431

Radiology Team

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Lecture 13: Radiology of GI and Hepatobiliary System (Interactive Lecture)

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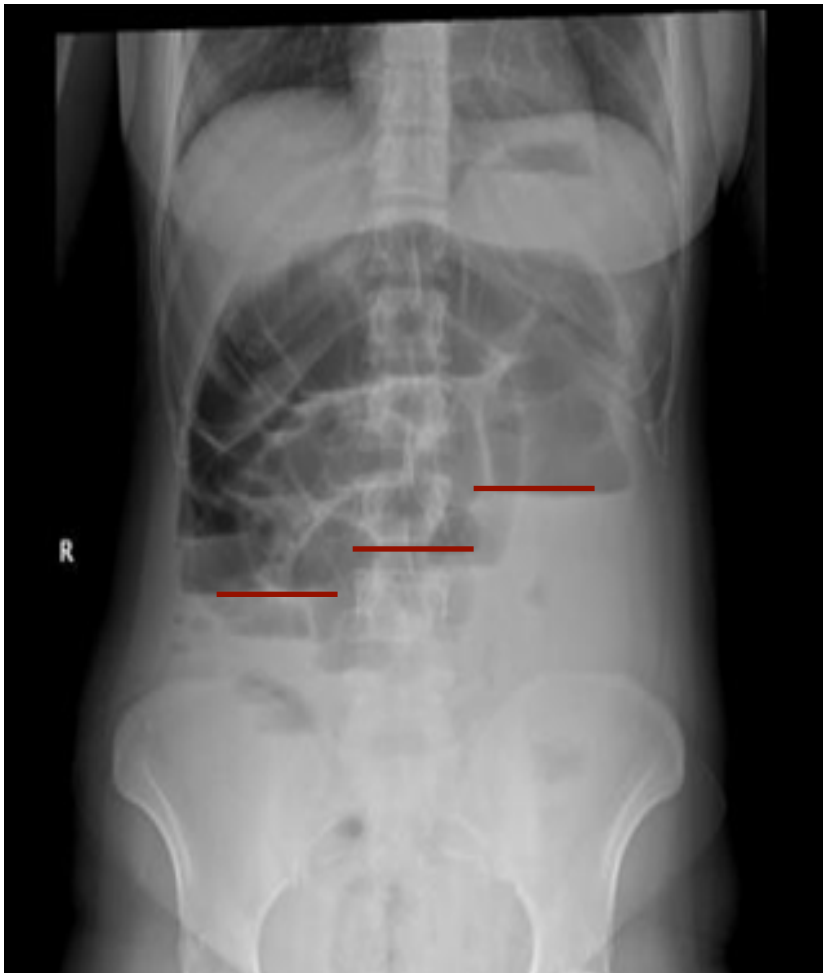
Revised By: Lama AlShwairikh

◆Important ◆Doctor's notes ◆Team's notes.

1) Regarding slides 41-56 (in this file), we've already taken them in lecture 12 with Dr. AlShami.

2) The doctor who gave this lecture stopped at "Gallstone ilius" slide and said "The rest of the lecture is interesting for you to read, but it's not going to be in the exam". But again, we took some of the rest in the last lecture with Dr. AlShami.

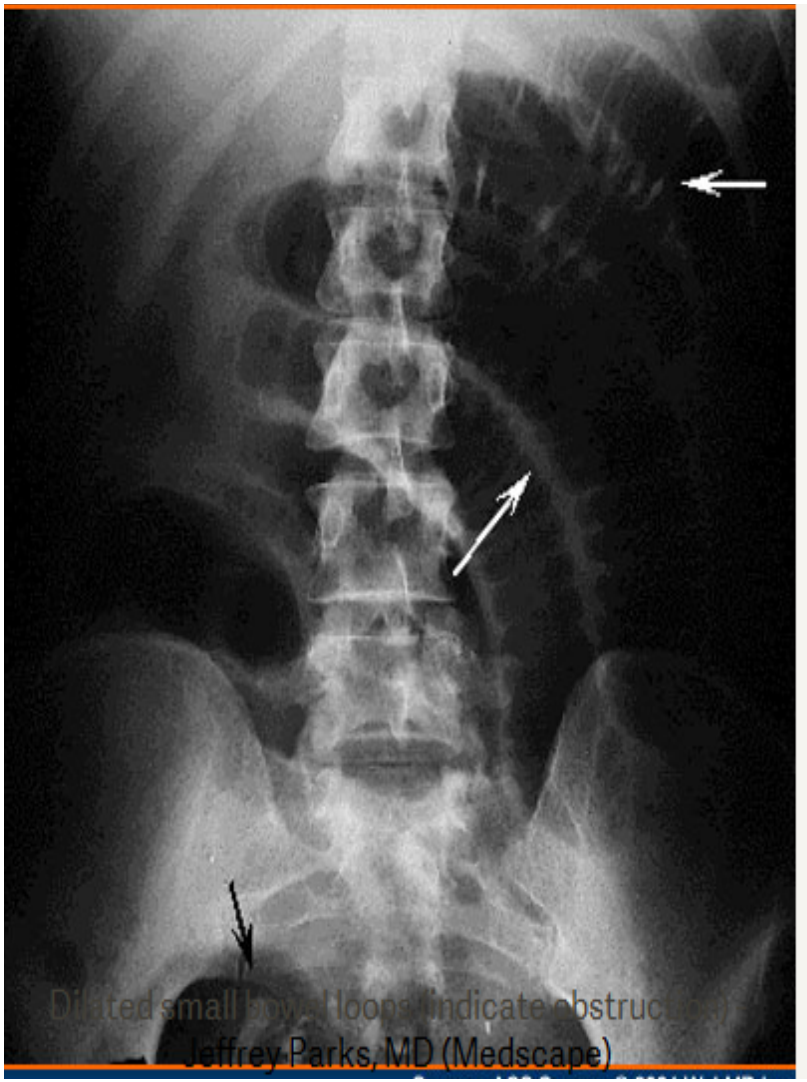


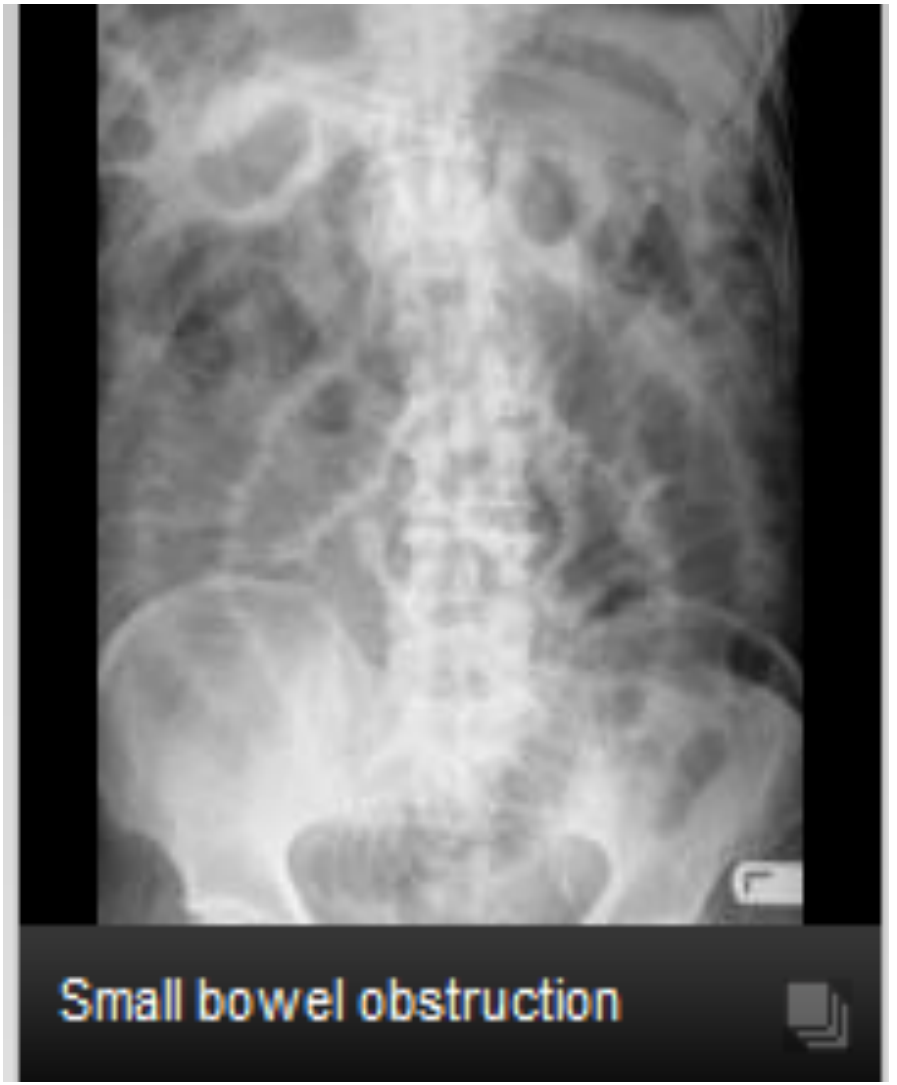
A 45 year old male with history of abdominal surgery 10 years ago, presented to ER with abdominal pain and vomiting.

Patient's position: Upright position.

What do you see in this plain film?
Air inside loops of small and large bowels with air fluid levels, the large and small bowels are dilated.

What is the diagnosis? Small and large bowl obstructions

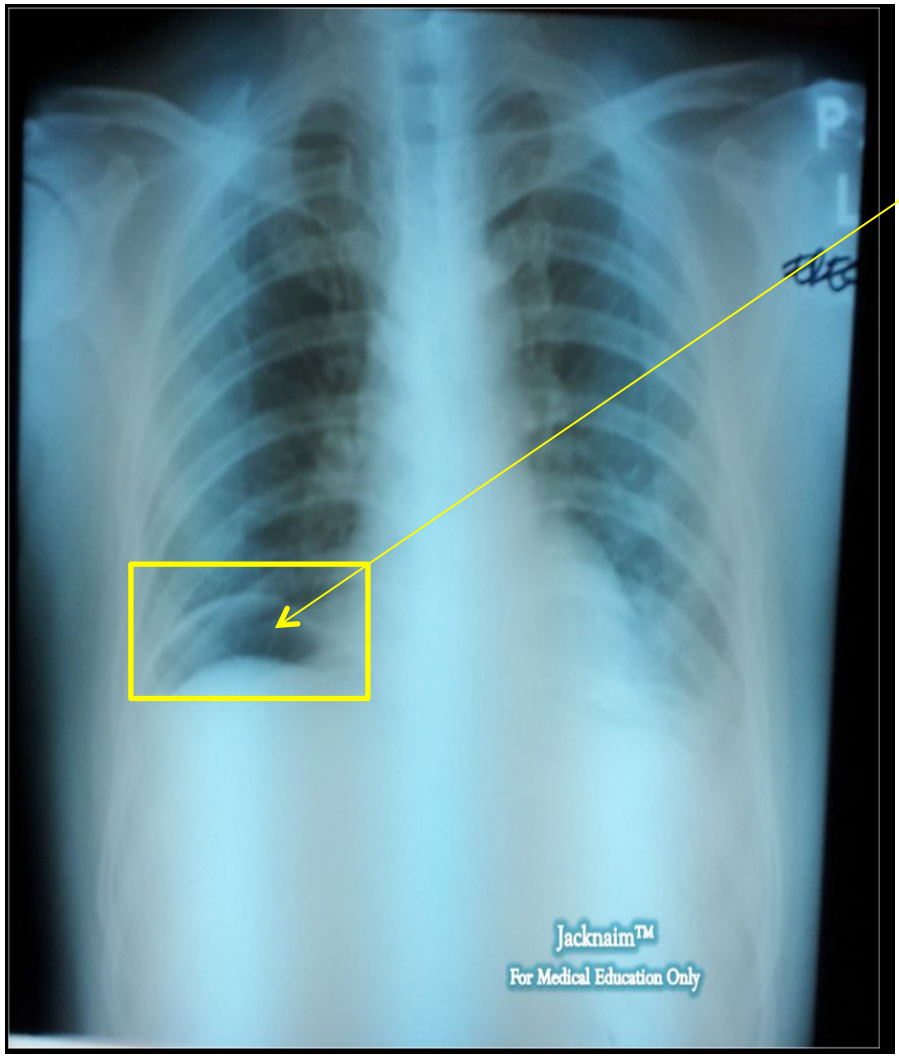




Patient's position (In both images): Supine position.

In this position we can't see the air fluid levels.

We see markedly dilated tense bowel loops indicating obstruction.

