowing

ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP)

* check on
biliary tree

be: ampulla of Vater at
injection

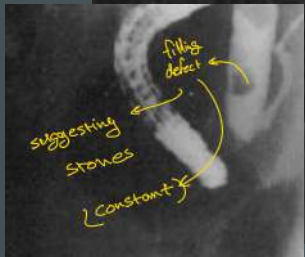
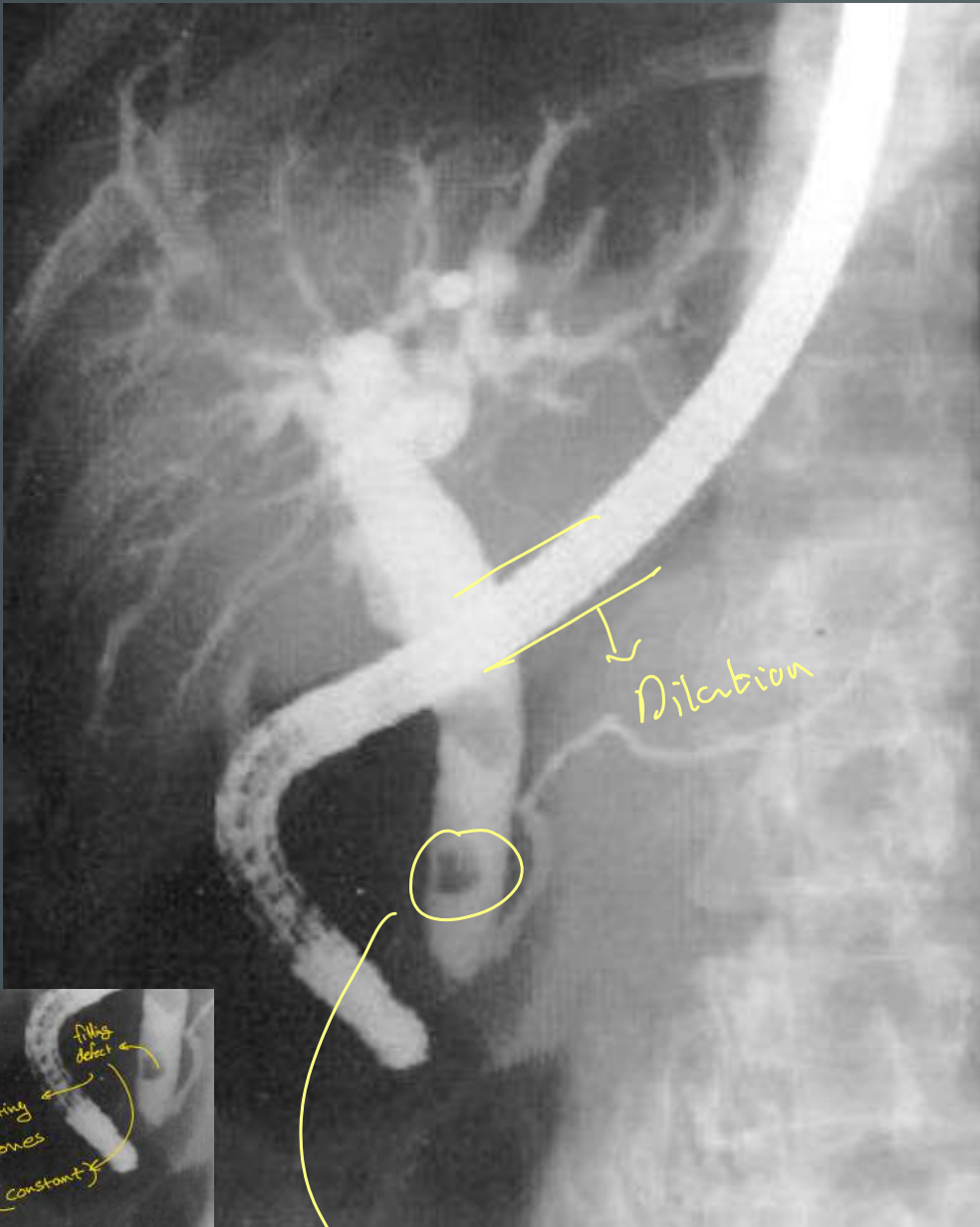
☆
Indication: Diagnostic and therapeutic

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

● Common Bile Duct stone
(Cholelithiasis)

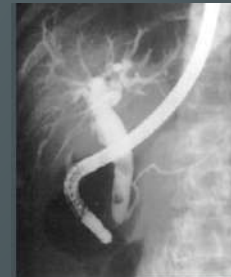
- An endoscope is introduced and advanced through the mouth into the duodenum, with injection of contrast into the ampulla of Vater, to demonstrate both the bile ducts and the pancreatic ducts.
- CBD stones can be removed through the endoscope by insertion of a catheter with a basket or balloon.
- Malignant CBD strictures can also be stented.





* Cholangio Carcinoma

→ Filling defect → due to obstruction + dilation



STOMACH

GASTRIC CARCINOMA

- * MC gastric malignancy.
- * UGIS- Lobulated filling defects .
- * CT abdomen –
 - Diffuse / local wall thickening.✓
 - Lobular mass ✓
 - +/- Ulceration ✓
 - Enhancement ✓
 - Local lymphadenopathy ✓
 - Distant metastasis ✓

upper GI
series

Barium meal

Single



Filling
defect
lesion

*Constant mass

Abnormal thickening ←

coronal CT



axial CT



thickening

normal wall is thin

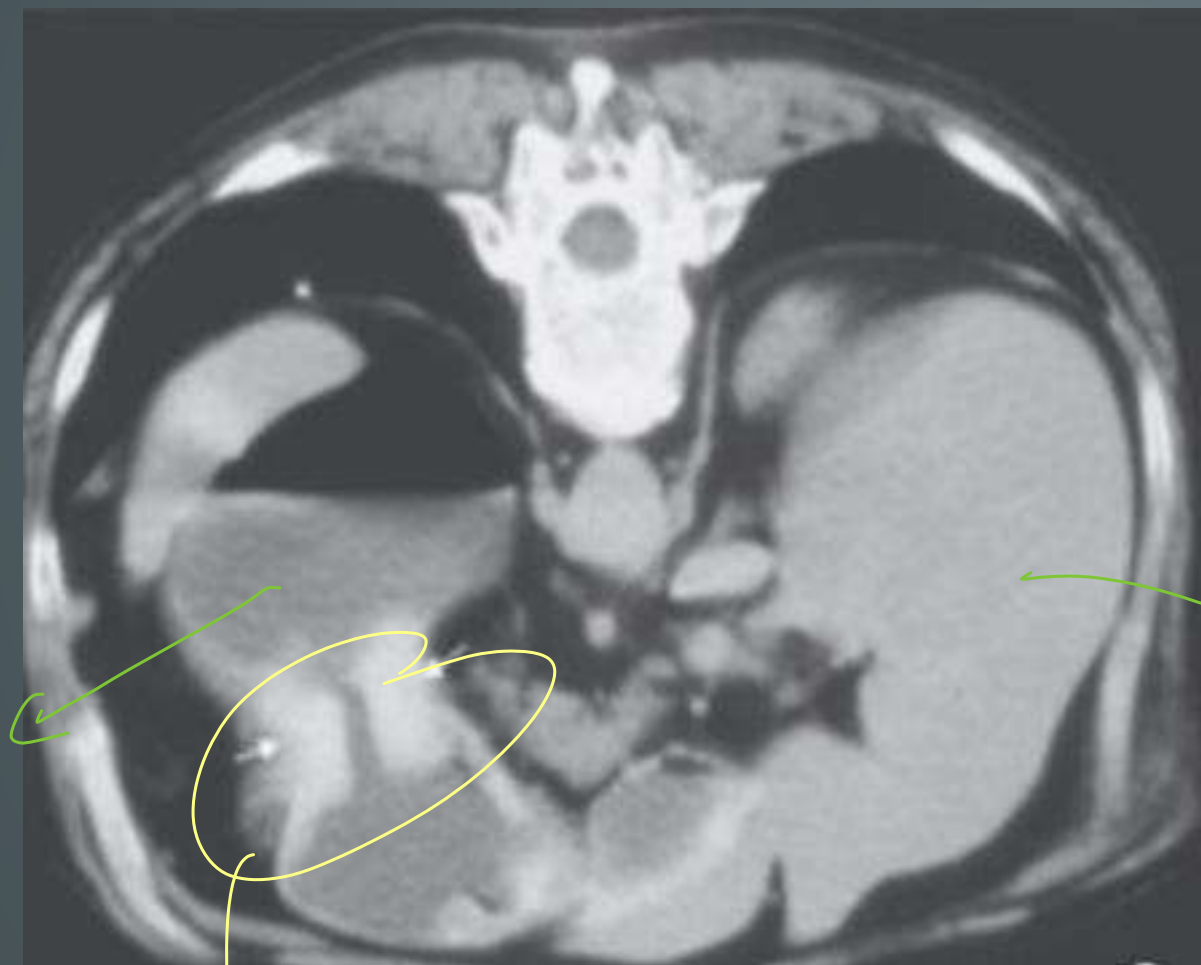
axial
CT

CT is
imp



→ invasion to
Spleen

→ Spleen



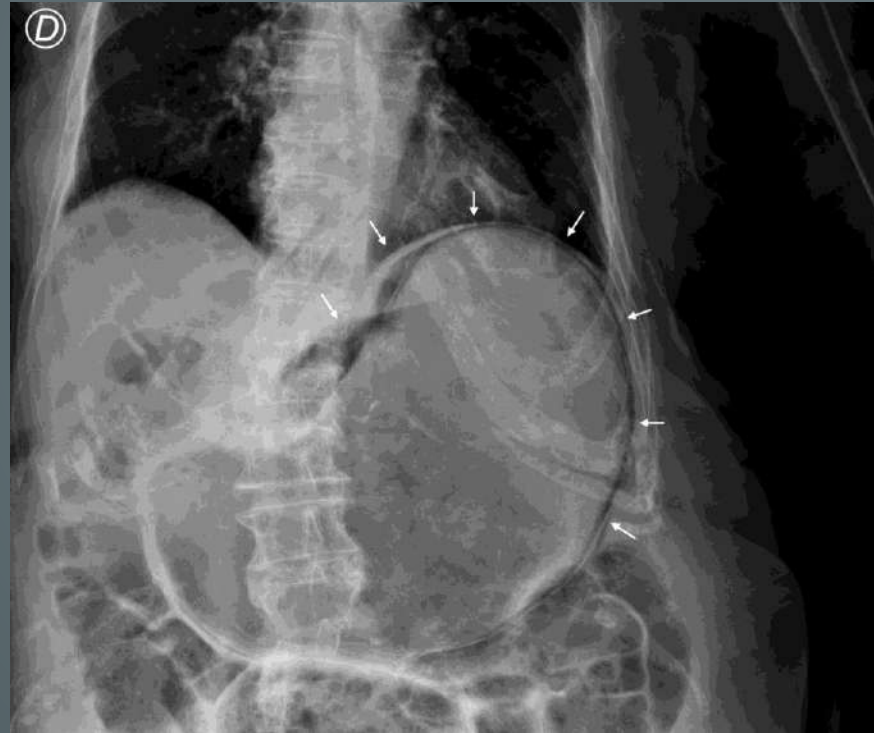
liver?

focal lesion

EMPHYSEMATOUS GASTRITIS

- Emphysematous gastritis is a cause of gastric emphysema.
- Most cases are brought about by caustic ingestion, alcohol abuse, surgery, trauma, or ischemia

→ emergency



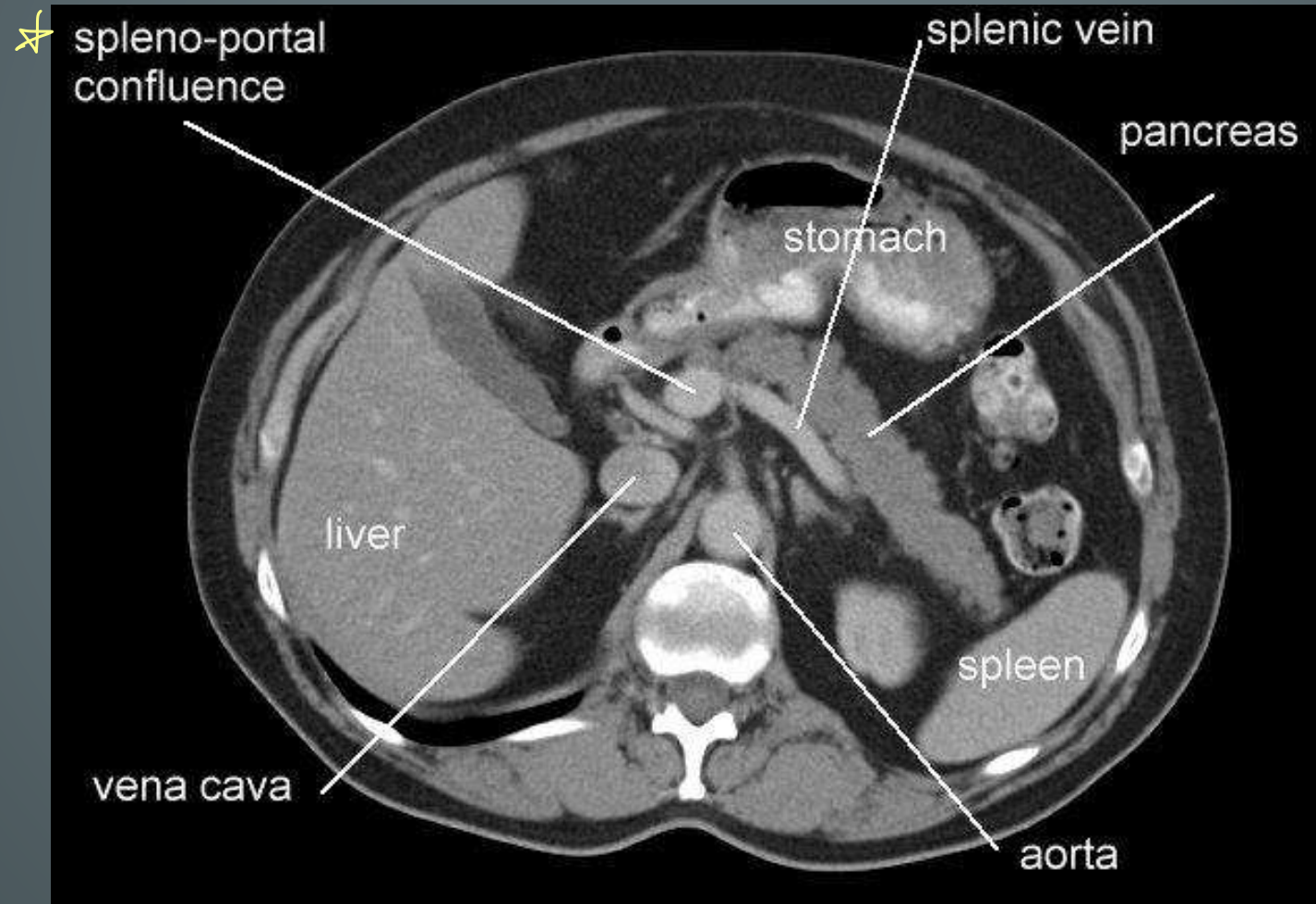
→ Air in the wall is abnormal

PANCREAS

- Pancreatitis-
- US, CT, MRCP, and ERCP are all used in the diagnosis and evaluation of inflammatory diseases of the pancreas. → Mcc by stones, diagnosed clinically → radio for the cause and complications
- 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 etiology (gallstones, etc), and assess for possible complications that would require intervention. In chronic pancreatitis, imaging allows for the classification of the morphological changes, which determines prognosis and potential interventions. Chronic → Mcc by alcohol, radiologically diagnosed