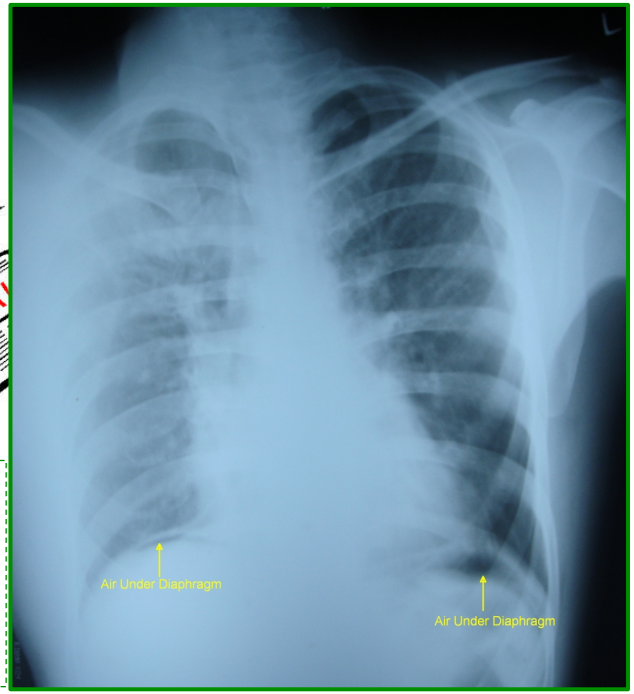


Q: What do you see in this x-ray?

Air under the diaphragm.

Q: Why do we order a chest X-ray In a patient with small bowel obstruction?

To look for perforation. (indicated by free air under the diaphragm)



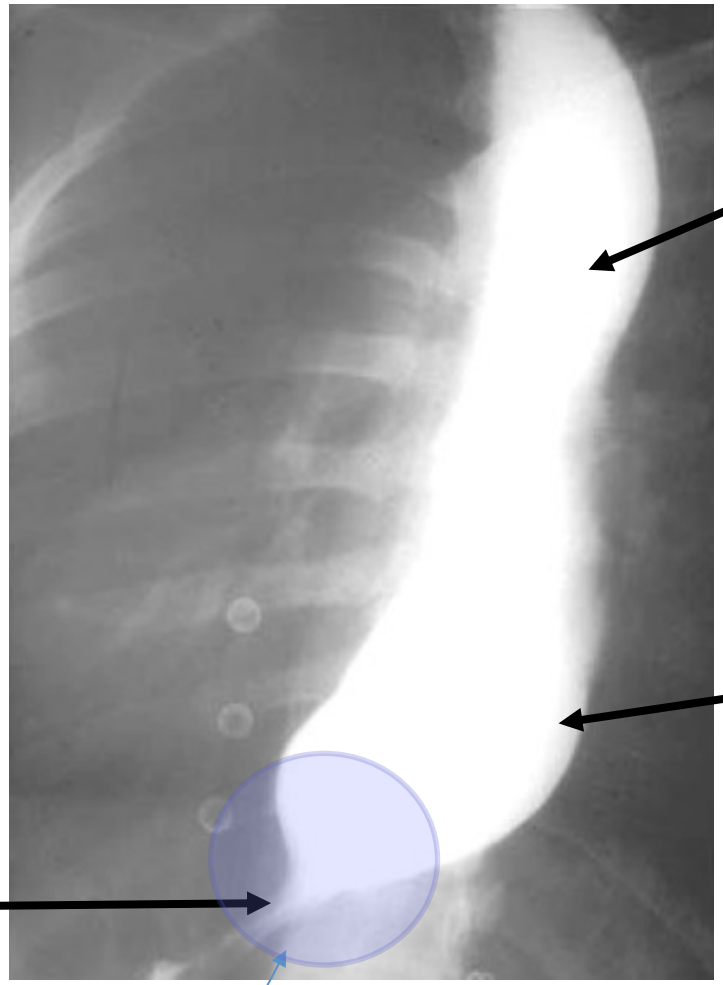
N.B Air doesn't always form under the whole diaphragm, it can be formed under only the right or left hemidiaphragm. Example: http://radiologymasterclass.co.uk/tutorials/abdo/abdomen_x-ray_abnormalities/pathology_bowel_gas_perforation.html

Barium Swallow, Single Contrast

A patient with inability/difficulty in swallowing (dysphagia). What's the diagnosis?

Achalasia

A Smooth stricture → Benign
Irregular in shape → Malignant

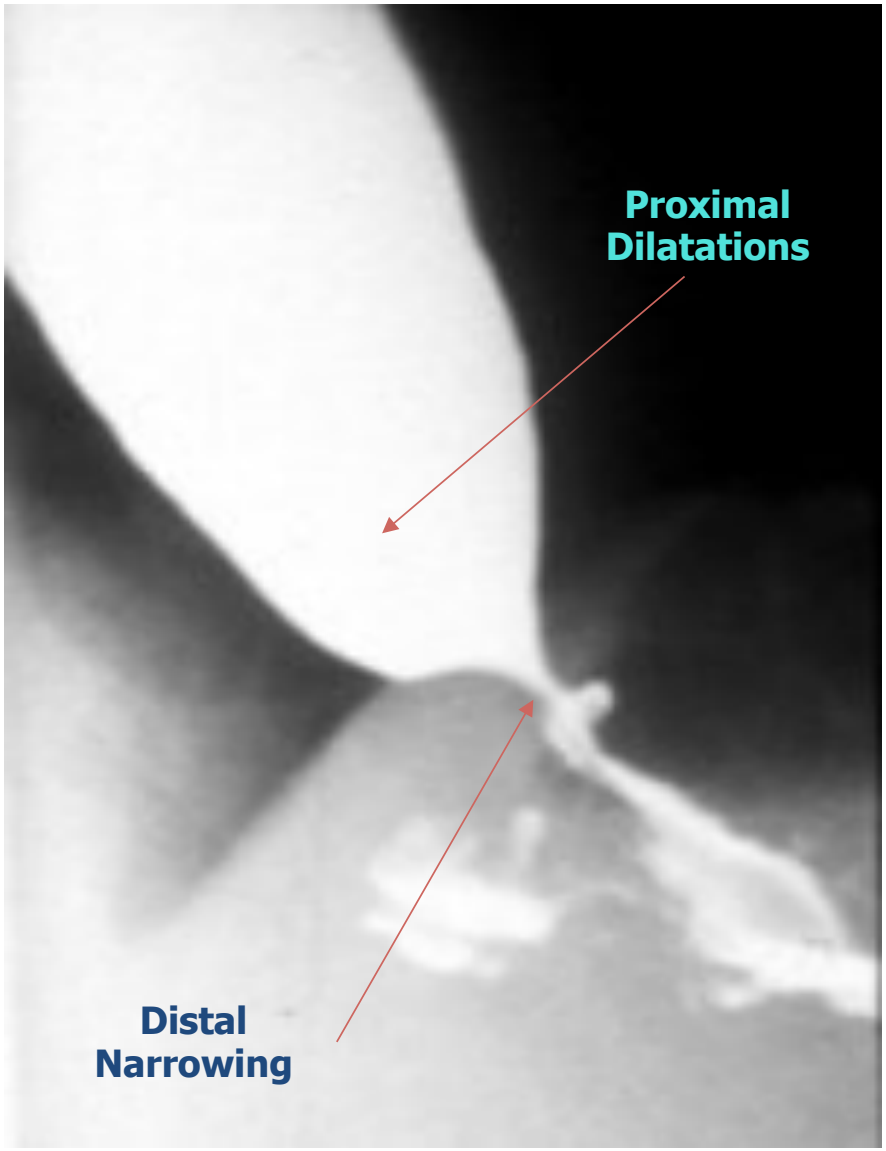


Barium Swallow, Single Contrast

Lower Esophagus

Benign Stricture:

- The transitional Zone looks **smooth** and free of filling defects
- No rigid and free of filling defects



Barium Swallow, Single Contrast

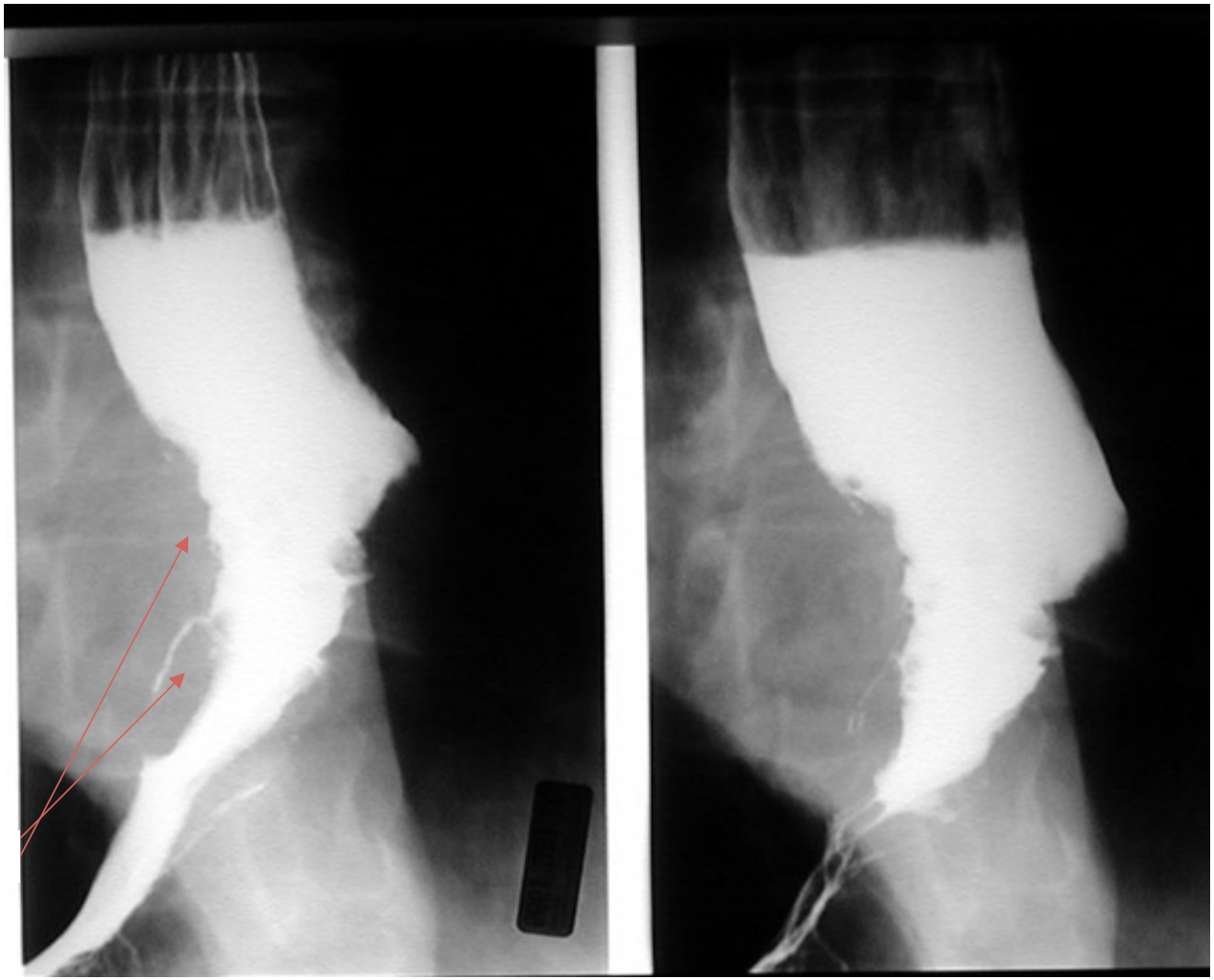
It shows an irregularity that almost looks like an apple core lesion in the esophagus. This is typical in carcinoma of the esophagus

Malignant Stricture:

- The transitional Zone looks Irregular & ill defined
- Presence of many filling defects

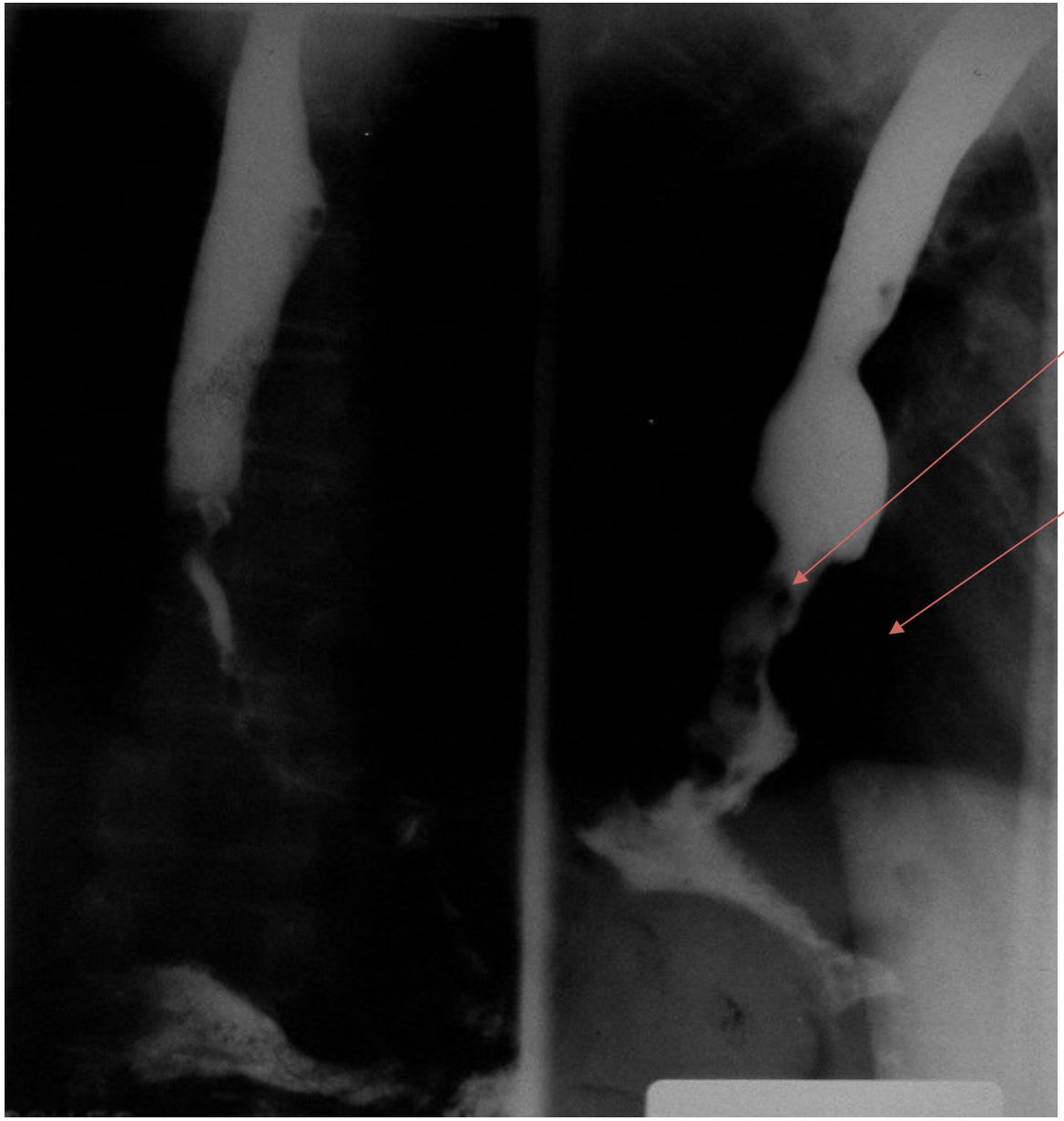
Dx:

- Adenocarcinoma
- Squamous cell carcinoma

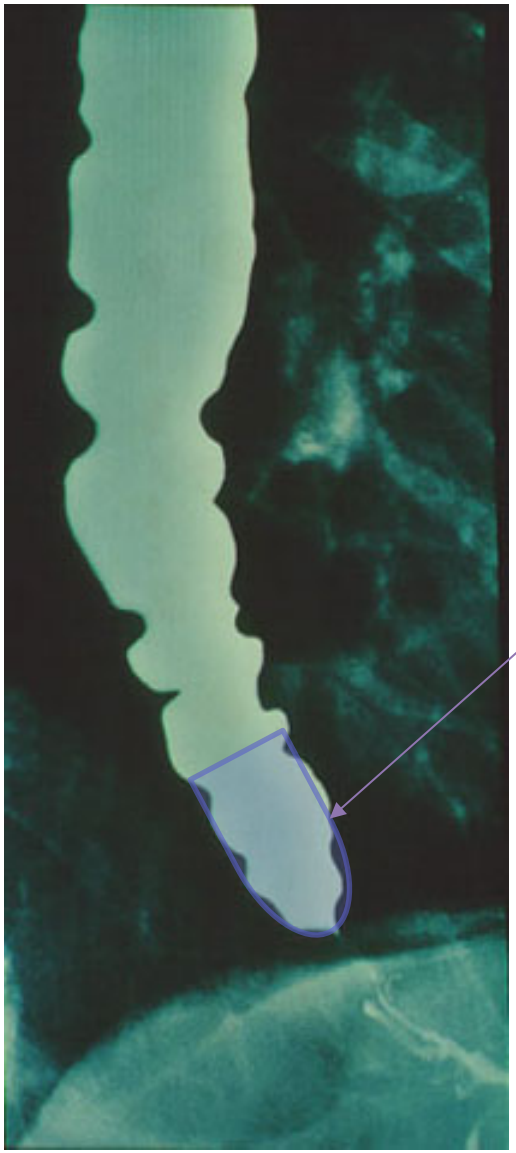


Barium Swallow, Single Contrast (Oblique)

It shows an irregularity that almost looks like an apple core lesion in the esophagus. This is typical in carcinoma of the esophagus



Barium Swallow, Single Contrast (Oblique)



Irregular Wall & Dilatation:
Tertiary Contraction (Pathological non-propulsive Contraction)

Funnel Shape
(Achalasia)

Barium swallow in this patient with achalasia reveals:

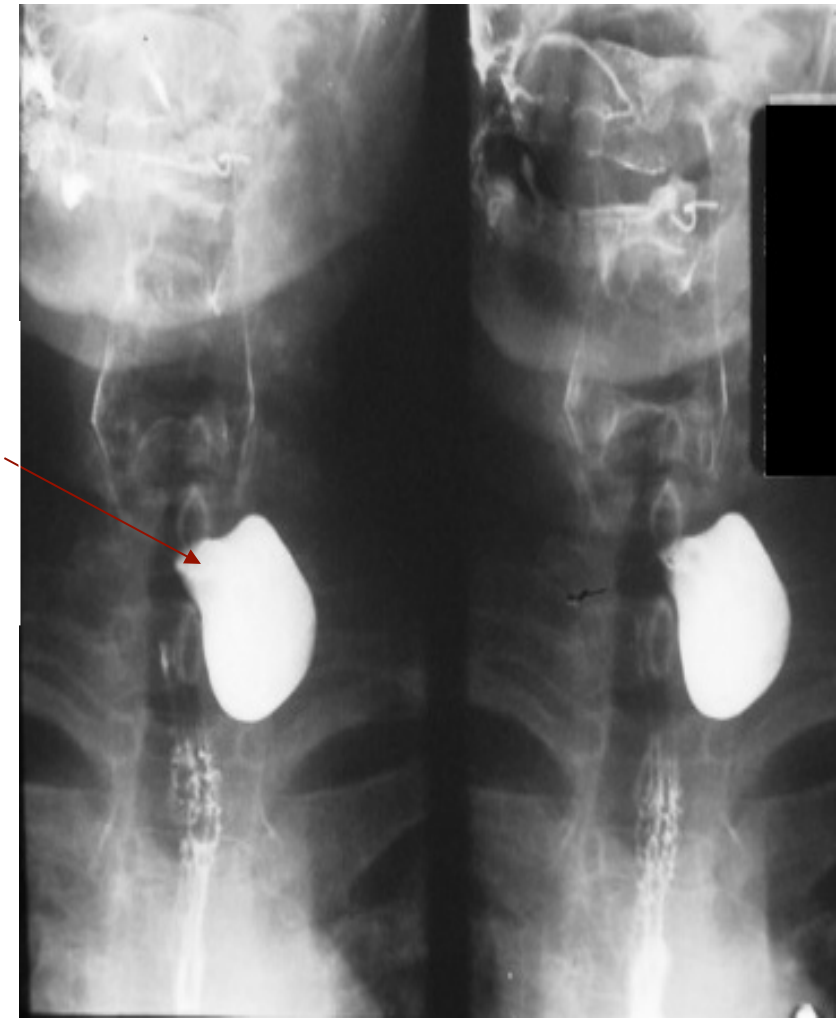
- A smooth distal tapering caused by the hypertensive lower esophageal sphincter that straddles the diaphragm.
- Multiple non-Peristaltic contractions throughout the body of the esophagus.

This radiographic appearance sometimes has been called "vigorous achalasia". This term has little value, however, because recent studies suggest that patients with so-called vigorous achalasia cannot be distinguished clinically from non-vigorous achalasia.

Barium Swallow, Single Contrast (Oblique)

Pharyngeal Pouch (Zenker's Diverticulum):
Occurs in an area of anatomic weakness known as **Killian's dehiscence**

Well Defined Contrast Filled left cervical level sac



Here there is no narrowing but there is **out pouching**

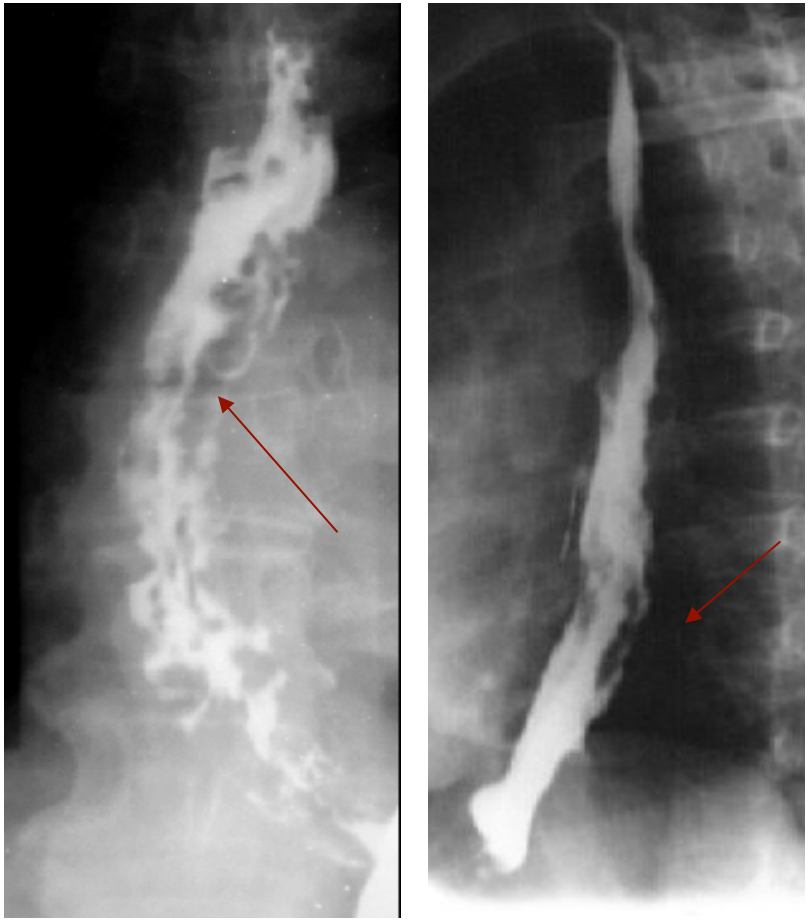
Barium Swallow, Single Contrast

AP view: Numerous rounded and elongated smooth-contoured filling defects are present in the inferior two thirds of the esophagus. The contour of the esophagus is irregular and spiculated.

Irregular Multiple Filling Defects
(Esophageal Varices)

Differential Diagnosis of Multiple Esophageal Filling Defects:

1) Esophageal Varices. (most common)
2) Fungal Infection.
3) Polyps.
4) Food Particles.