I GET SMASHED

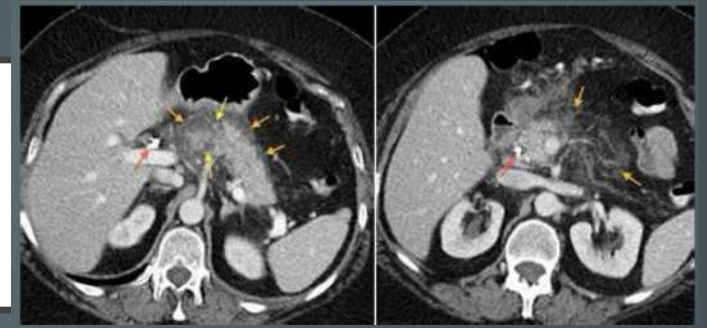
NORMAL PANCREAS



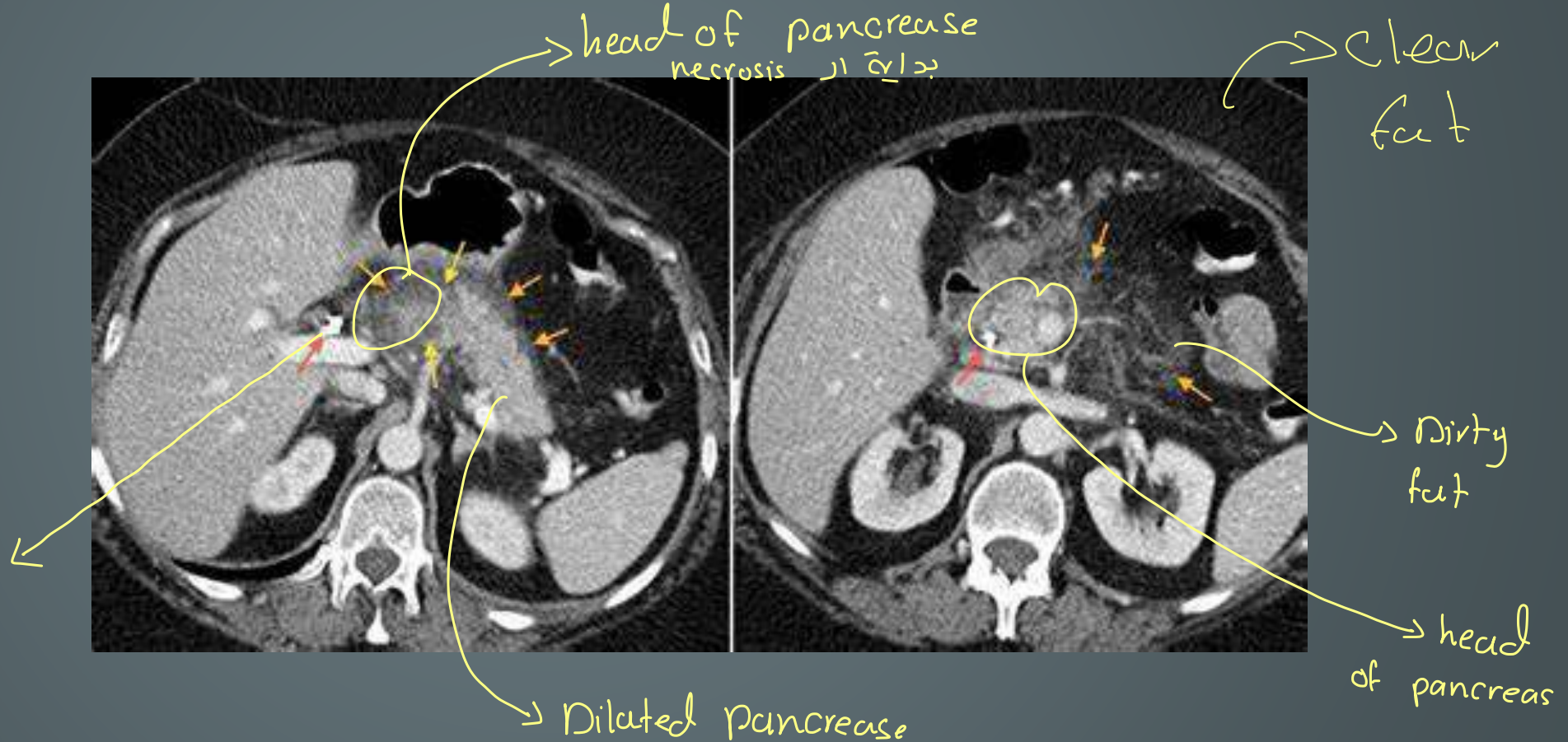
CT
with
contrast

ACUTE PANCREATITIS

CT
with
contrast

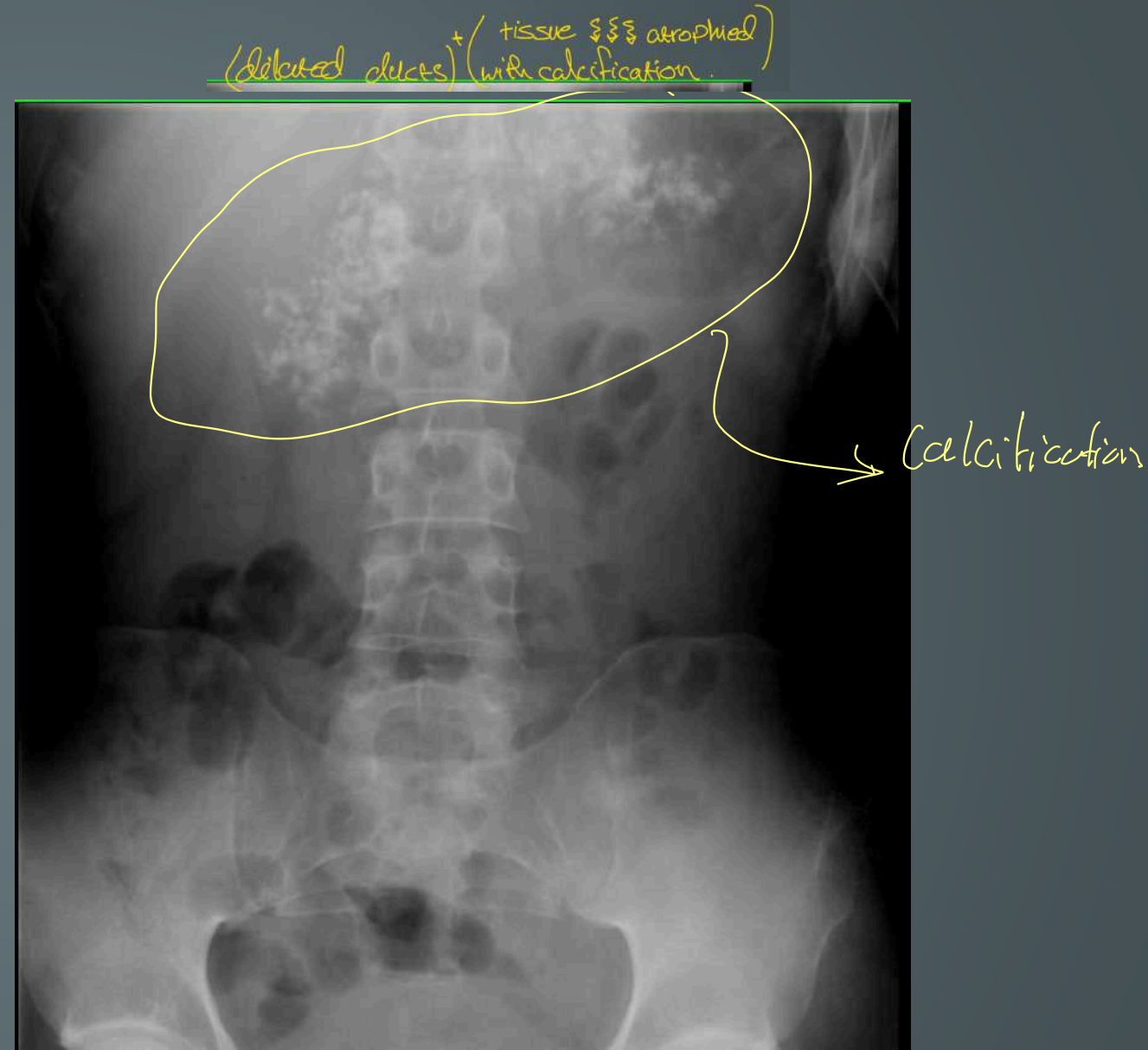


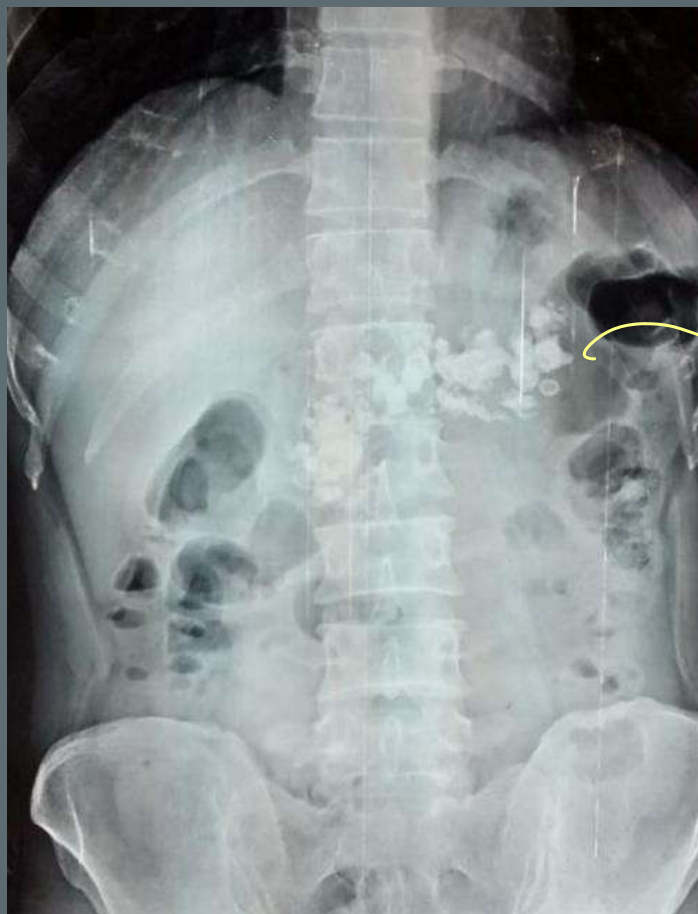
- Common causes of pancreatitis include alcohol abuse, choledolithiasis, hypertriglyceridemia, and hypercalcemia.



CHRONIC PANCREATITIS

- Chronic pancreatitis presents with different diagnostic and therapeutic challenges compared to acute pancreatitis; the role of imaging may be interventional as well as diagnostic. Chronic pancreatitis is characterized by parenchymal atrophy, ductal calcifications, and ductal dilatations and strictures.





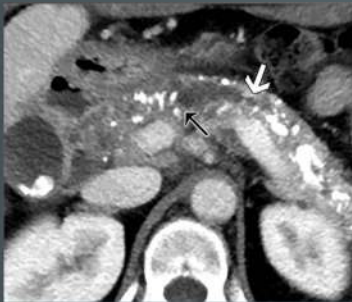
Calcifications



→ Dilated Duct

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

→ tissue
absent



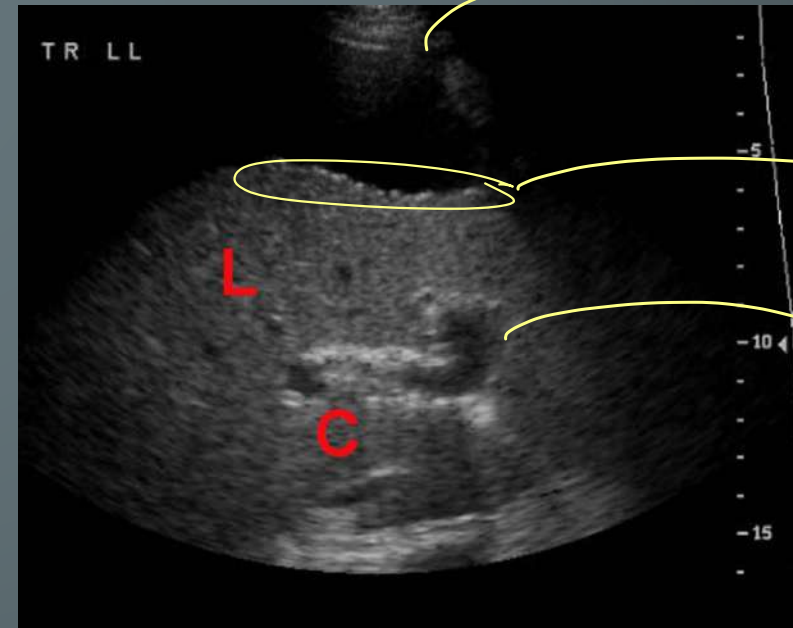
LIVER

- 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

IMAGING FINDINGS IN CIRRHOTIC LIVER

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

Smooth
homogeneous



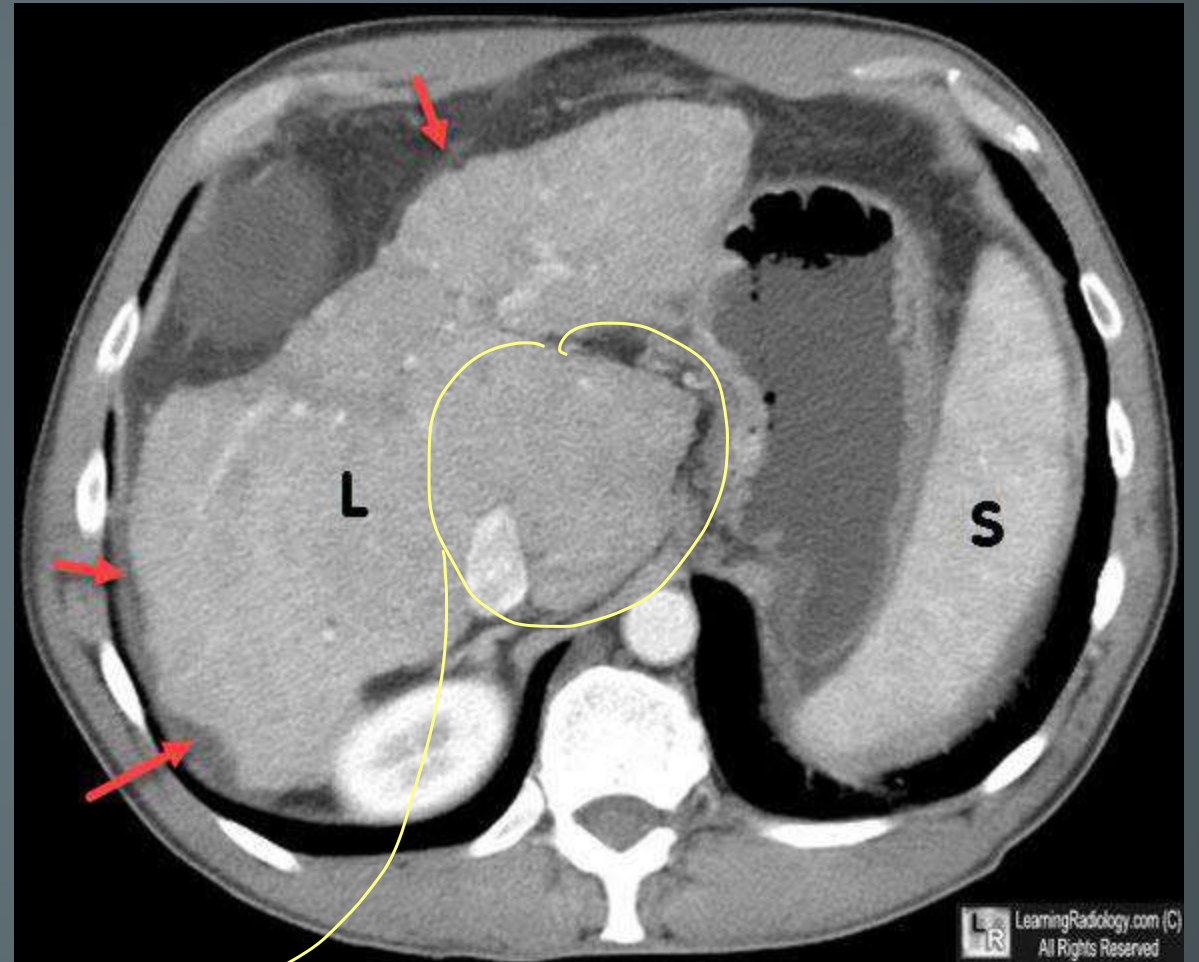
caudate lobe hypertrophy
other lobes atrophied

heterogeneous

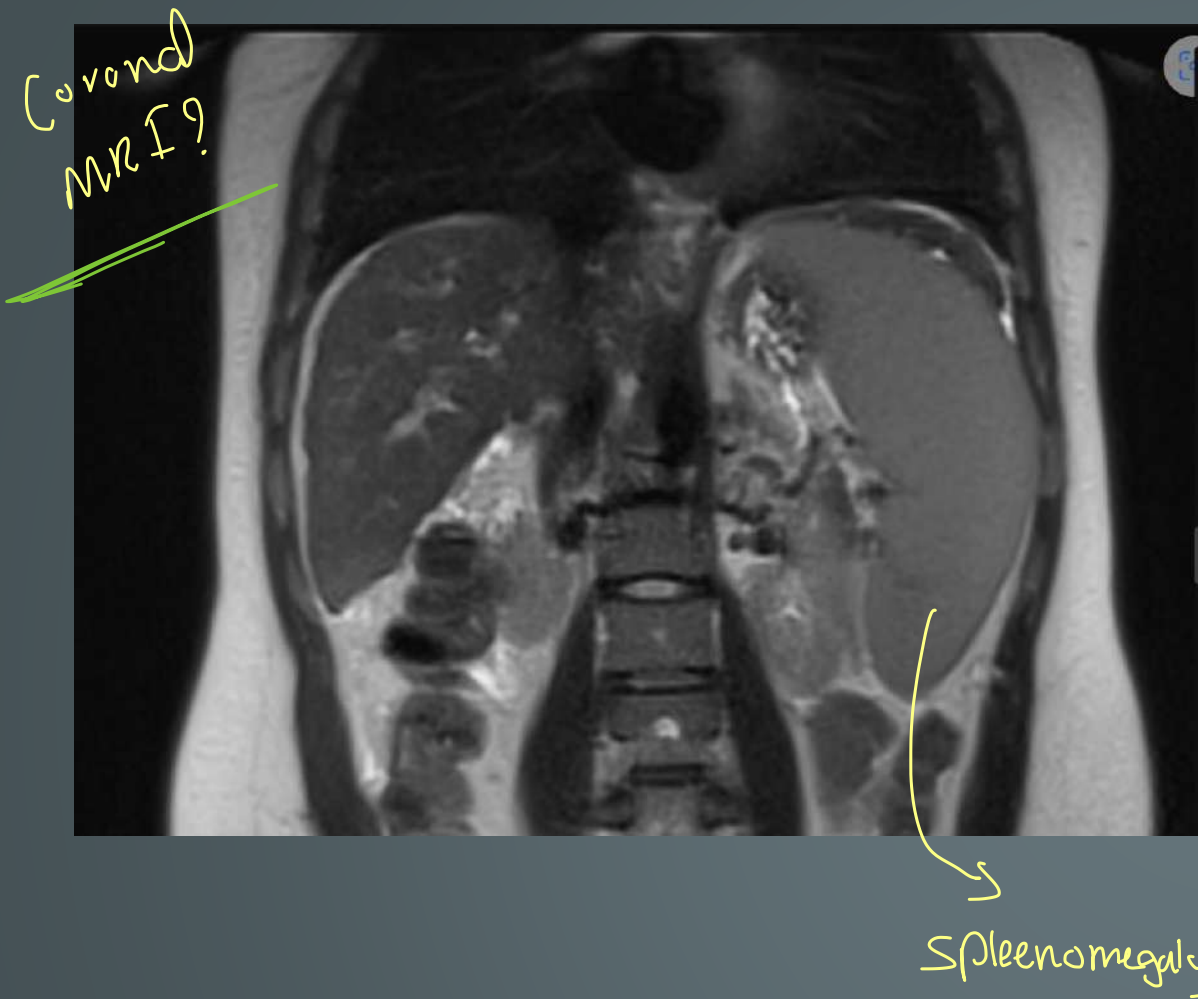
nodular

Fluid

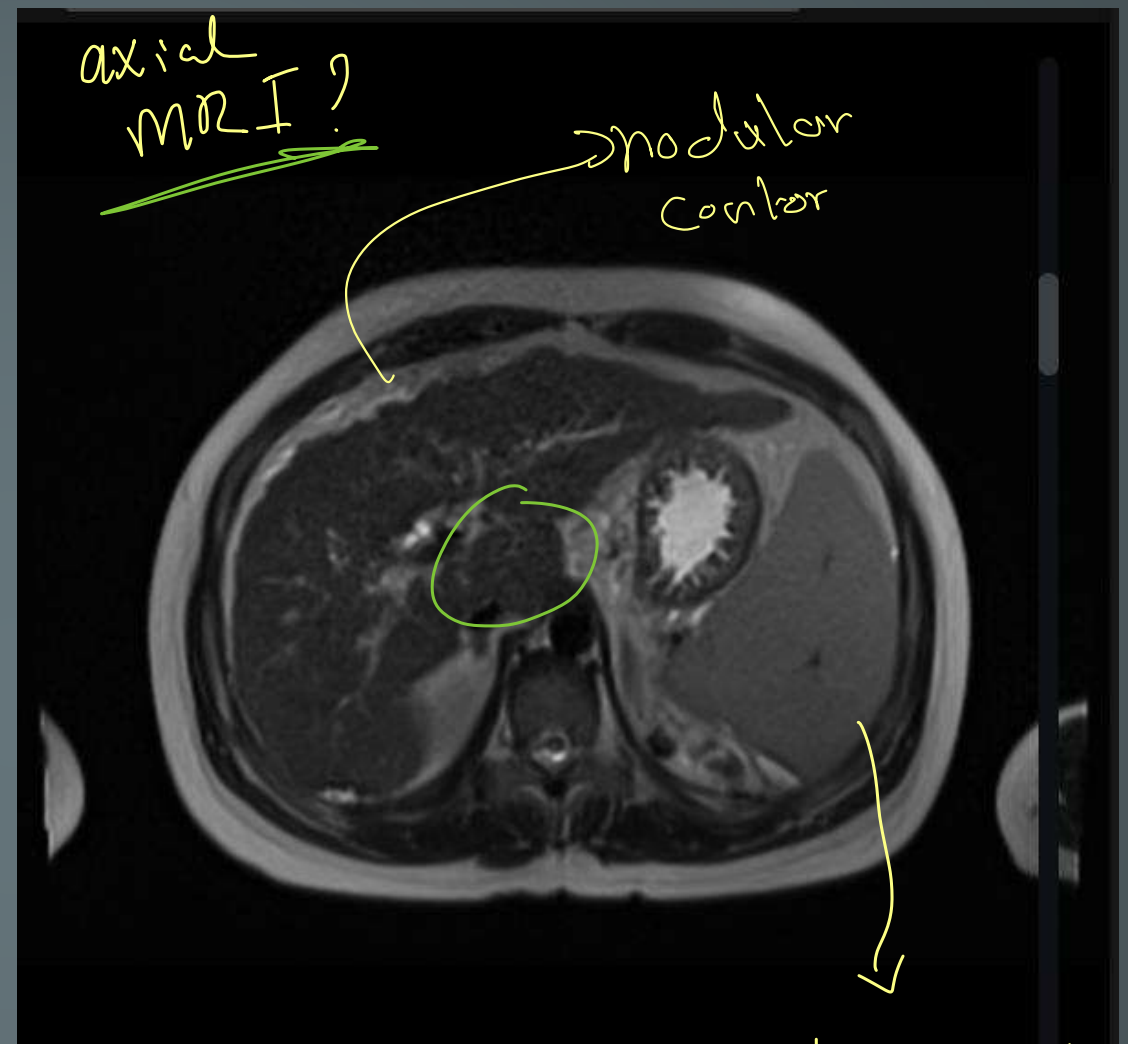
- Noncontrast CT: depending on the extent of fatty infiltration, fibrosis, and regenerating nodules, the hepatic parenchyma may have either homogeneous or heterogeneous decreased attenuation.
- Contrast CT: areas of fibrosis and regeneration may become isodense to parenchyma. The surface of the liver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



caudal lobe hypertrophy



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



Liver Cirrhosis → portal HTN → splenic vein affected

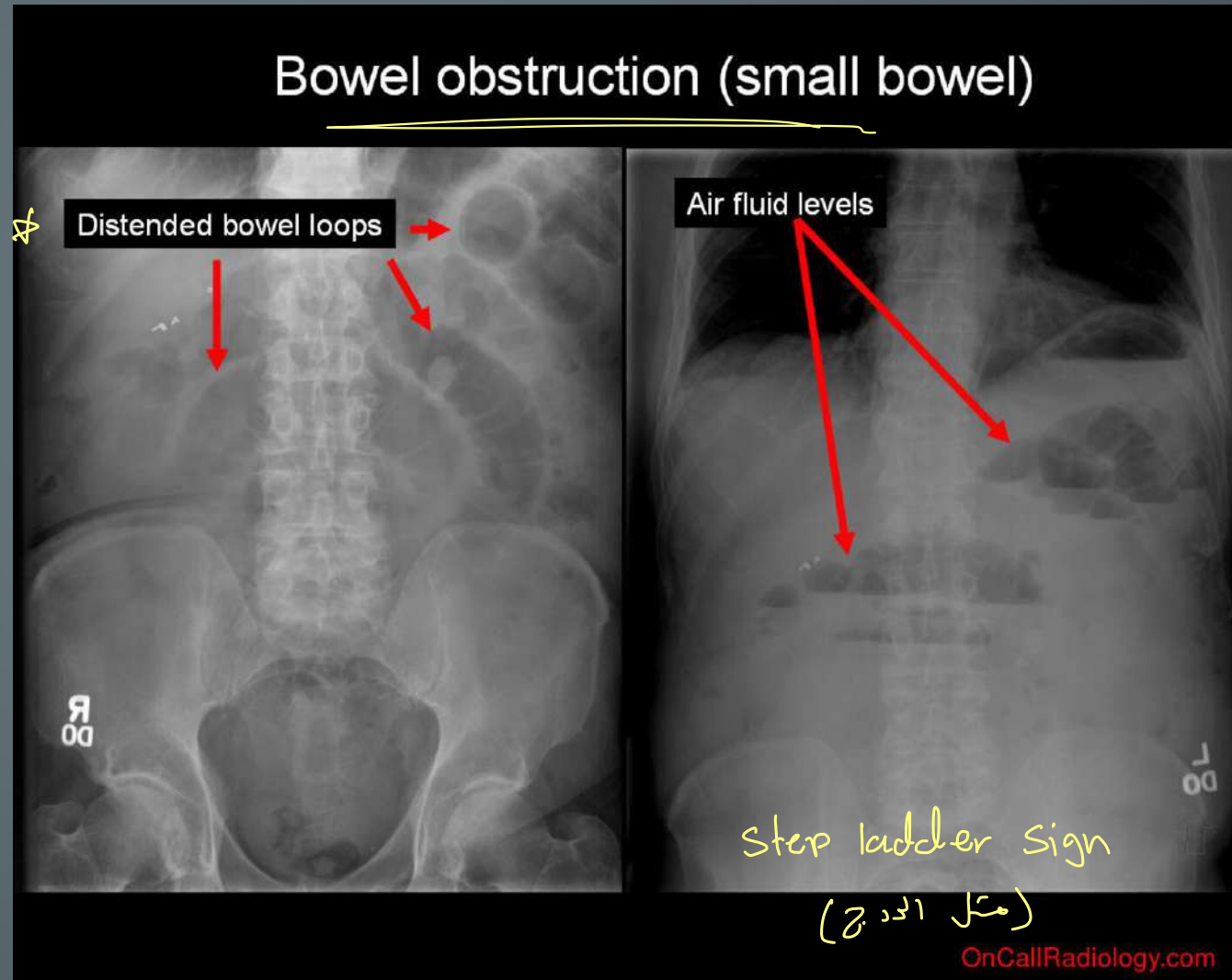
SMALL BOWEL

Normal Small Bowel



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, and bowel wall lesions such as masses or strictures.



* most sensitive CT

Air-fluid
level

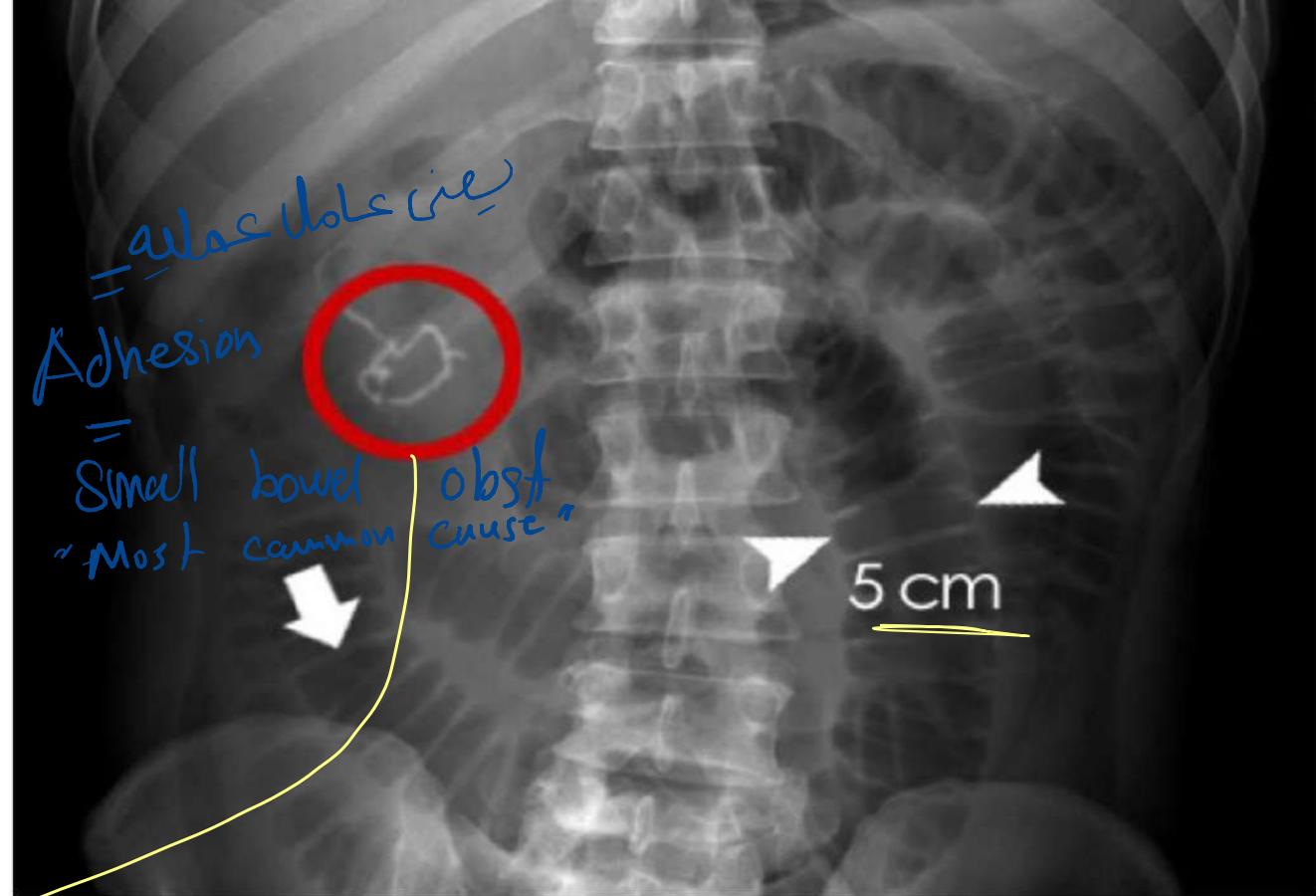
Adhesion
MCC



narrowing
(transition point)

prox.
dilation

> 3cm



X-Ray

Clue for previous
Surgery

Small bowel obstruction - features

- ◆ Centrally located multiple dilated loops of gas filled bowel (**arrowheads**)
- ◆ Valvulae conniventes (**arrow**) are visible - confirming this is small bowel
- ◆ Evidence of previous surgery - note the anastomosis site (**red ring**) - this suggests adhesions is the likely cause of obstruction (confirmed at surgery)