Barium Meal, Double Contrast

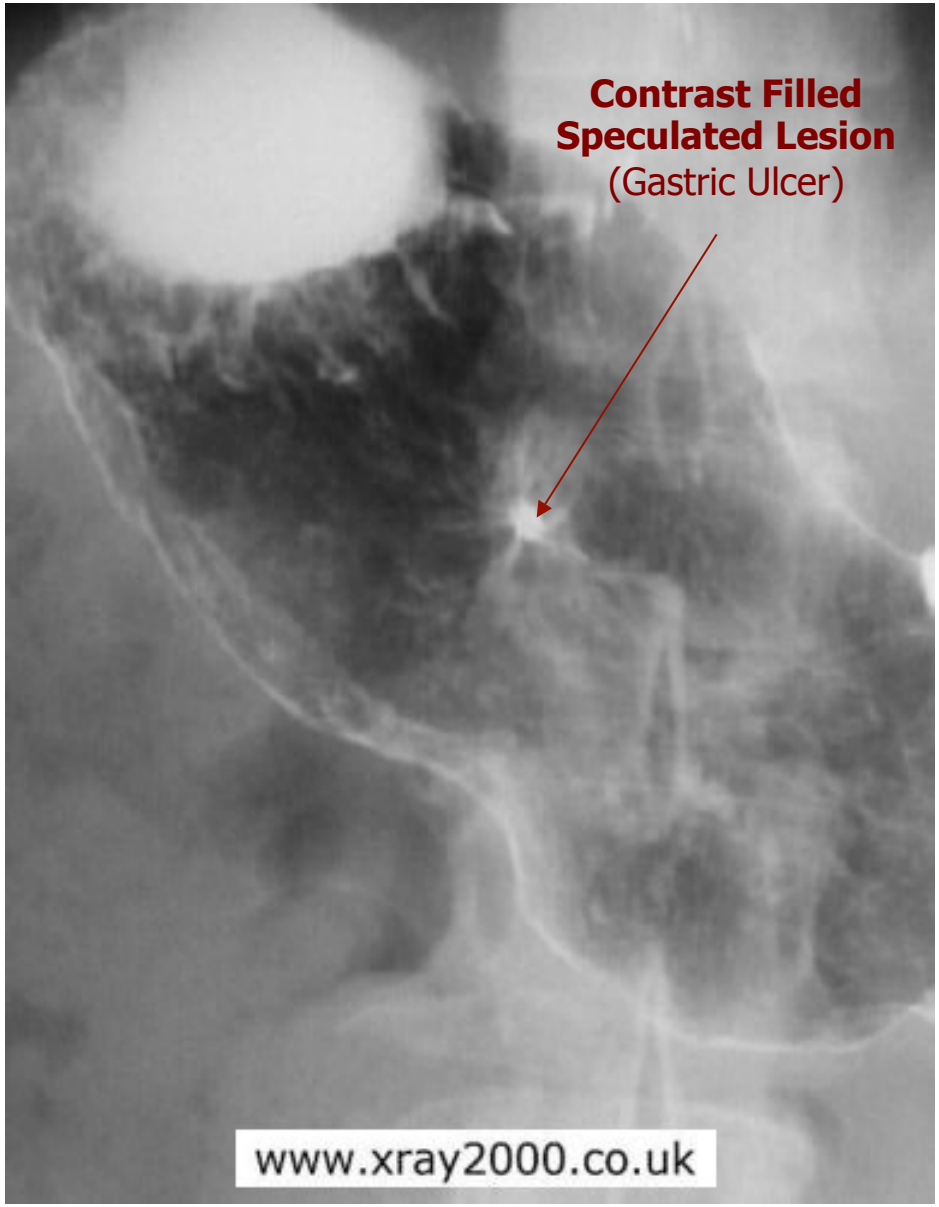
A patient presented with an epigastric pain exaggerated by hunger.

Diagnosis: Gastric Ulcer

Diagnosing modalities:
1- Barium meal, Double Contrast
2-Endoscopy (invasive and expensive)

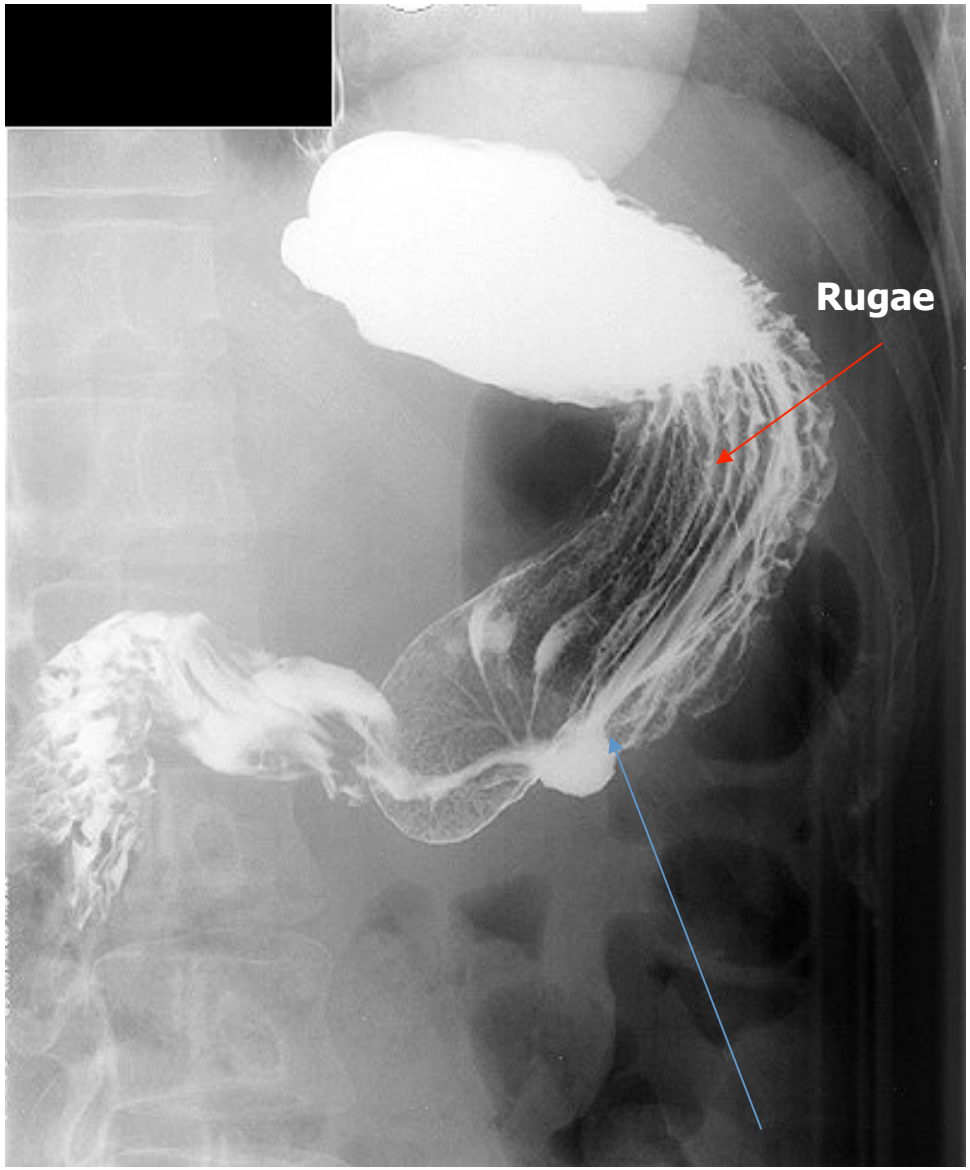
It is normal to see the contrast in the fundus of the stomach, however seeing it accumulated in the body -as in this case- indicates an abnormality.

The ulcer appears as if it's a "hole" in the body of the stomach filled with contrast.



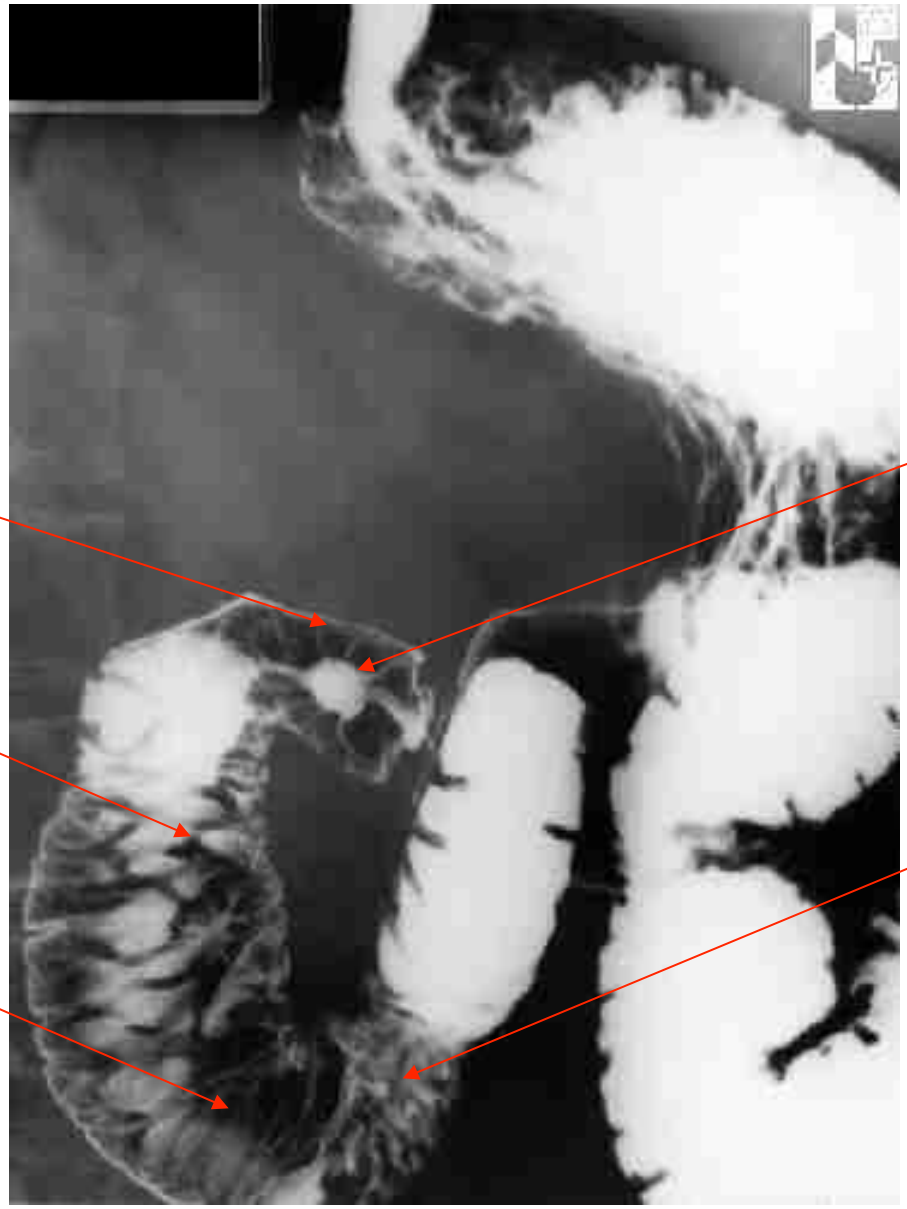
Barium Meal, Double Contrast

You can see a normal distribution of the contrast because this patient is lying down but when you look down you will see an accumulation of the contrast which is abnormal and indicates Malignant gastric ulcer.



Contrast Filled Outpouching at the Greater Curviture (Malignant Gastric Ulcer)