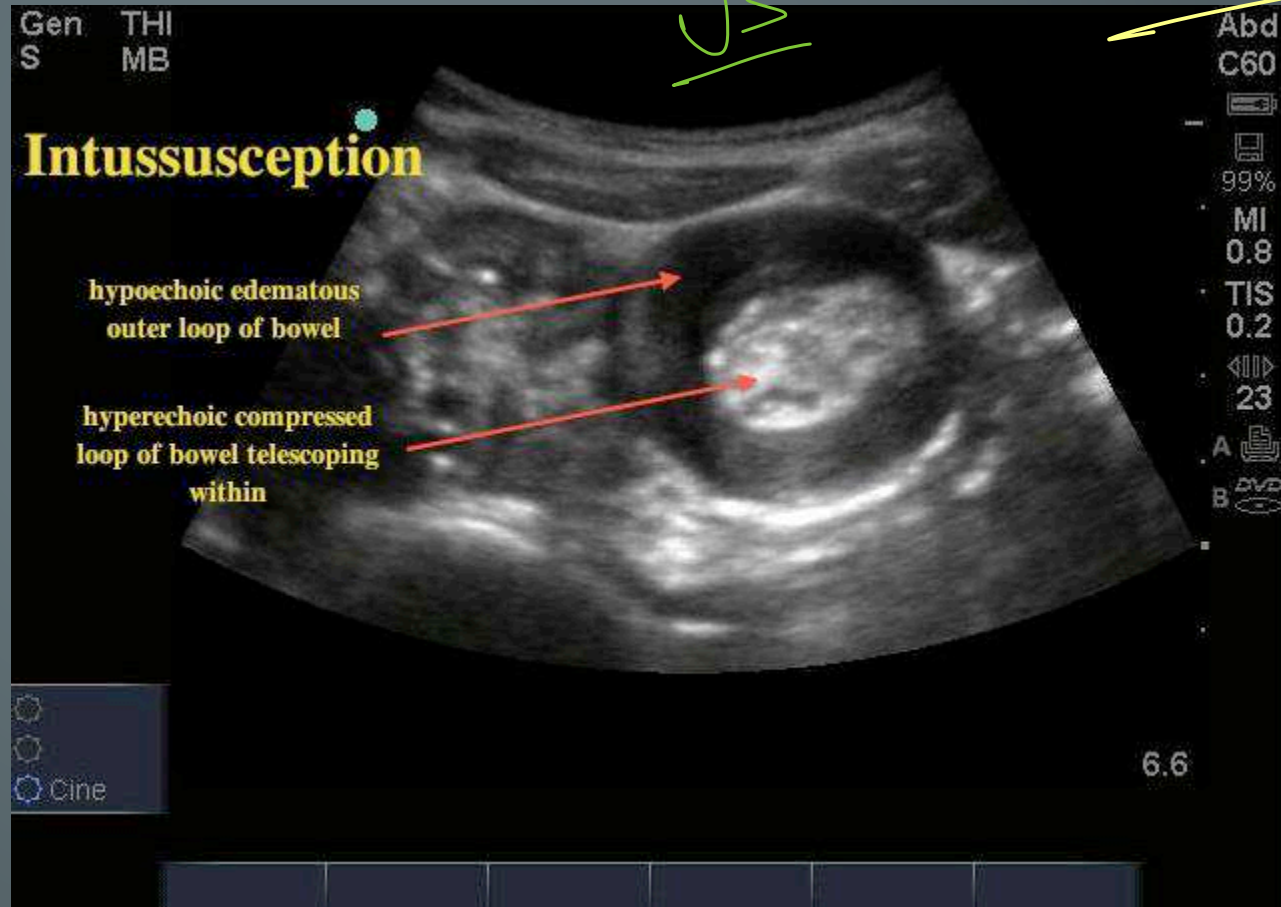
INTUSSUSCEPTION

target or donut
Sign → on US
and CT

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

Adult → lesion

proximal
distal
children
with
Jelly
feces



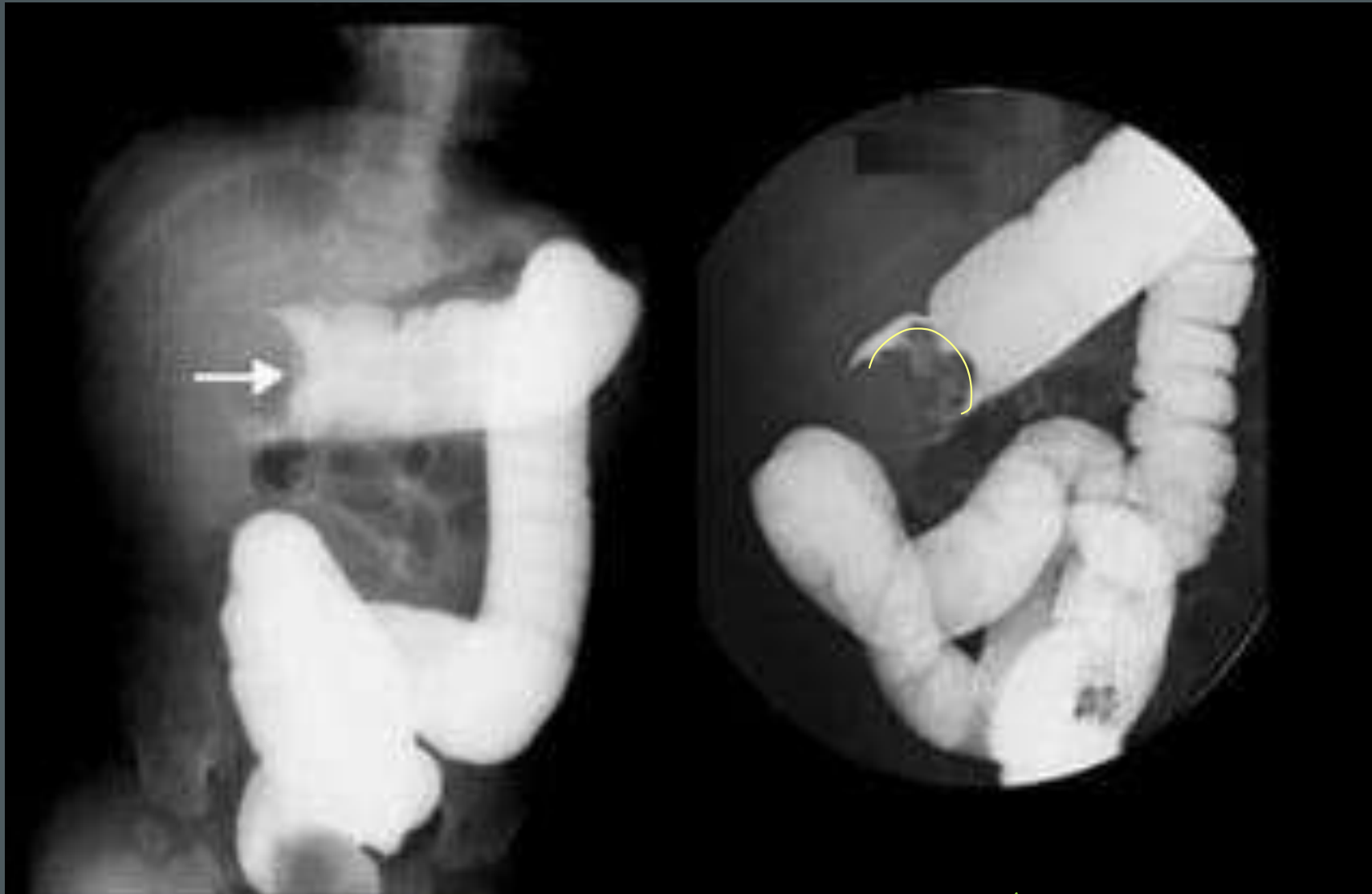
US

P

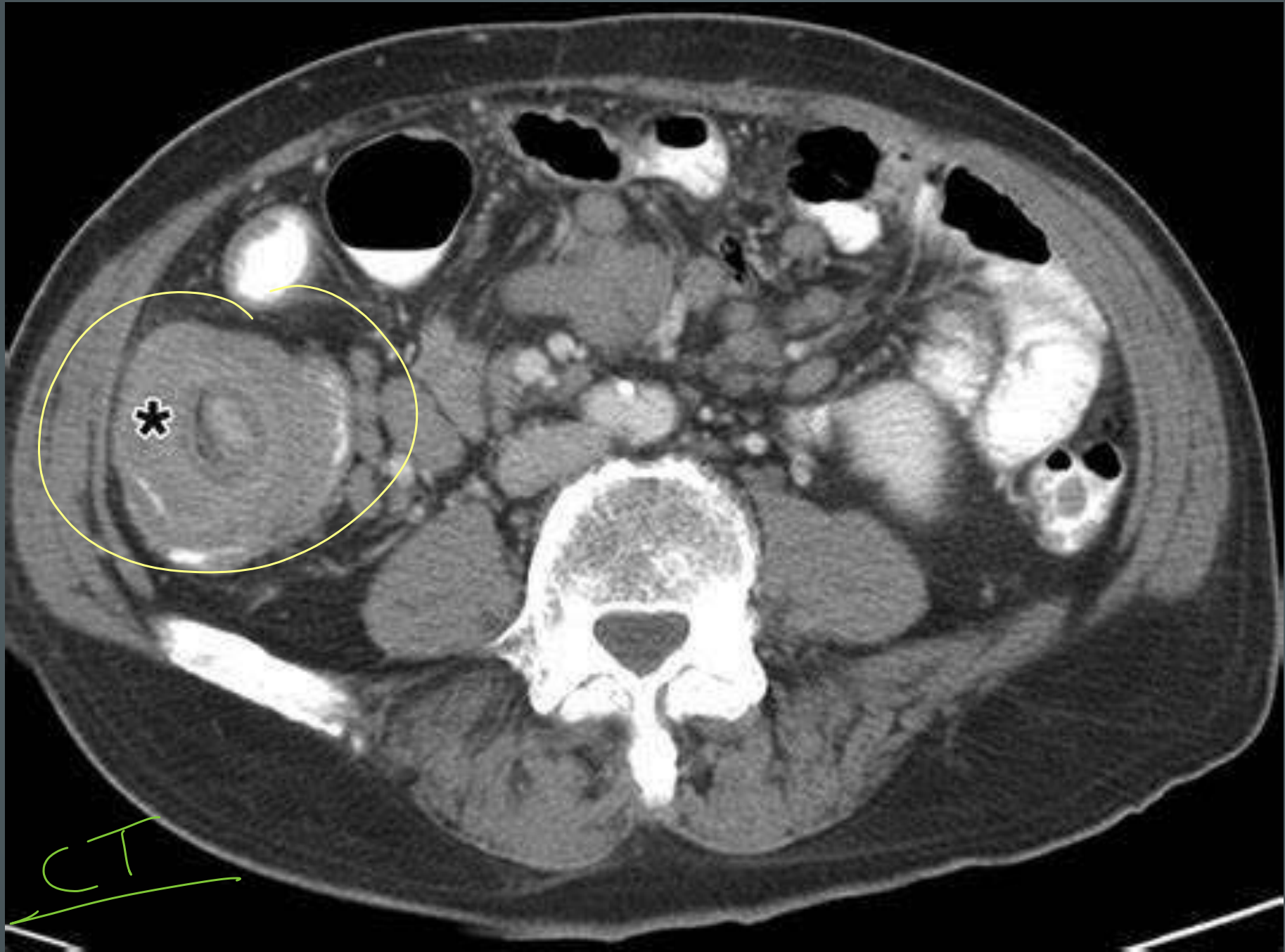
ⓐ
P △ R
4,4 8,8



x



✱ Meniscus sign of intussusception at the hepatic flexure on barium enema. ✱



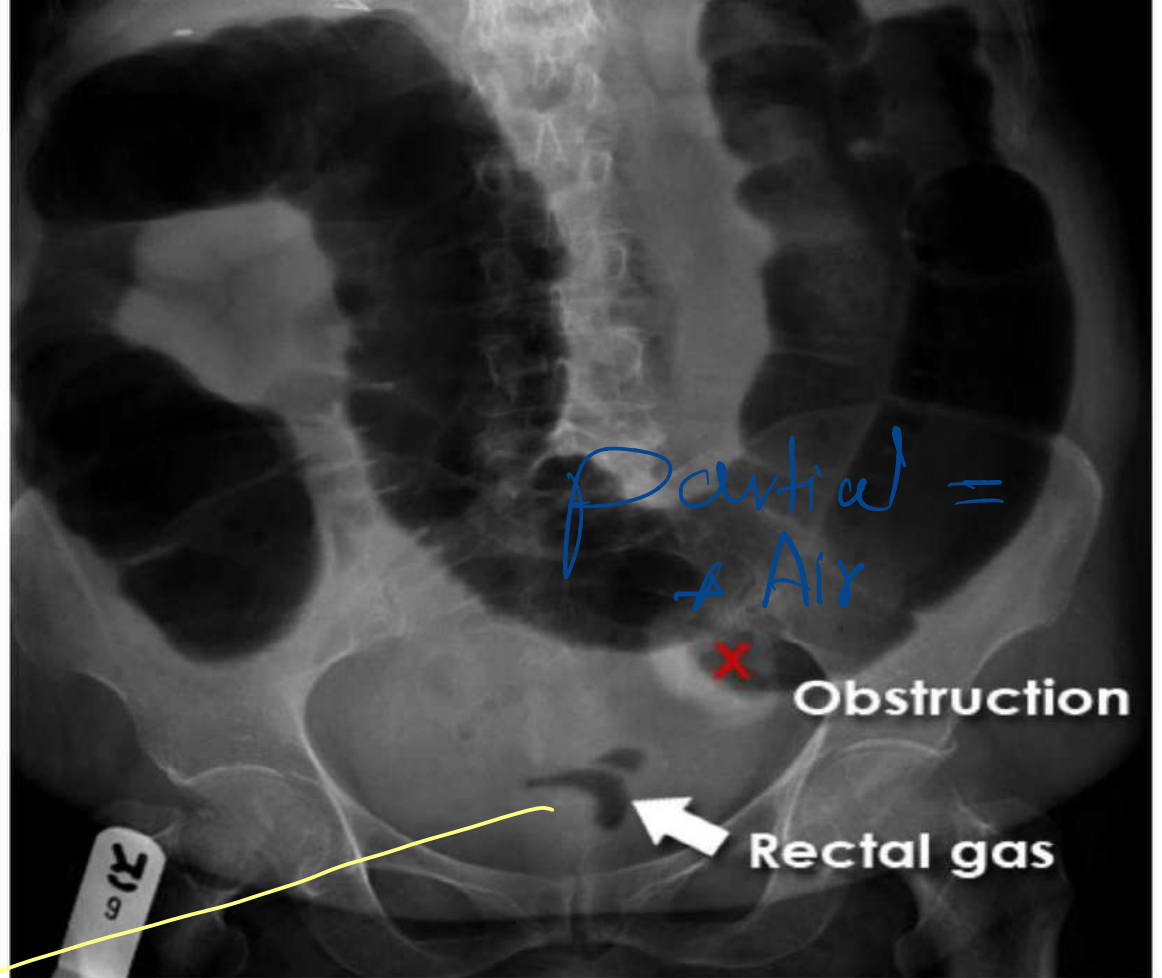
LARGE BOWEL OBSTRUCTION

- Bowel obstruction may be complete or incomplete :
 - • 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

≠ MCC by Cancer → Colon Cancer



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



Air, so it's partial
obstruction

Large bowel obstruction

- ◆ Here the colon is dilated down to the level of the distal descending colon. There is the impression of soft tissue density at the level of obstruction (X). No gas is seen within the sigmoid colon.
- ◆ Obstruction is not absolute in this patient as a small volume of gas has reached the rectum (arrow).
- ◆ An obstructing colon carcinoma was confirmed on CT and at surgery.

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

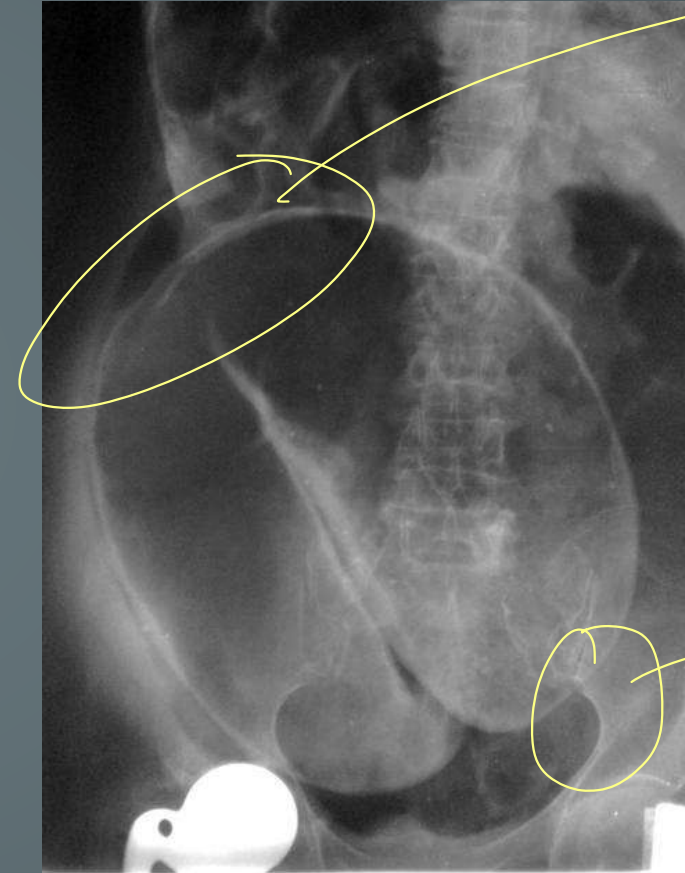
SMALL	LARGE
3cm max diameter	6cm max diameter
Lines all the way across the bowel (Plicae Circulares)	Lines not fully across (Haustra)
Central	Peripheral