Barium Meal + Follow-Through



1st Part of duodenum

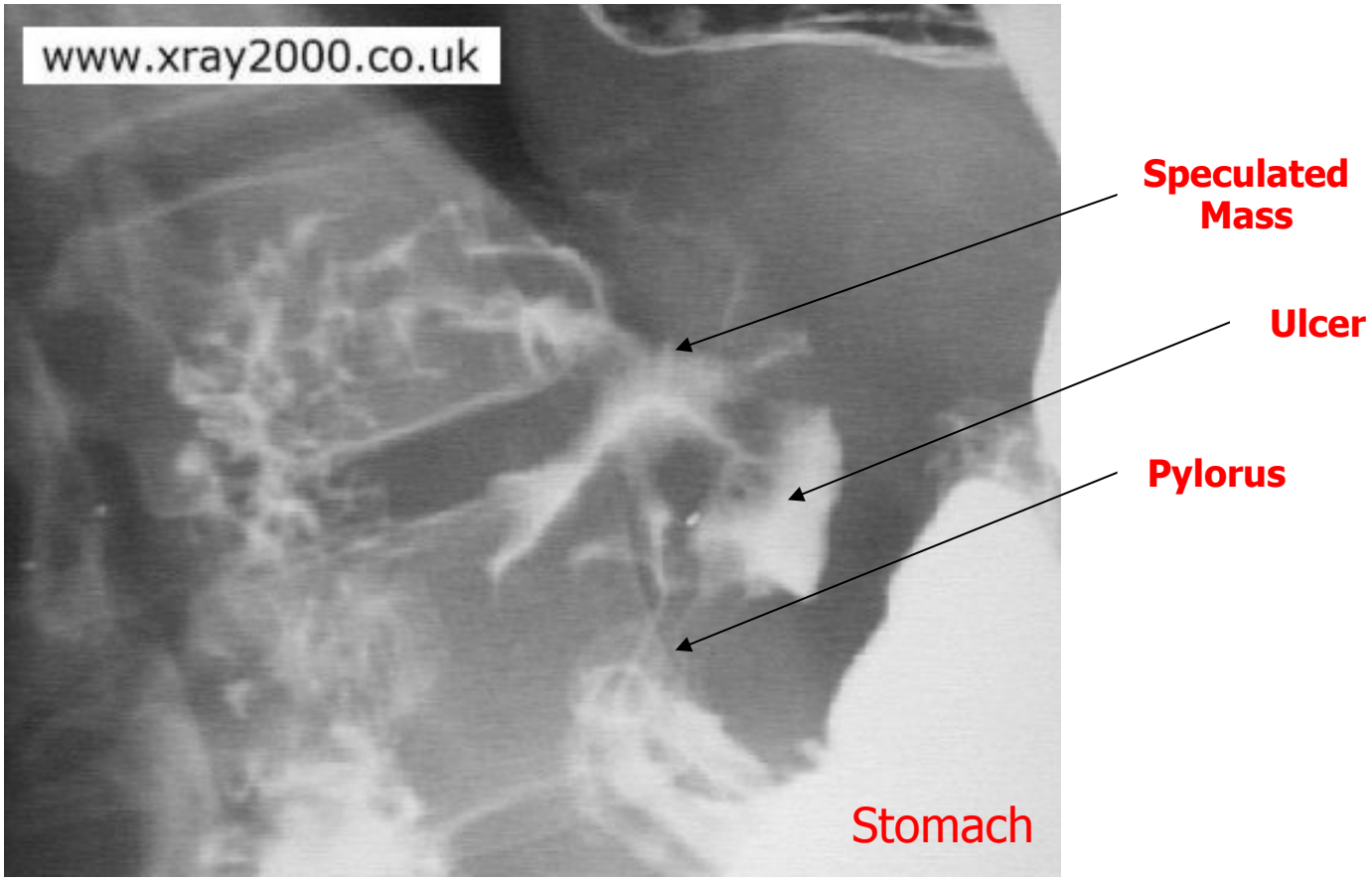
2nd Part of duodenum

3rd Part of duodenum

Contrast Filled Speculated Lesion (Duodenal Ulcer)

4th Part of duodenum

Barium Meal, Double Contrast



The most common site of duodenal ulcer is the 1st part of duodenum.

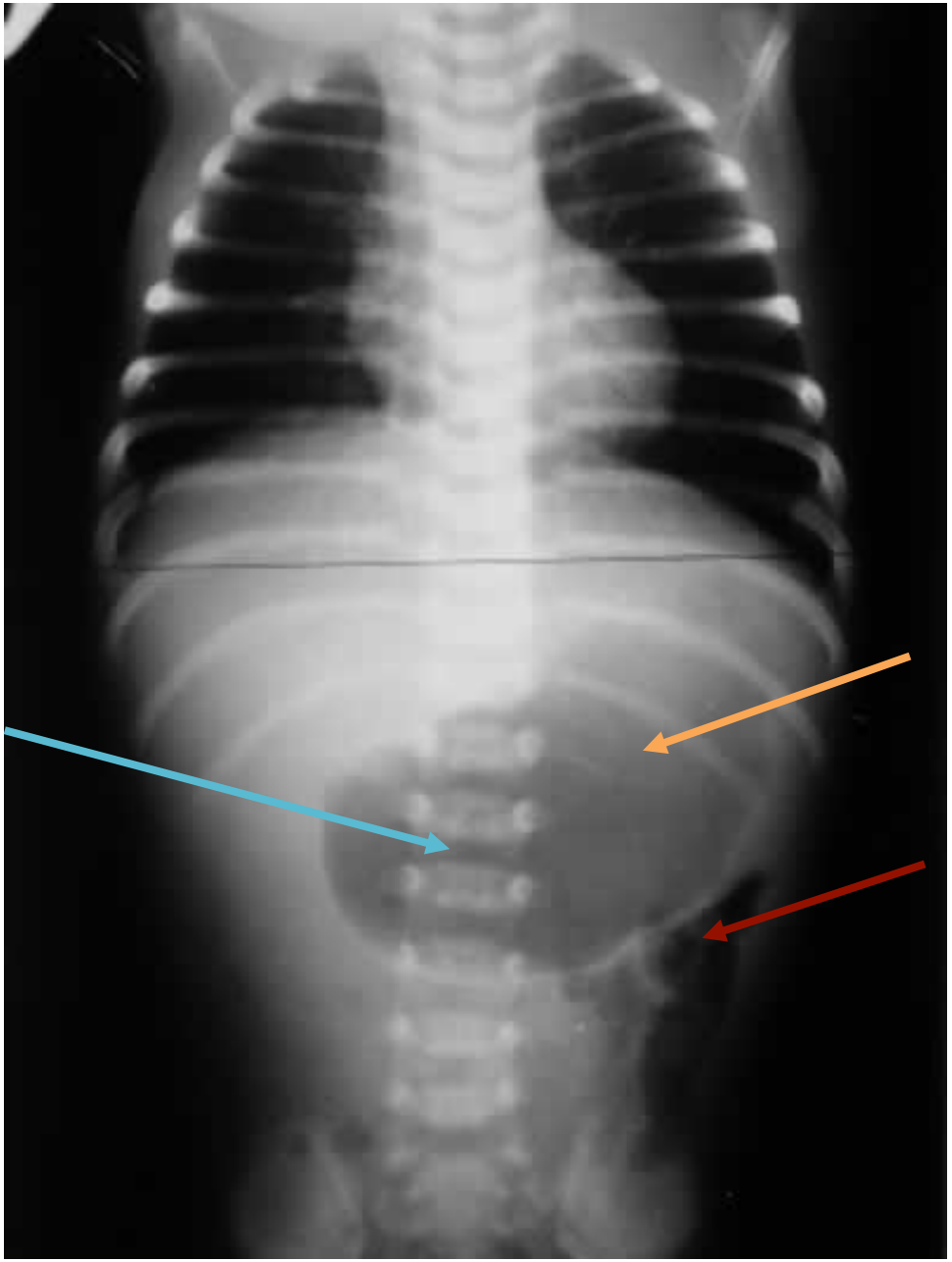
Barium Meal, Double Contrast

A 2 year old boy presented to the ER, crying with non-bilious vomiting.

Diagnosis: Gastric Output Obstruction: Pyloric Stenosis

The most common cause of stomach obstruction in children is pyloric stenosis.

- Distended Stomach
- Gas in Descending Colon (partial obstruction)
- Single Bubble Sign



Barium Meal, Double Contrast (Erect Position)

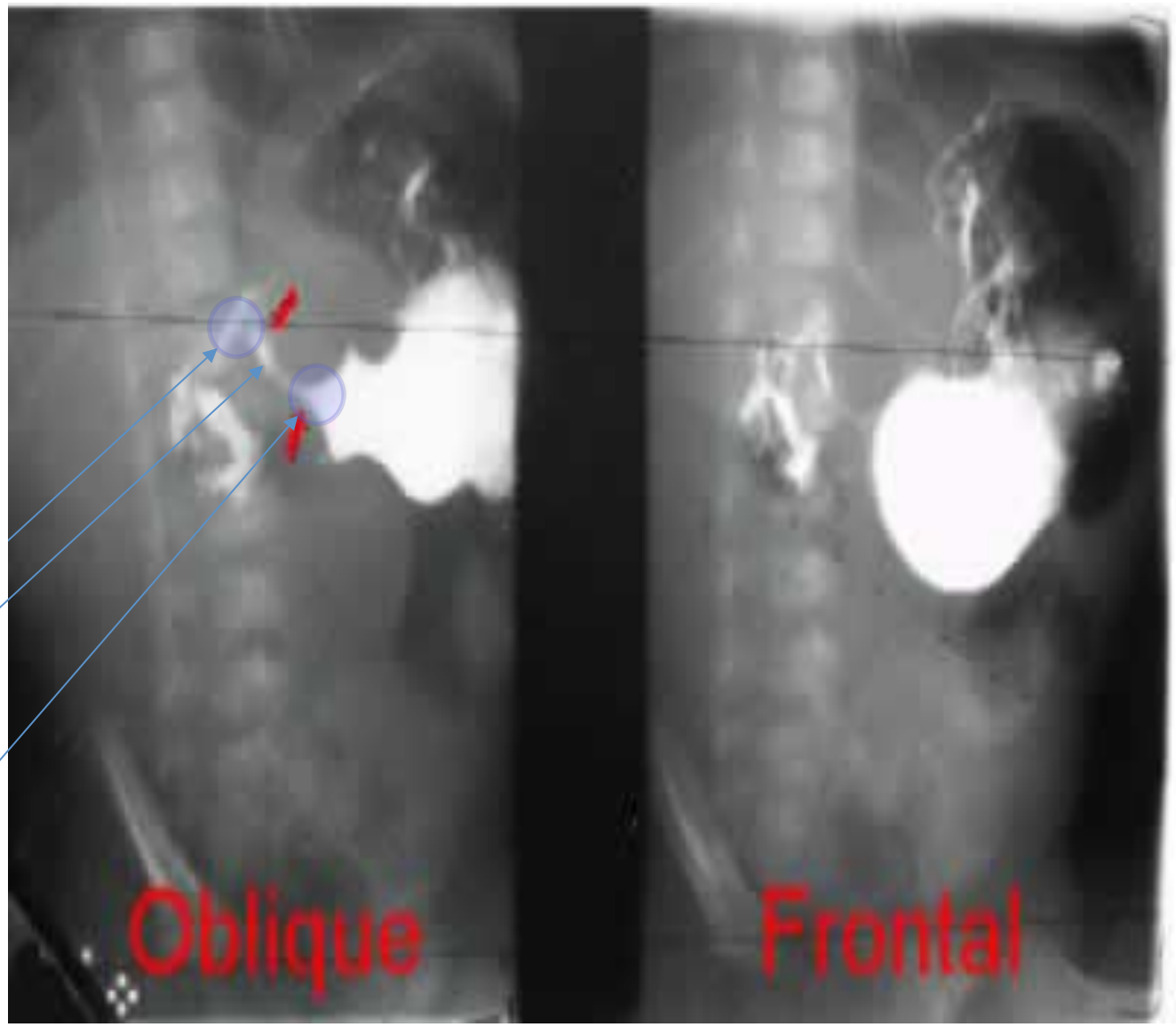
DDx:
Pyloric Stenosis

Mushroom's Sign diagnostic of pyloric stenosis.

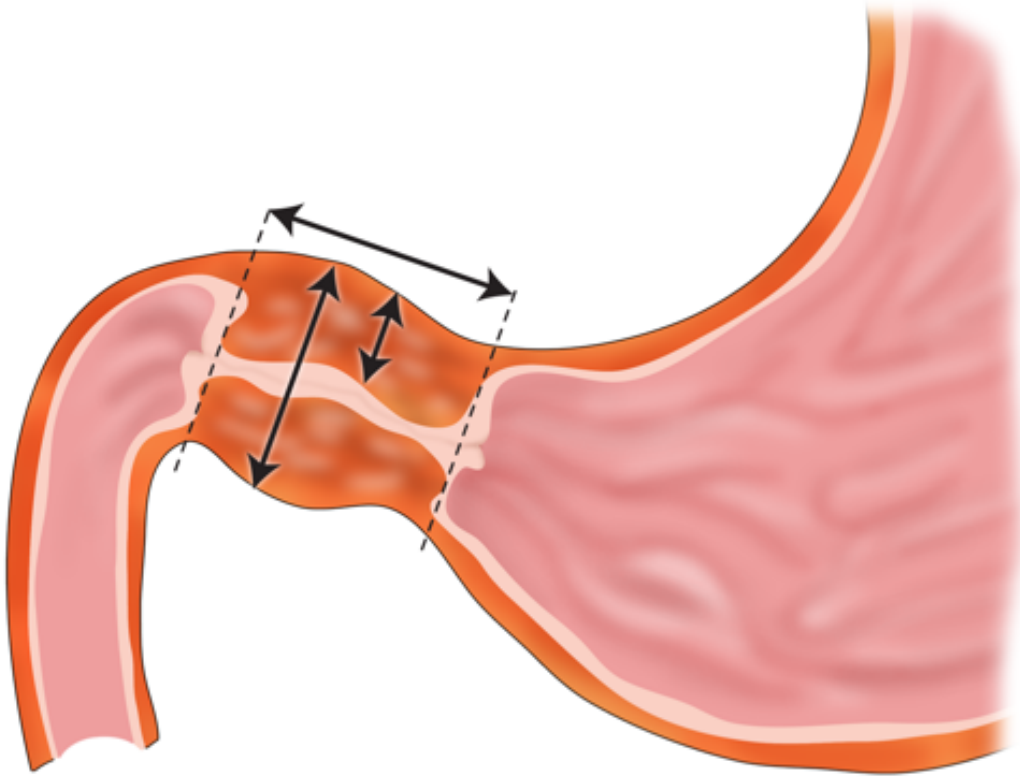
Mushroom's Sign
(or **apple core Sign**)

String's Sign

Shoulder's Sign



Pyloric stenosis



Normal values *

Length: <15mm
Single muscle thickness: <3mm
Pyloric width: <7mm

* values vary somewhat from publication to publication

F Gaillard 2010

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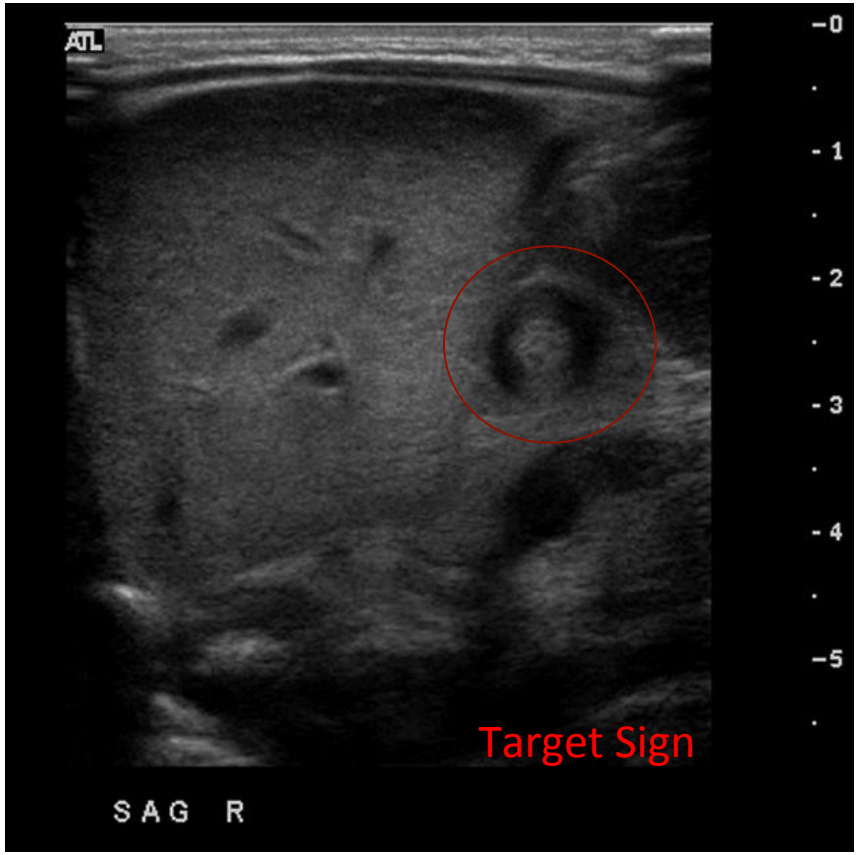
Pyloric stenosis

Hypertrophied pylorus, Thickening reaching more than 7 cm.

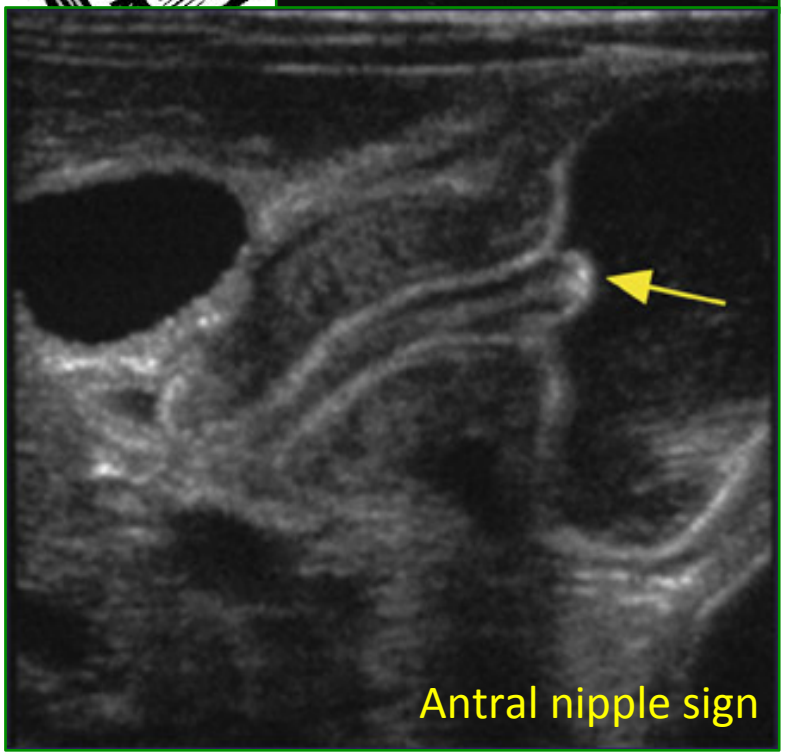
The doctor said that we can see Mushroom's Sign, String's Sign and Shoulder's Sign on ultrasound, however, when we looked it up, they are not seen on ultrasound.

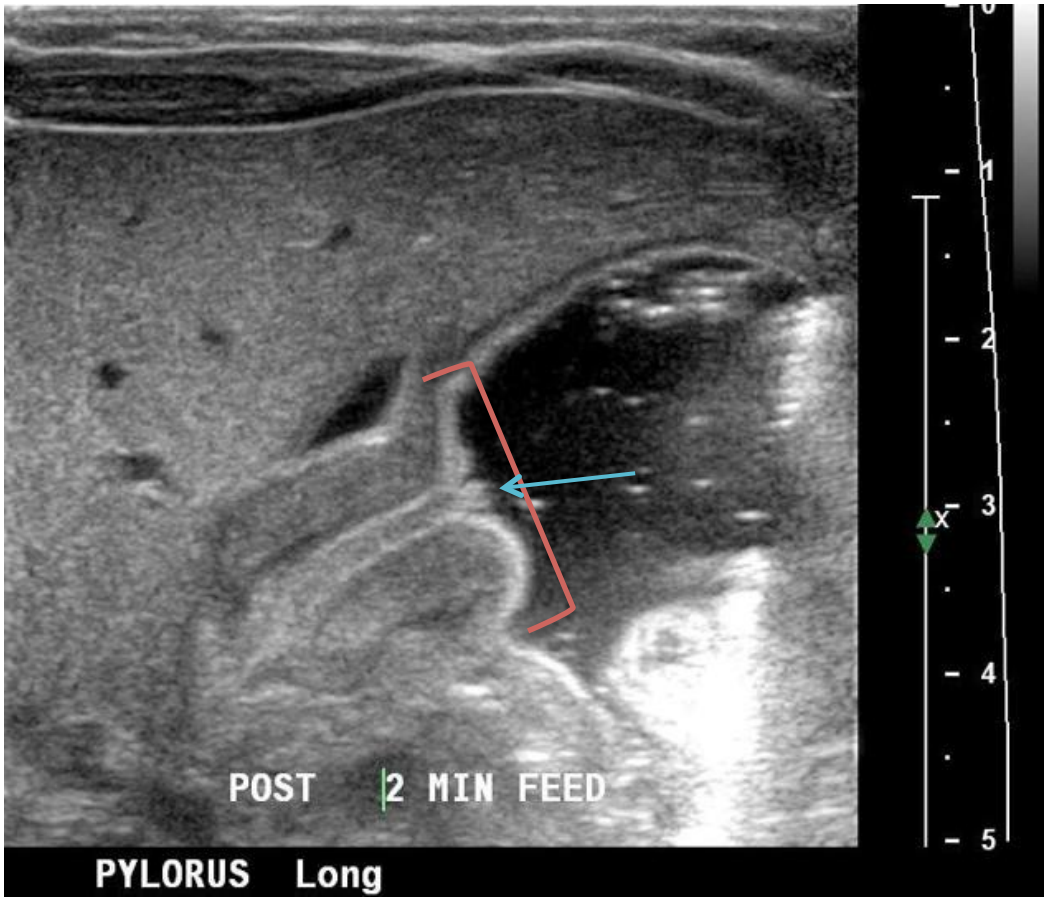
Signs of pyloric stenosis on ultrasound:

- Cervix Sign: indentation of the pylorus into the fluid-filled antrum.
- Antral nipple sign: redundant pyloric mucosa protruding into the gastric antrum.
- Target sign (On transverse): Hypertrophied hypoechoic muscle surrounding echogenic mucosa.



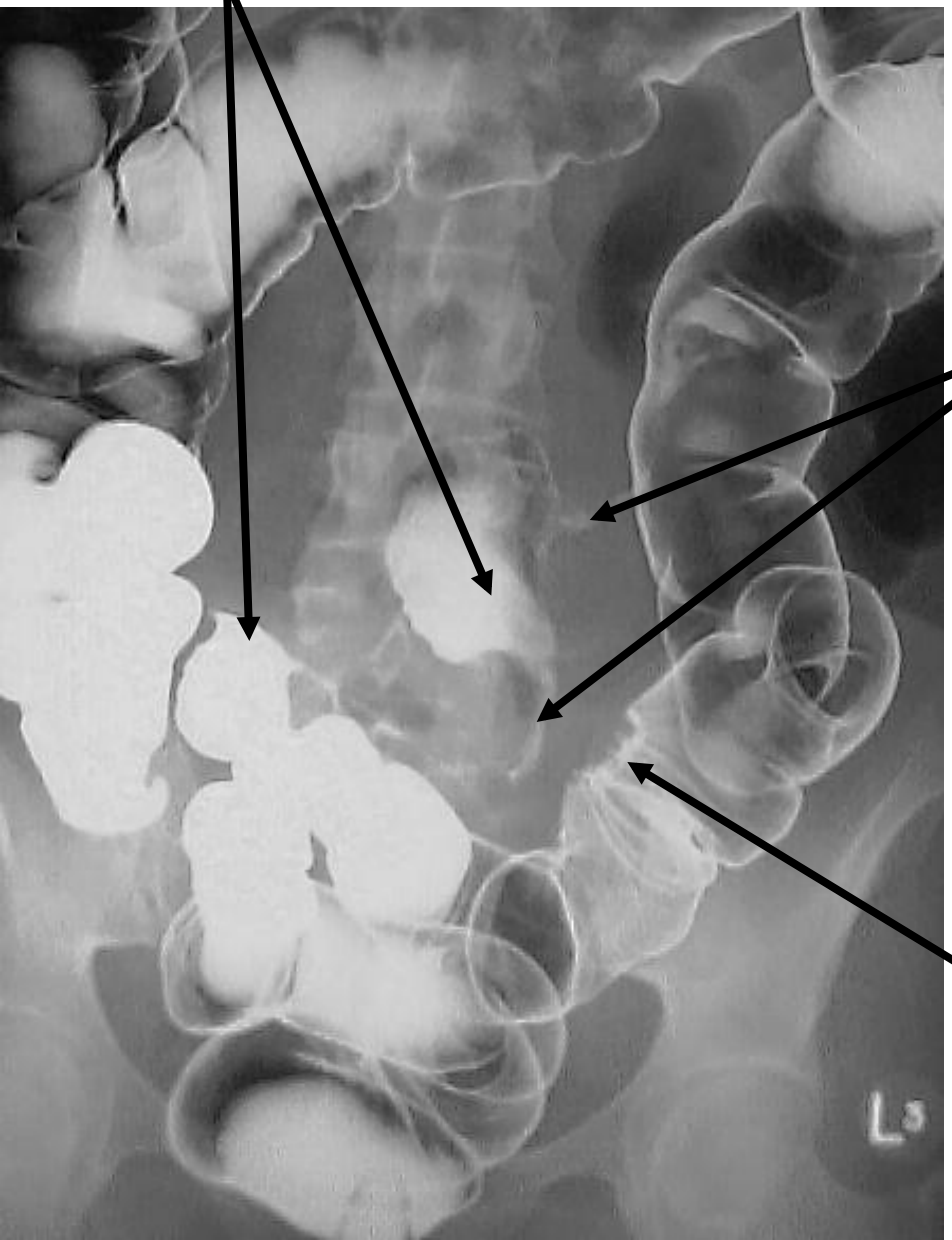
Sources:
http://emedicine.medscape.com/article/409621-overview
http://radiopaedia.org/cases/pyloric-stenosis