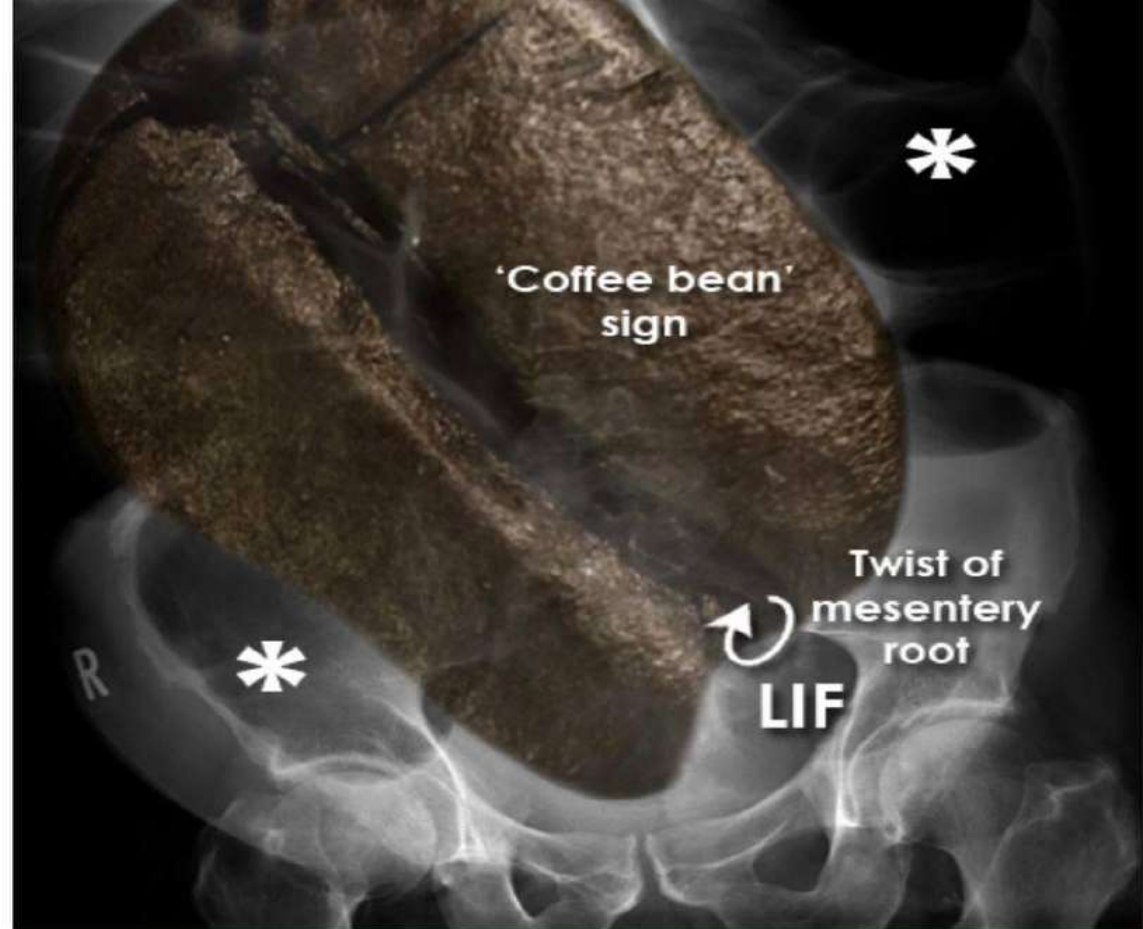
Large Bowel Obstruction

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



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



Sigmoid volvulus - 'coffee bean' sign

- ◆ The sigmoid colon is very dilated because it is twisted at the root of its mesentery in the left iliac fossa (**LIF**). The proximal large bowel is also dilated (**asterisks**).
- ◆ The twisted loop of sigmoid colon is said to resemble a coffee bean. As in this case the loop of dilated sigmoid colon - or 'coffee bean' - usually points upwards towards the diaphragm.
- ◆ This patient is at high risk of perforation and/or bowel ischaemia.

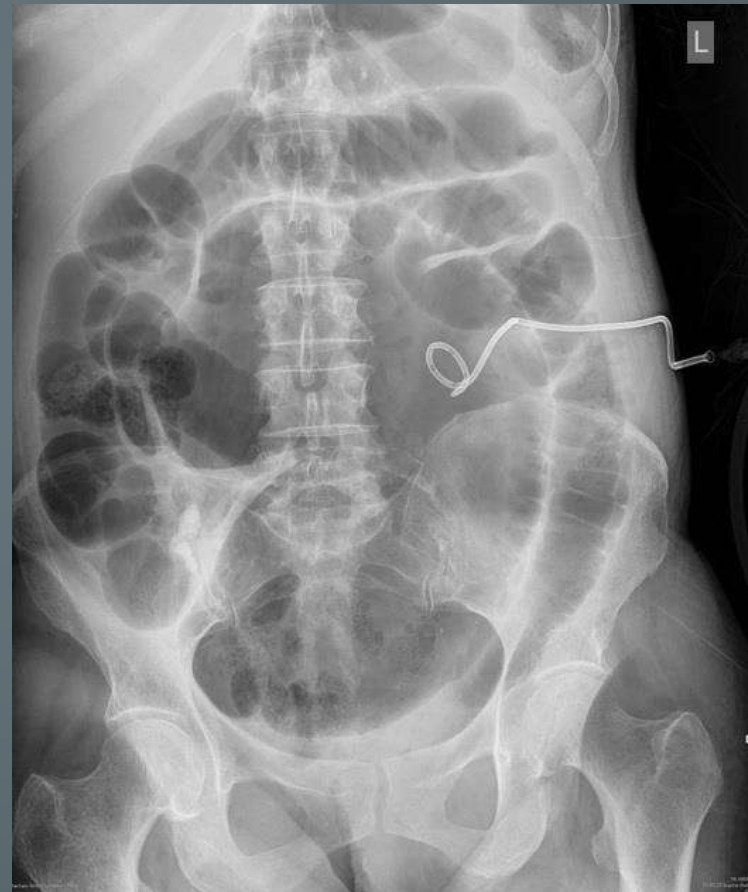
CT?



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

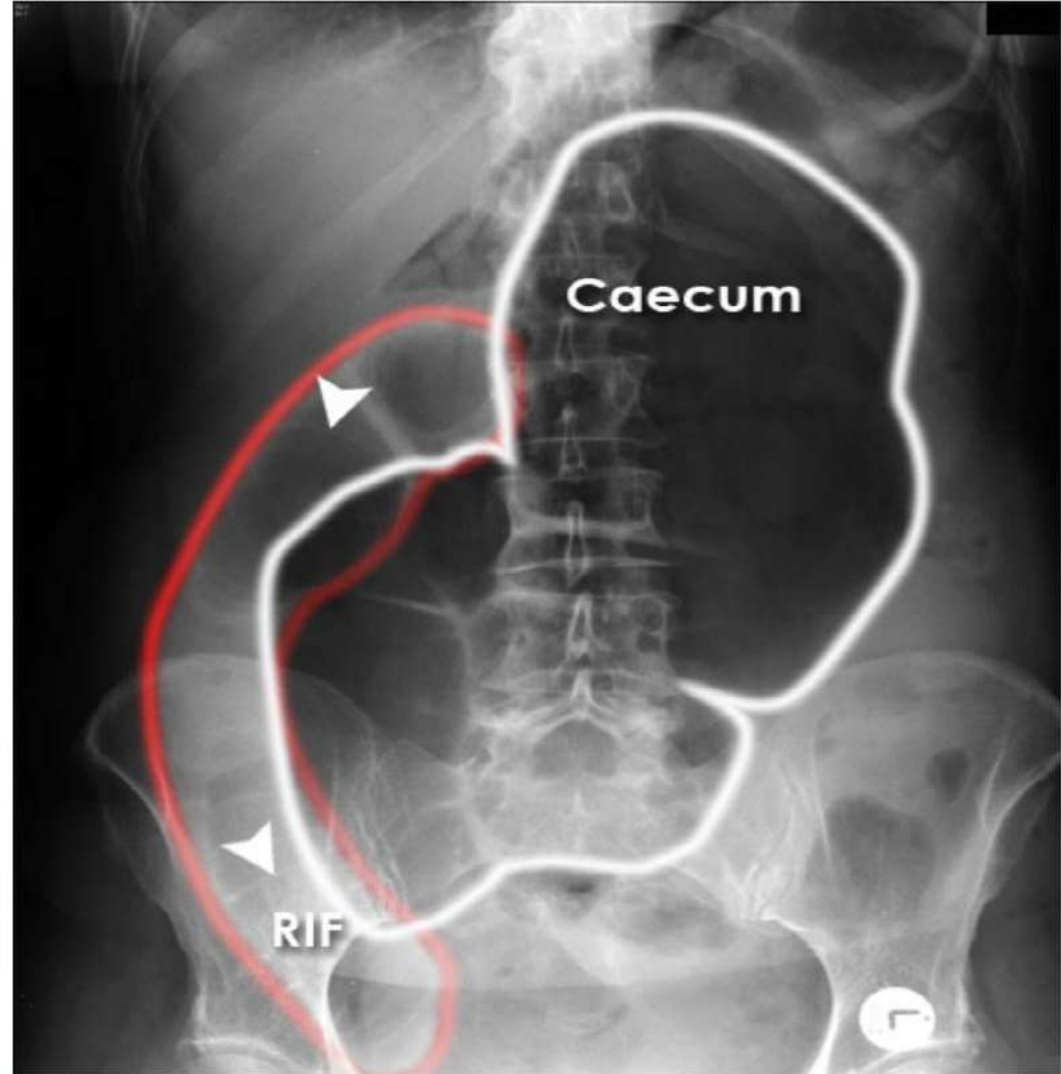
CECAL VOLVULUS

- Cecal volvulus describes torsion of the [cecum](#) around its [mesentery](#) which often results in [obstruction](#). If unrecognised, it can result in [bowel perforation](#) and [fecal peritonitis](#).





embryo
sign



Caecal volvulus

- ◆ The massively dilated caecum no longer lies in the right iliac fossa (RIF). Rather this is occupied by small bowel (red outline). The small bowel is identified by the valvulae conniventes - mucosal folds that cross the full width of the bowel (arrowheads). Caecal volvulus was confirmed at laparotomy.

PNEUMOPERITONEUM

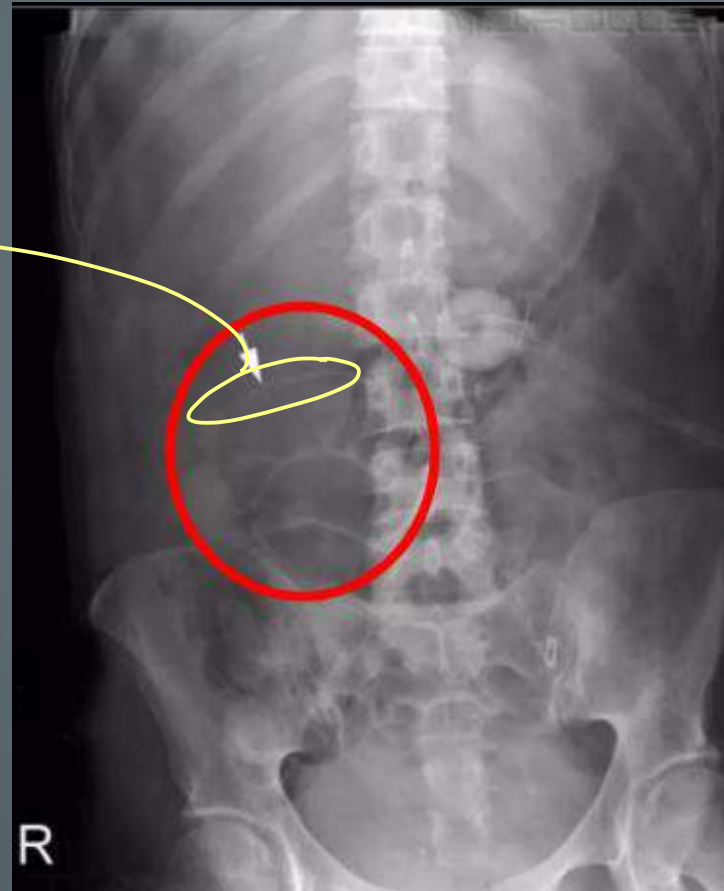
- Describes gas within the peritoneal cavity, often due to critical illness.
- The most common cause of pneumoperitoneum is the disruption of the wall of a hollow viscus, mc perforated ulcer.

SIGNS

Wall - من براو من جود هوا

- Rigler sign

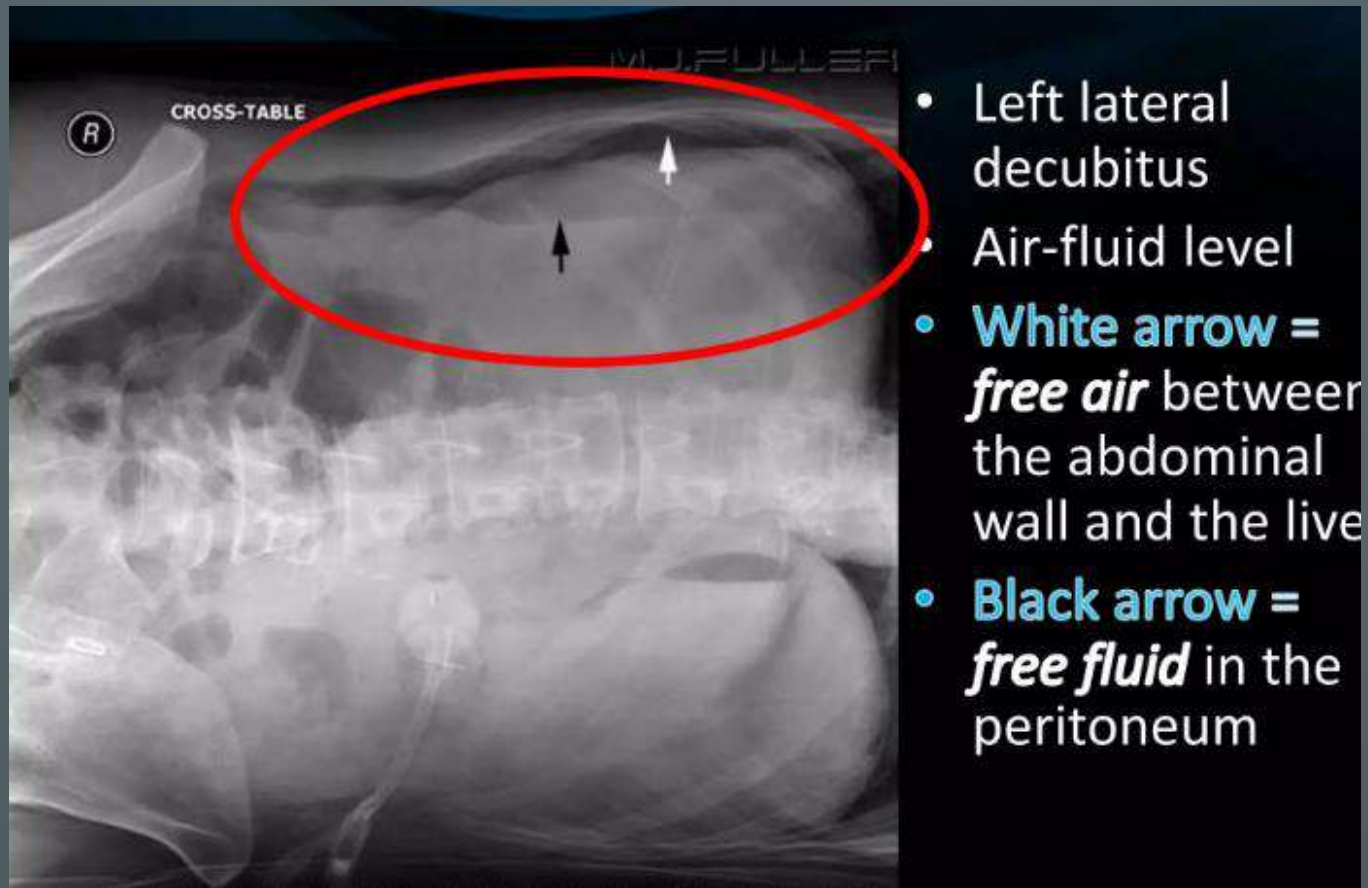
free air



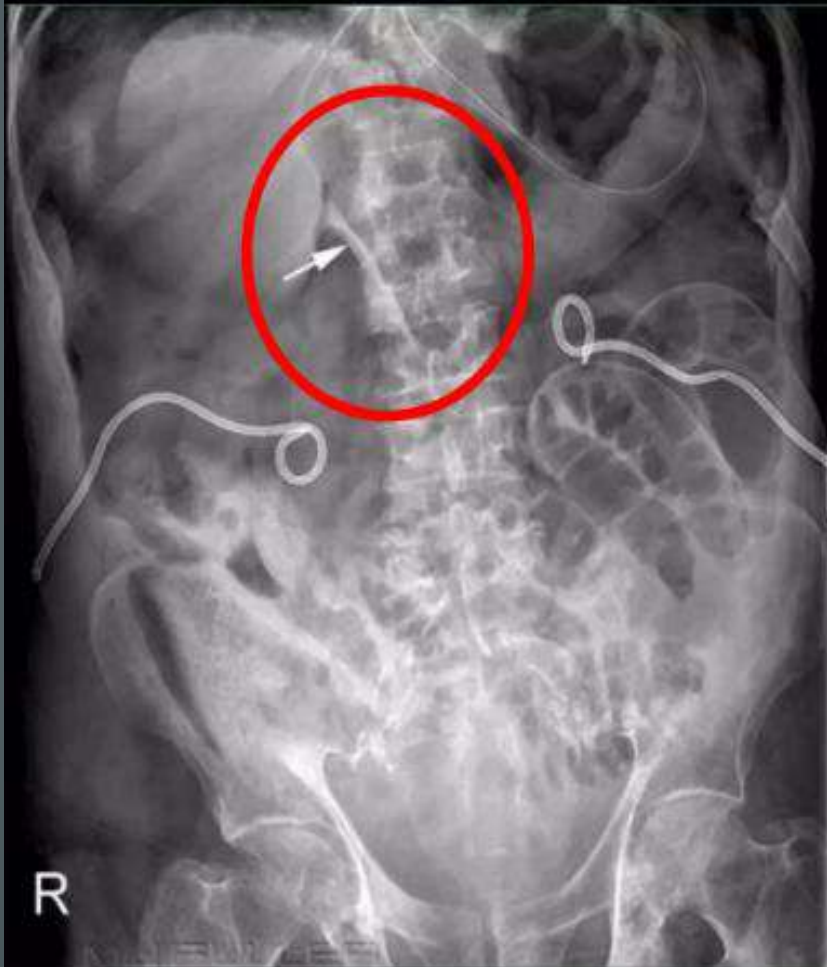
- Supine
- Bowel wall **outlined by intraluminal & extraluminal air** (extraluminal = free peritoneal gas)
- **Both sides** of bowel wall can be seen (red arrows)



DECUBITUS ABDOMEN SIGN



FALCIFORM LIGAMENT SIGN



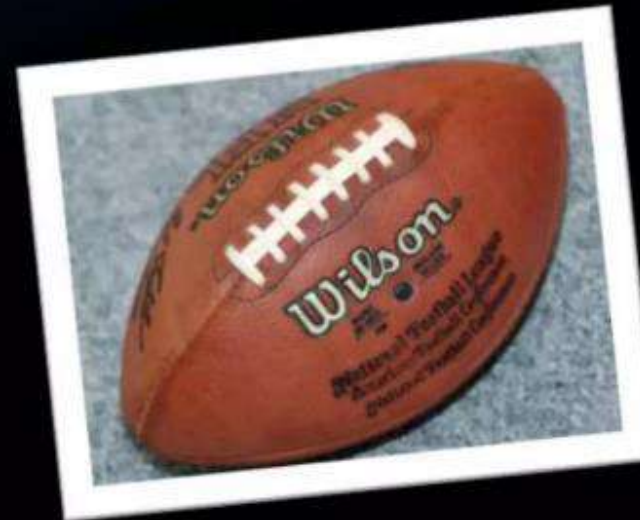
- Supine
- Falciform ligament
 - ✧ – connects the anterior abdominal wall to the liver
 - ✧ – extends inferiorly beyond the liver → becomes round ligament
 - becomes **outlined with air** in a patient with free abdominal gas

FOOTBALL SIGN

في الأضلاع
لأنه حساسة
بجانبها
صغيرة
فأني شوية
هوا
كسك بشفط
البطن



- massively air-filled
peritoneum

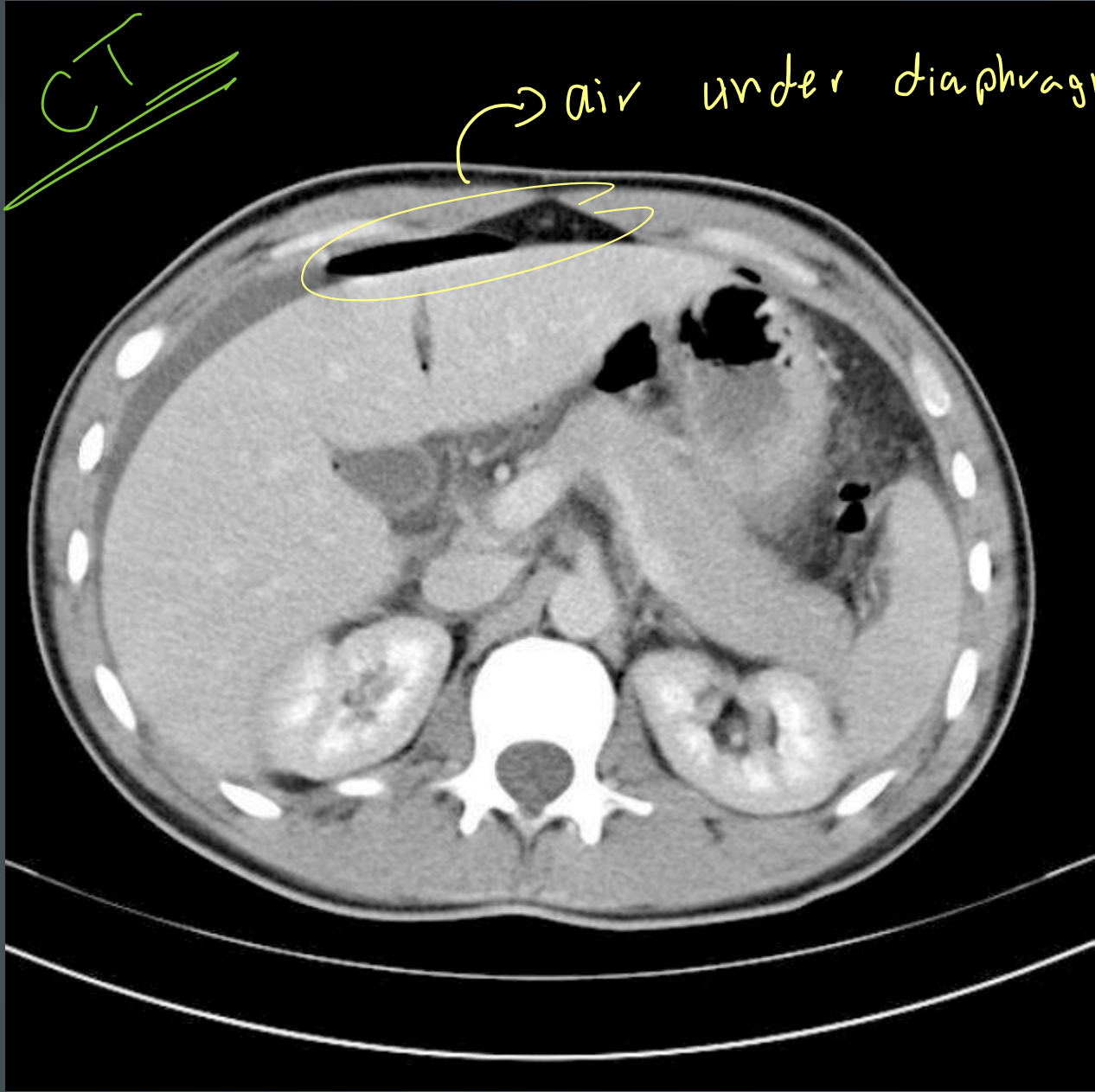


CONTINUOUS DIAPHRAGM SIGN



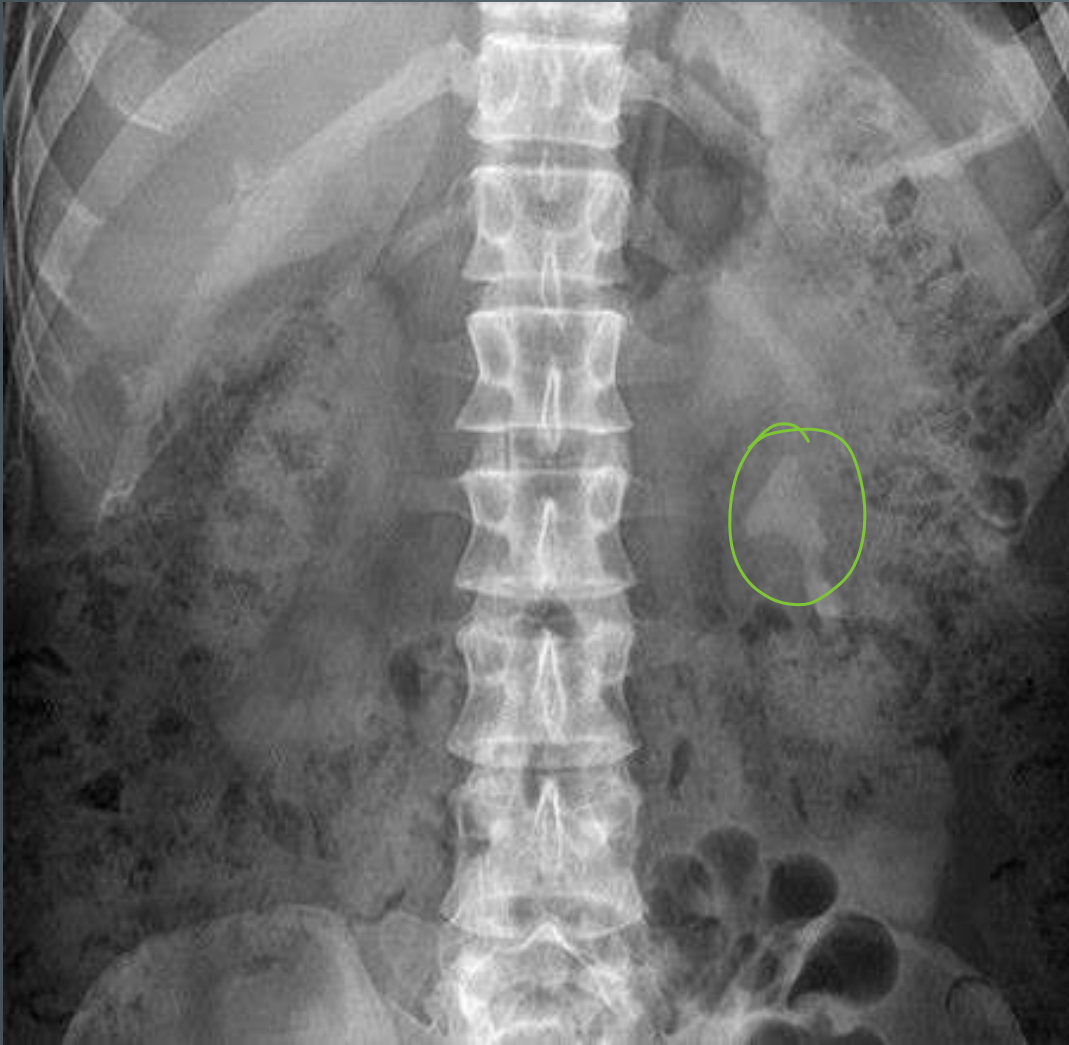
- massive pneumoperitoneum → sufficient air beneath the diaphragm
- left & right hemidiaphragms contrasted by the free gas appear as a **continuous structure**

* 2-hemidiaphragms at the same levels.



ABDOMINAL PLAIN FILM CASES

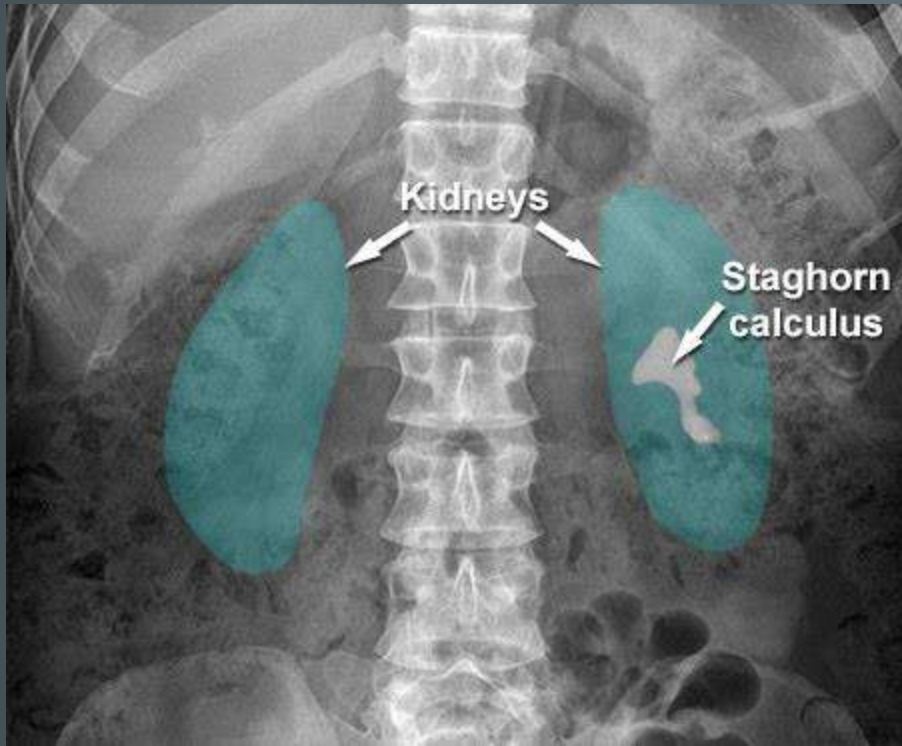
CASE 1



What is the cause of the abnormal calcification?

- ☐ Adrenal calcification
- ☐ Appendicolith
- ☐ Gallstones
- ☐ Pancreatic calcification
- ☒ Staghorn renal calculus

CASE 1



An irregularly shaped calcified area is located over the left kidney. It resembles a staghorn, hence 'staghorn calculus'

CASE 2



Patient with severe abdominal pain. What does the image show?