- Cervix Sign
- Antral nipple sign

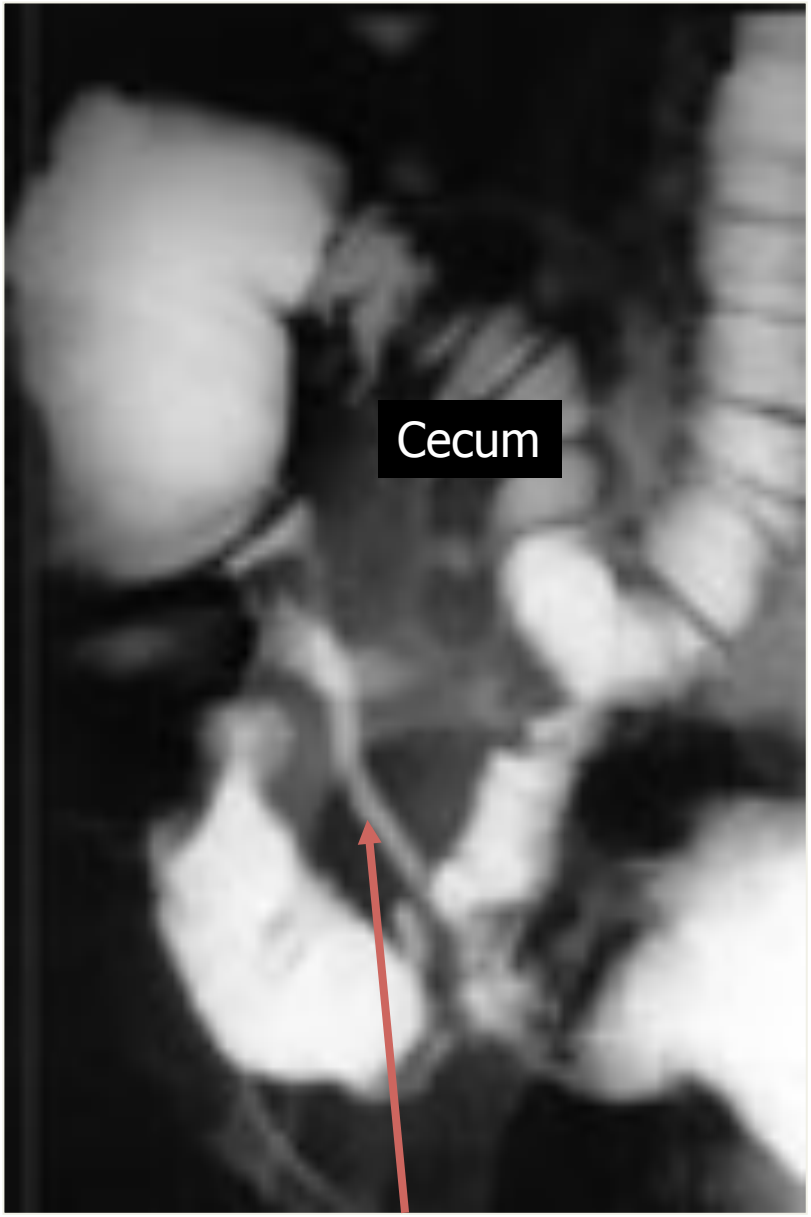
Barium Enema, Double Contrast (Prone Position)



Skip Lesions & lesions in Small intestines

DDx: Crohns' Disease

There is a short segment of abnormal descending colon with asymmetrical puckering of the mucosal surface, without stricturing.
Note also however that contrast has refluxed into the terminal ileum and small bowel, and there are several strictures present within it. One of these lies adjacent to the large bowel abnormality.

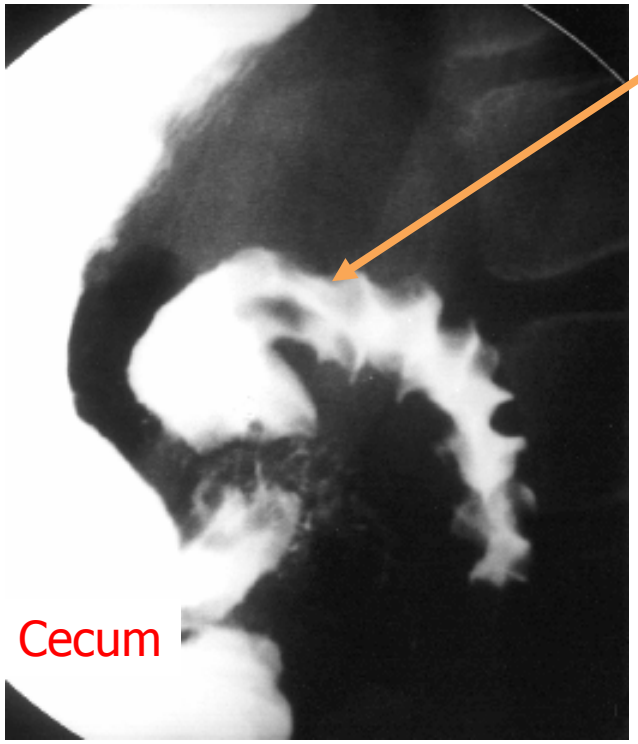


There is smooth narrowing of the terminal ileum and an adjacent loop of more proximal ileum as it crosses to the right side of the pelvis. There is no visible mucosal fold thickening or ulceration.

Differential Diagnosis of Terminal Ileum Narrowing:

1. Tumor → Lymphoma
2. Iatrogenic → Adhesion (TB)
3. Inflammatory (IBD)

Barium Enema



Multiple Filling Defects
Cobble Stone appearance

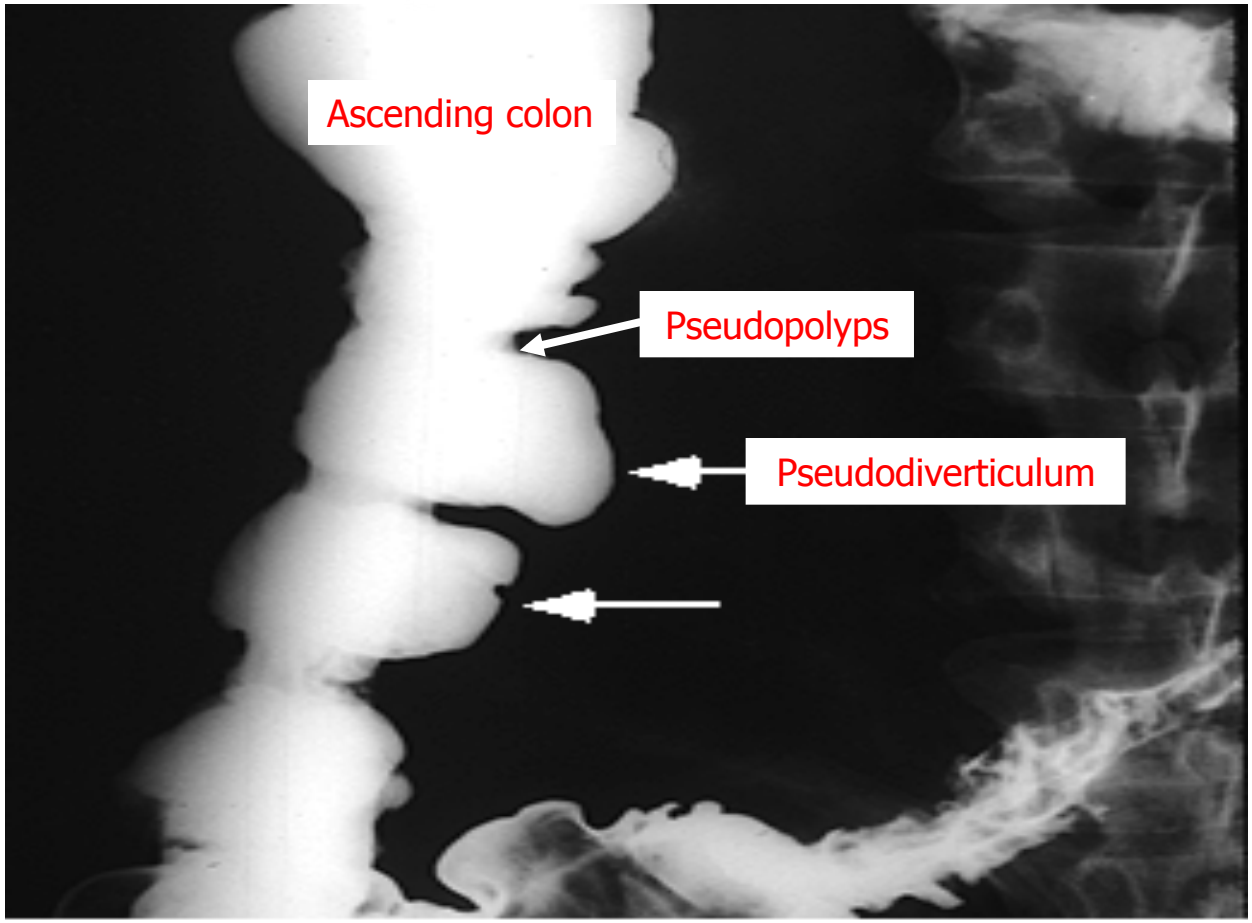
DDx: Crohn's Disease

There is abnormal wall thickening, luminal narrowing, and cobblestoning involving a long segment of the distal ileum including the terminal ileum.

Barium Enema

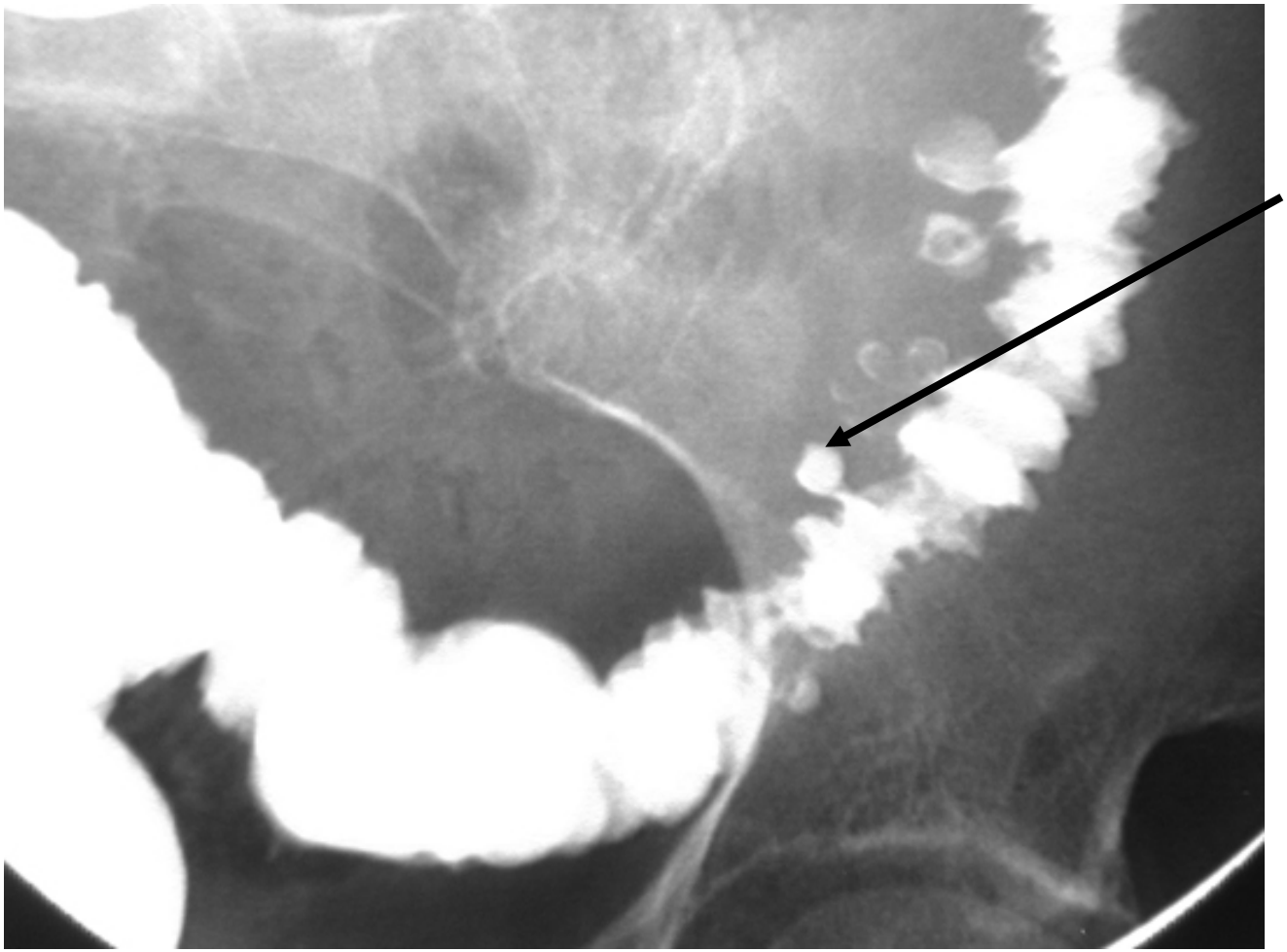
DDx: IBD

Pseudopolyps and Pseudodiverticulum → Chronic



Chronic Crohn's colitis Barium enema demonstrates sacculations along the medial border of the ascending colon (arrows) produced by scarring and fibrosis in a patient with Crohn's disease. Courtesy of Jonathan Kruskal, MD, PhD.