☐

Ascites

☐

Lead pipe colon

☐

Normal gas pattern

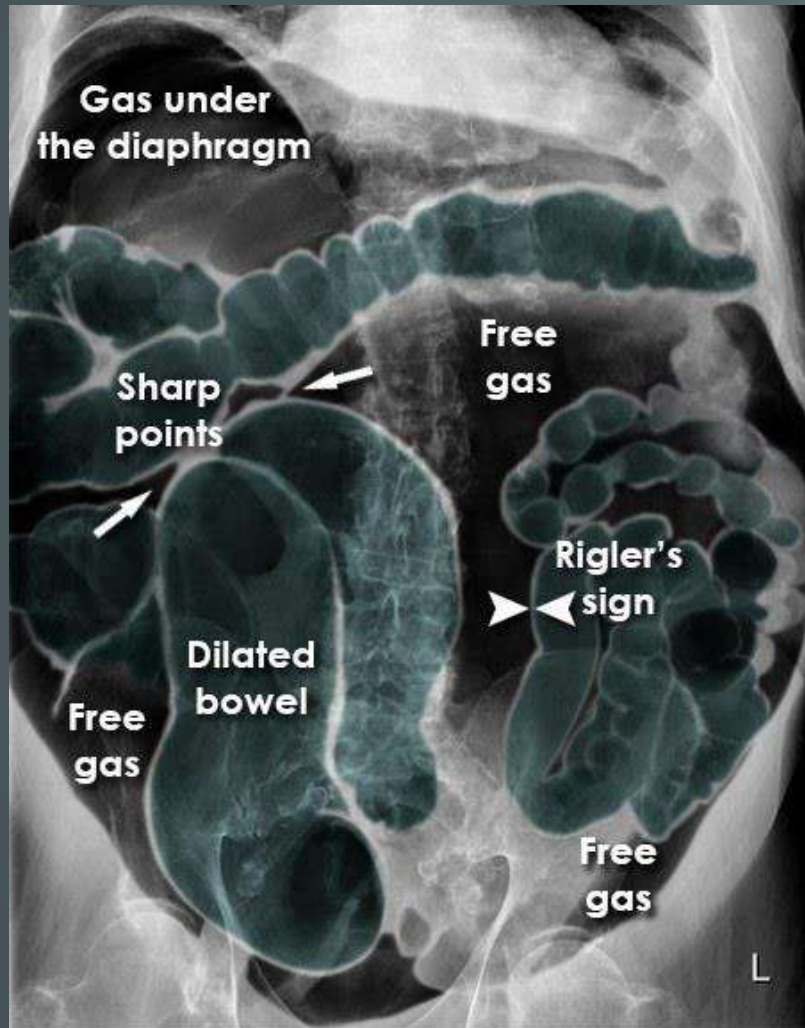
☒

Rigler's/ double wall sign

☐

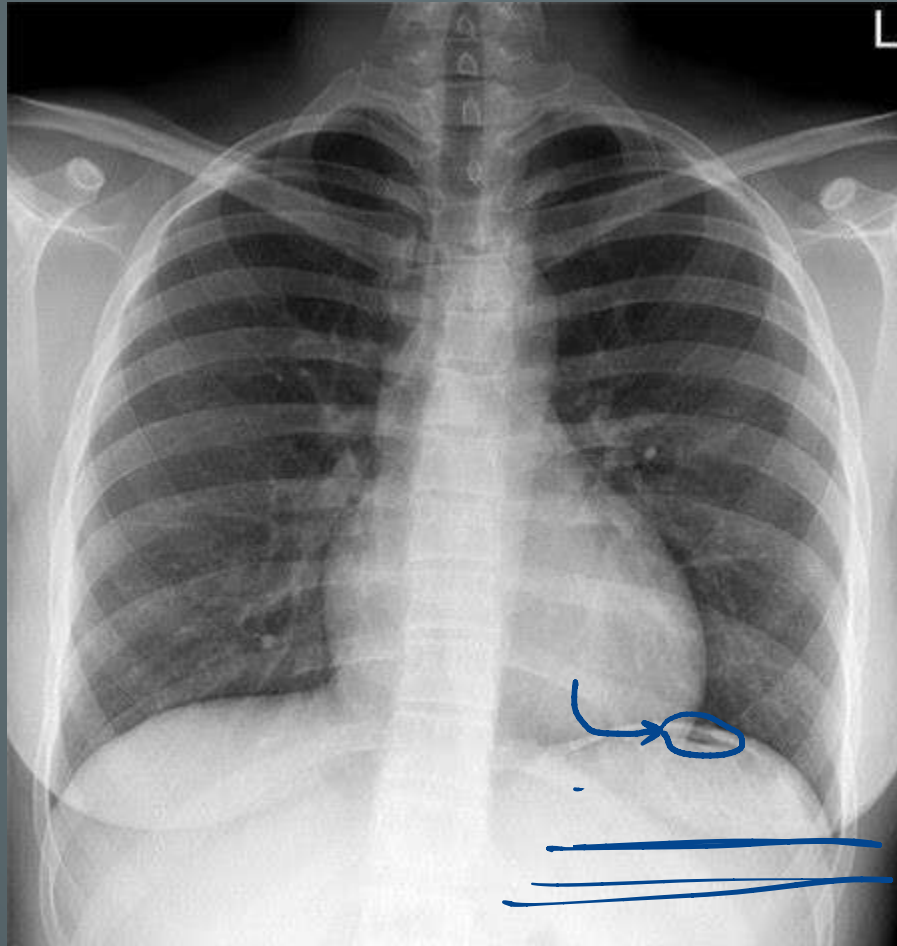
Thumbprinting

CASE 2



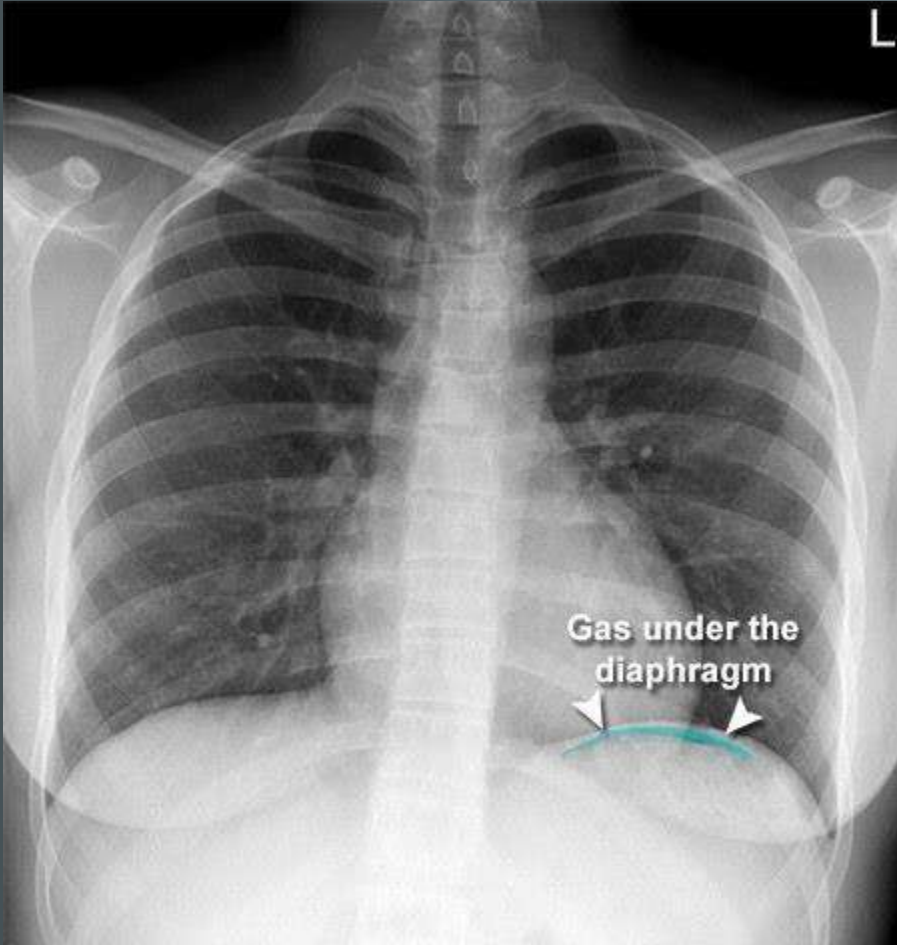
Free gas (pneumoperitoneum) can be seen on both sides of the bowel wall. This is Rigler's sign or the double wall sign.

CASE 3



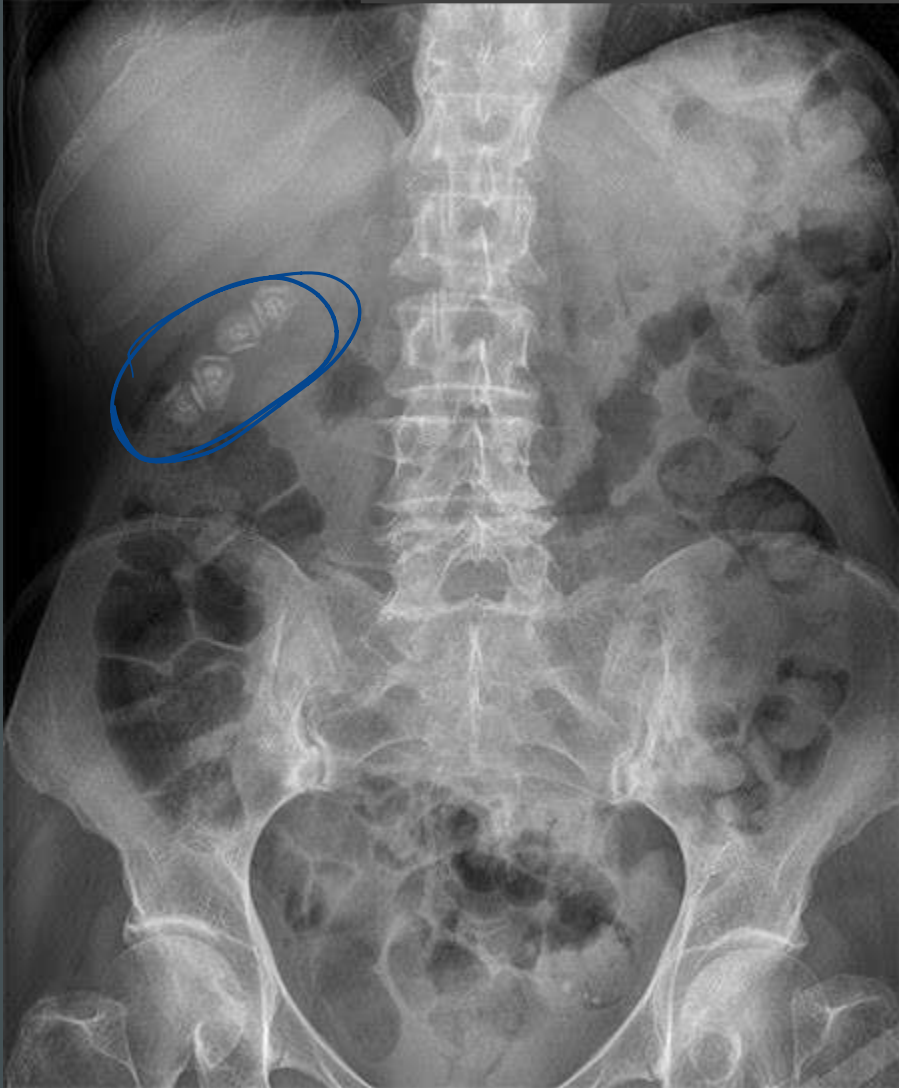
Free ear → x
Air papillae → ✓

CASE 3 ➡



An erect chest X-ray is more sensitive for detection of free gas than an abdominal X-ray. This image shows a small volume of free gas under the left hemidiaphragm. This may be seen following abdominal surgery, but in the context of a patient presenting with abdominal pain this finding indicates perforation.

CASE 4



What is the cause of the abnormal calcification?

☐

Appendicolith

☐

Adrenal calcification

☒

Gallstones

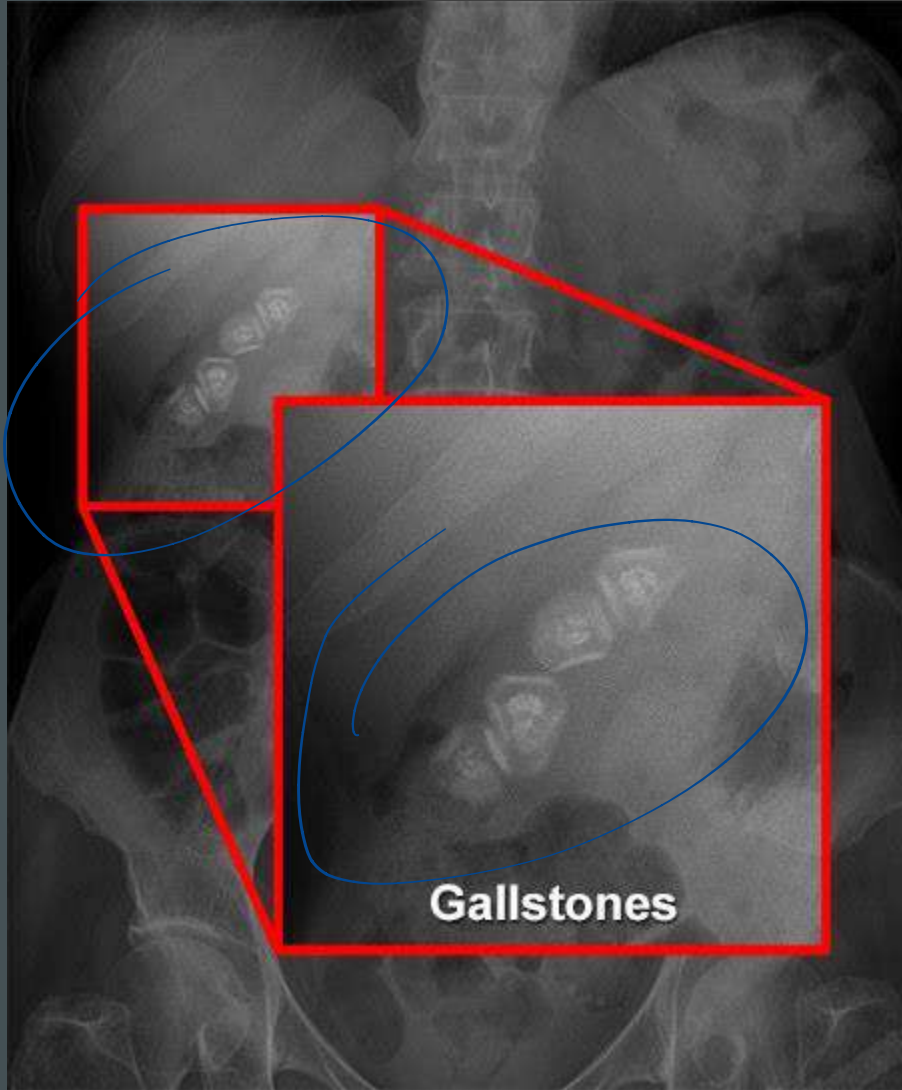
☐

Pancreatic calcification

☐

Staghorn renal calculus

CASE 4



10-15% of gallstones are calcified sufficiently to be visible on an abdominal X-ray. They have very varied appearances and are frequently asymptomatic – as was the case in this patient.

next step vs

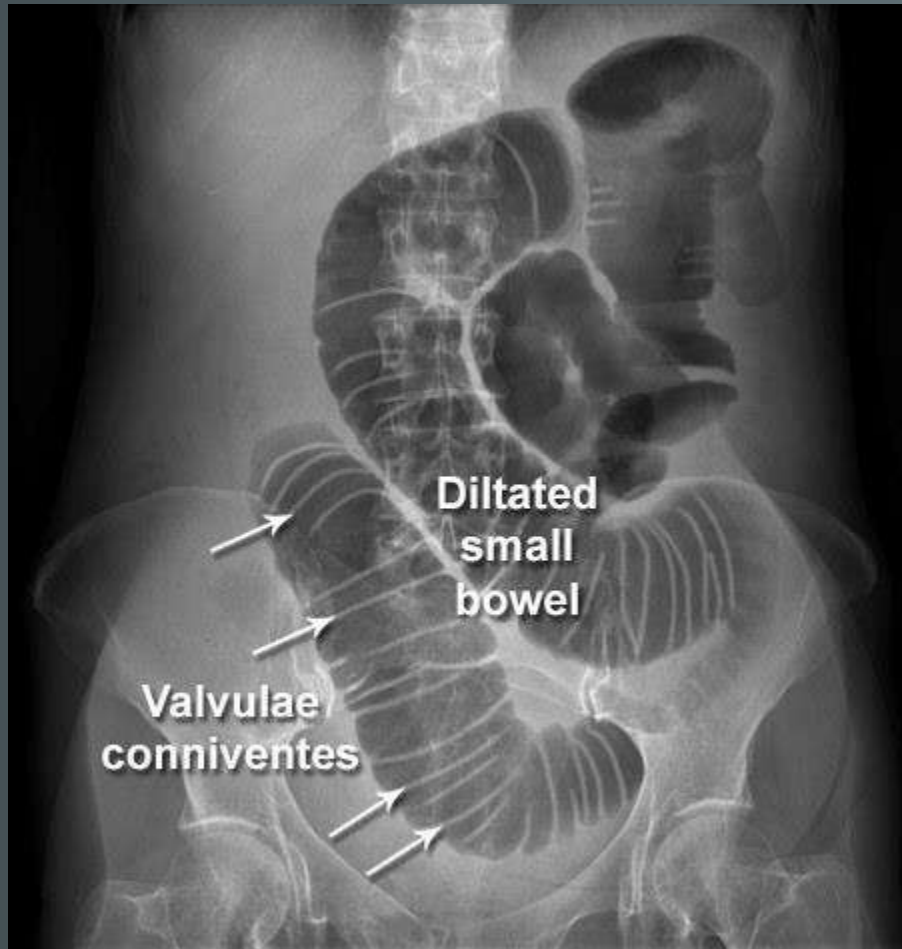
CASE 5



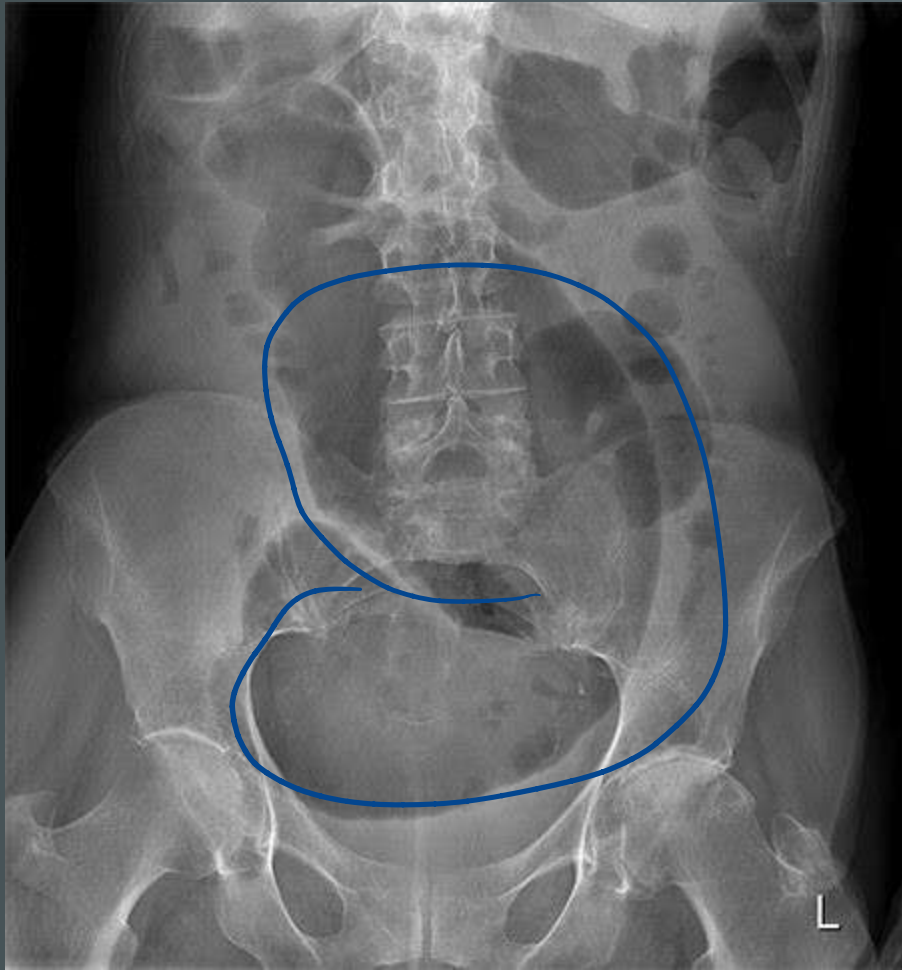
24-year-old patient with suspected appendicitis. What does the image show?

- ☐ Caecal volvulus
- ☐ Normal appearances
- ☐ Pneumoperitoneum
- ☒ Small bowel obstruction
- ☐ Toxic megacolon

CASE 5



Dilated loops of bowel with valvulae conniventes – lines crossing the full width of the bowel – indicates small bowel obstruction.

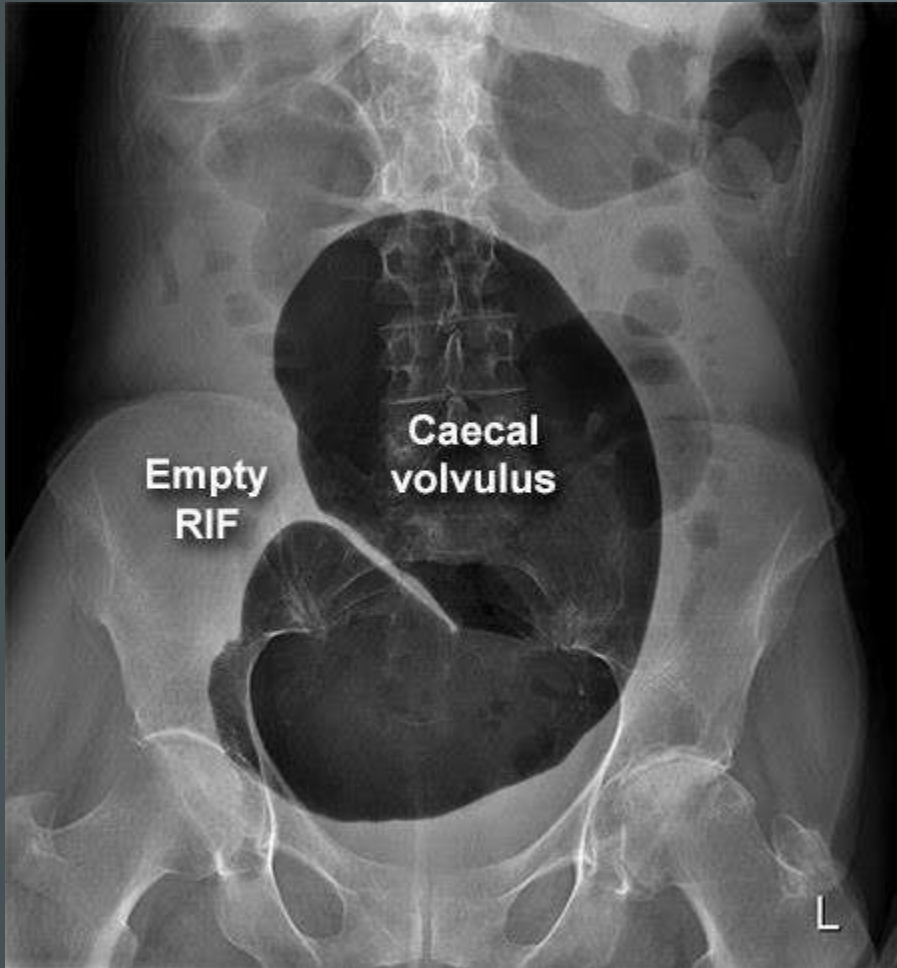


CASE 6

Patient with severe abdominal pain. What is the cause of pain demonstrated on this abdominal X-ray?

- ☒ Caecal volvulus
- ☐ Normal appearances
- ☐ Pneumoperitoneum
- ☐ Small bowel obstruction
- ☐ Toxic megacolon

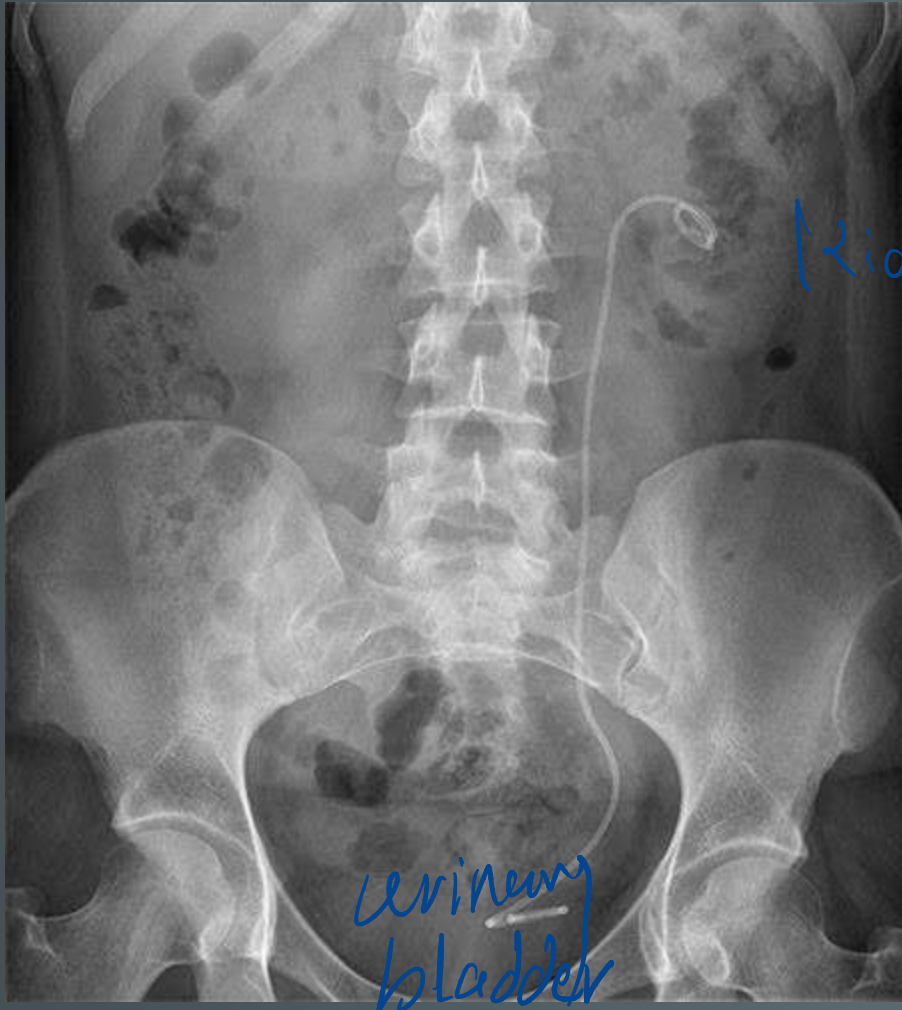
CASE 6



embryo sign

There is a segment of very dilated gas-filled bowel. The right iliac fossa (RIF) is empty indicating displacement of the caecum. These are typical appearances of caecal volvulus.

CASE 7



What is the artifact shown in this image?

☐

Biliary stent

☐

Colonic stent

☐

External tubing

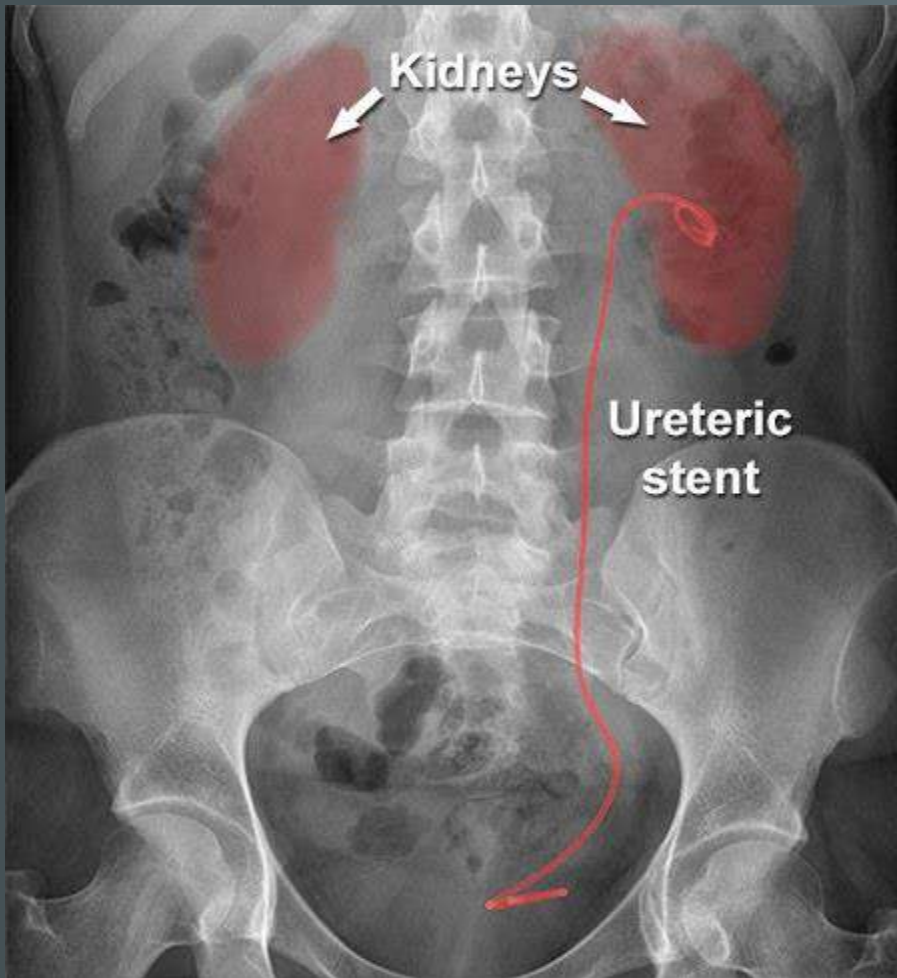
☐

Percutaneous nephrostomy tube

☒

Ureteric stent

CASE 7



This patient presented with an obstructed left ureter due to a renal stone. A ureteric stent was inserted – also known as a JJ-stent or a pig-tail catheter – which passes from the renal pelvis to the bladder. Percutaneous nephrostomy tubes pass through the abdominal wall to the renal pelvis.

CASE 8



bone dense

Patient with abdominal pain. What does the image show?

☐

Ascites

☒

Bone metastases

☐

Pneumoperitoneum

☐

Poor quality image which should be repeated

☐

Thumbprinting

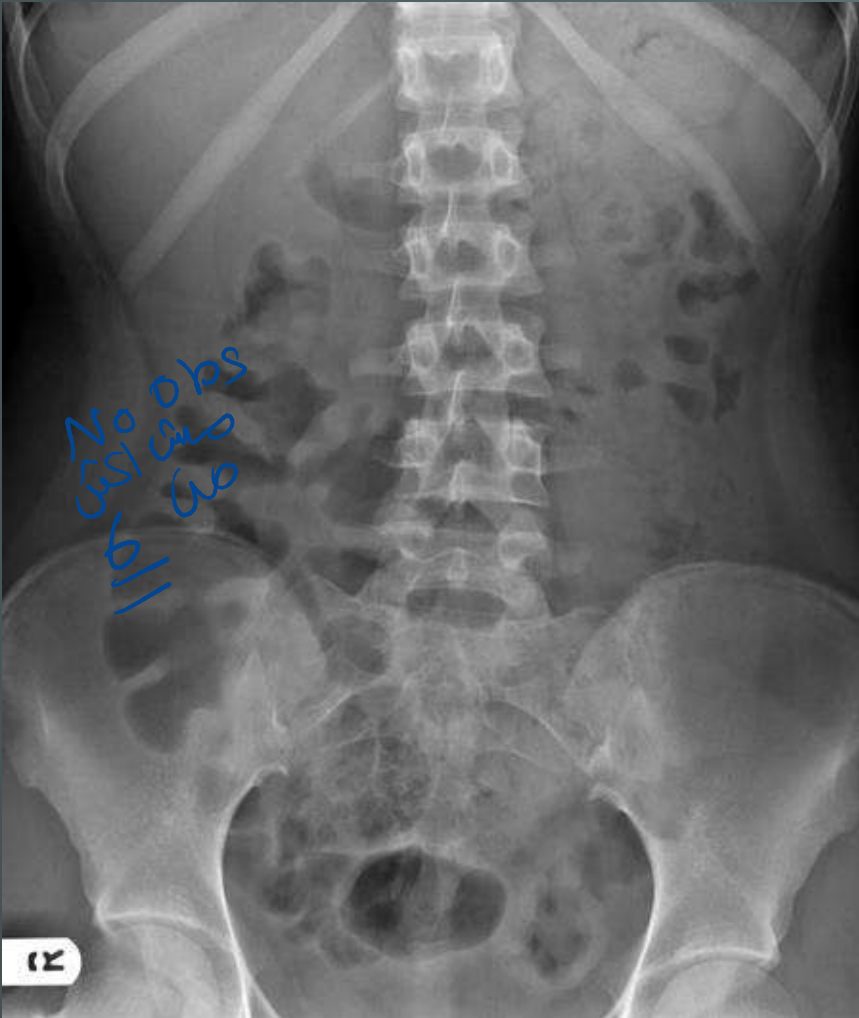
CASE 8



The bones should be checked whenever viewing an abdominal X-ray. In this image the bones of the spine and pelvis are much too dense.

These are the typical appearances of sclerotic bone metastases. In this case the patient had metastatic prostate cancer.

CASE 9

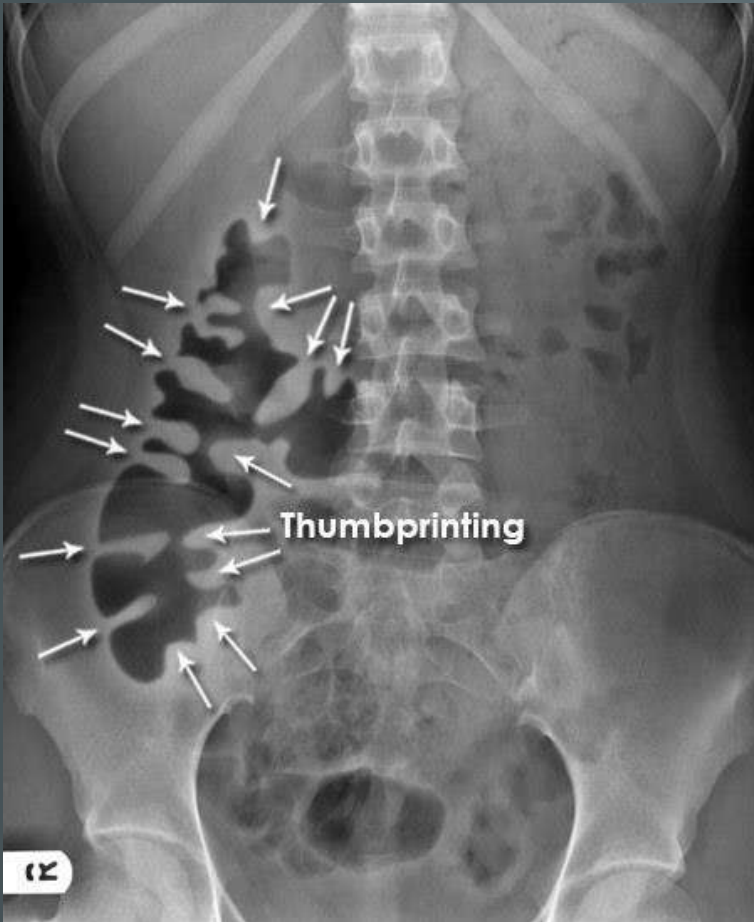


Patient with history of ulcerative colitis. What radiological finding is shown?

- ☐ Coffee bean sign
- ☐ Large bowel obstruction
- ☐ Normal appearances
- ☐ Rigler's/ double wall sign
- ☒ Thumbprinting

Handwritten blue text: * (S) ١٢

CASE 9



Inflammation of the bowel wall leads to thickening of the haustral folds. This results in the radiological sign of thumbprinting, a characteristic finding in patients with active ulcerative colitis.

THANK YOU