Barium Enema



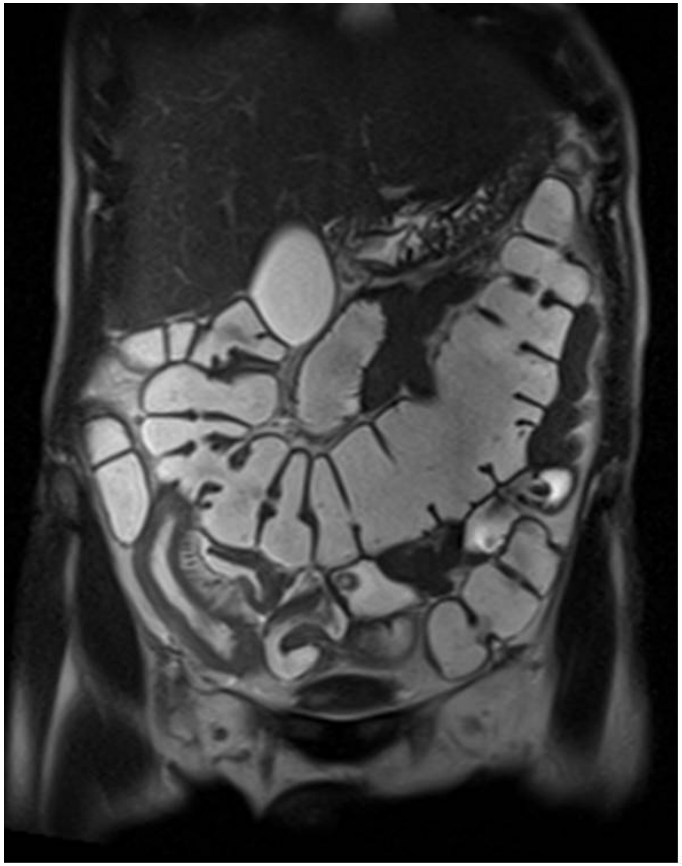
Contrast Filled Sacs (outside the Lumen)

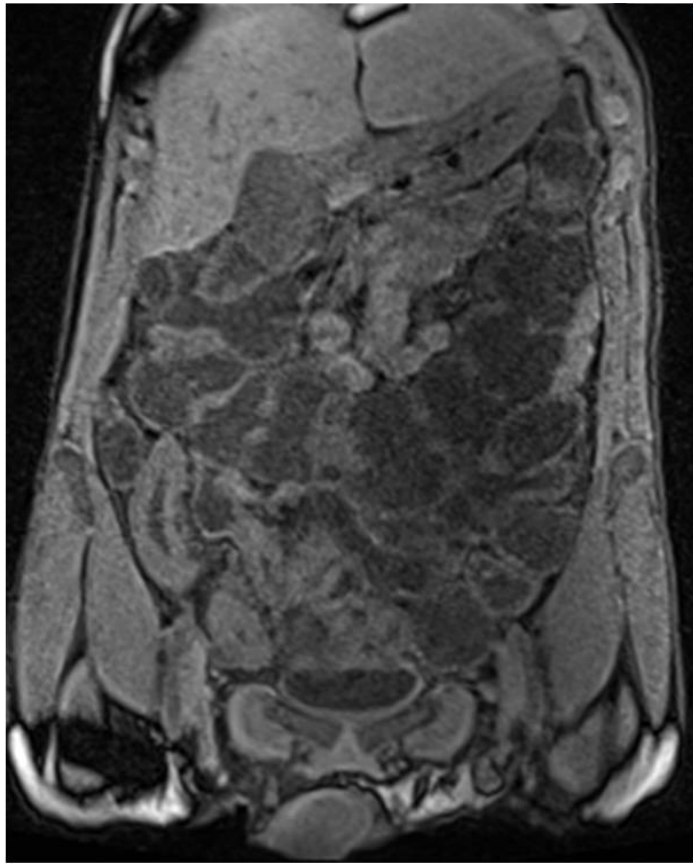
The scenario will be in an old patient about 65 year old presenting with severe abdominal pain and bleeding, sedentary lifestyle, not consuming much fibers in their diet.

Most common site is in the sigmoid colon

Diverticulosis in Descending & Sigmoid Colon

MRI





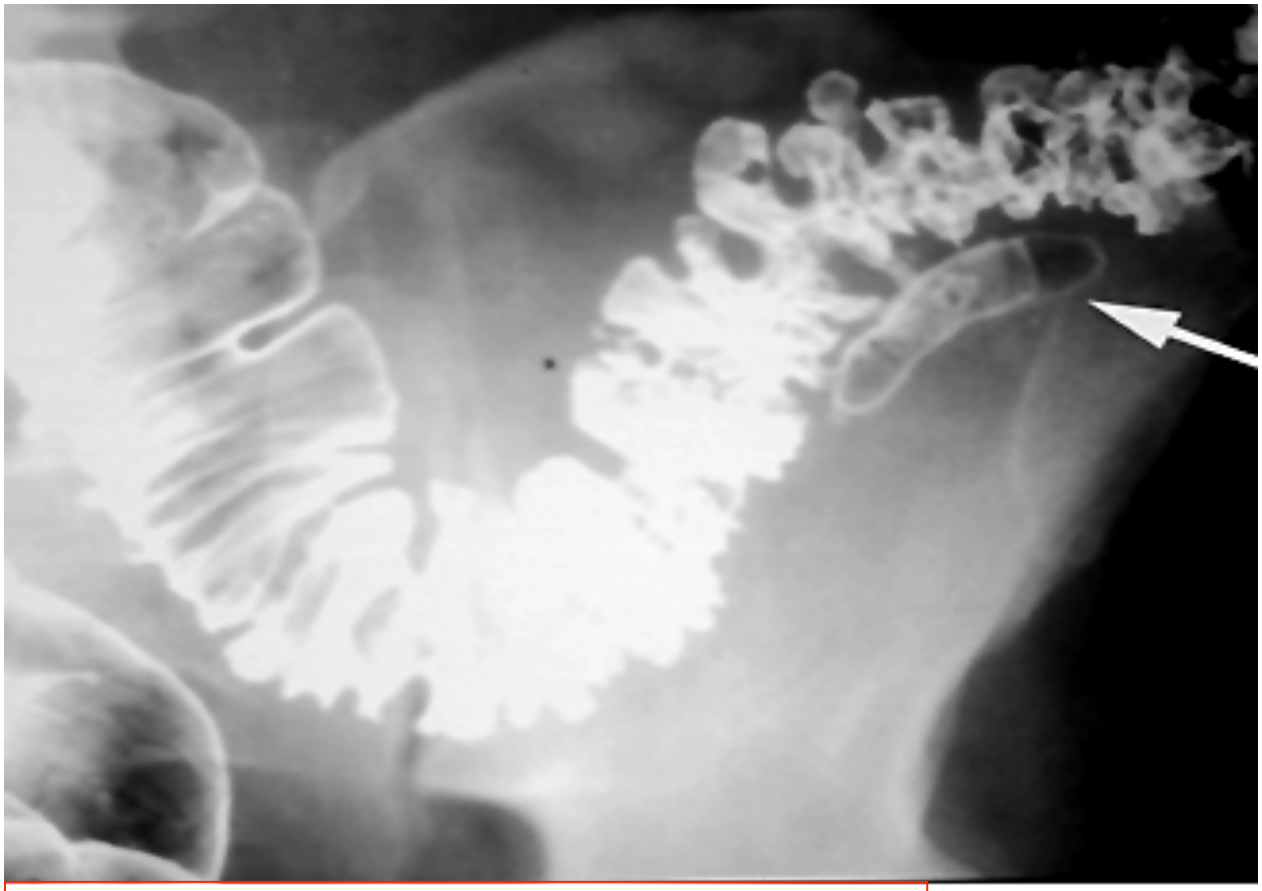
- Instead of exposing the patient to radiation and barium enema, we can do an MRI study. Images showing dilatation of the large bowel and thickening of the terminal ilium as it is inserting into the secum.
- It’s a good follow-up (as well as diagnostic) modality to assess crohn's disease progression and responsiveness to treatment.
- This thickening is associated with Chron’s, fibrofatty proliferation

Barium Enema

- Extensive narrowing of the colon + out pouching.
- If these pouches (diverticulae) get inflamed or infected, the condition is called diverticulitis.

Diverticulosis

Barium Enema, Double Contrast



Intramural diverticular abscess Double contrast barium enema in a patient with numerous sigmoid colon diverticulae demonstrates an air-containing intramural abscess cavity (arrow). Courtesy of Jonathan Kruskal, MD, PhD.

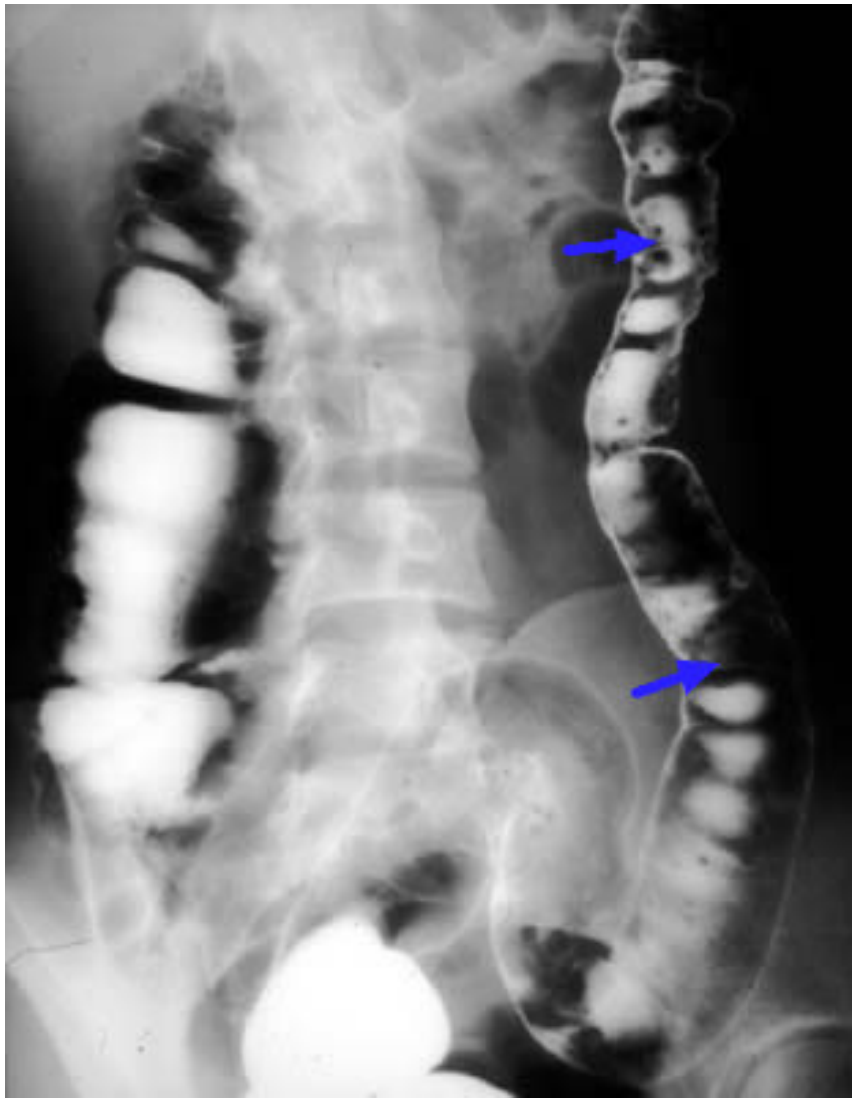
Leak in an intramural fashion → Diverticulitis.

Abscesses become a good place for bacteria to aggregate there

Symptoms :
Hesitancy
Pain
Fever
Diarrhea
Vomiting

Barium Enema, Double Contrast

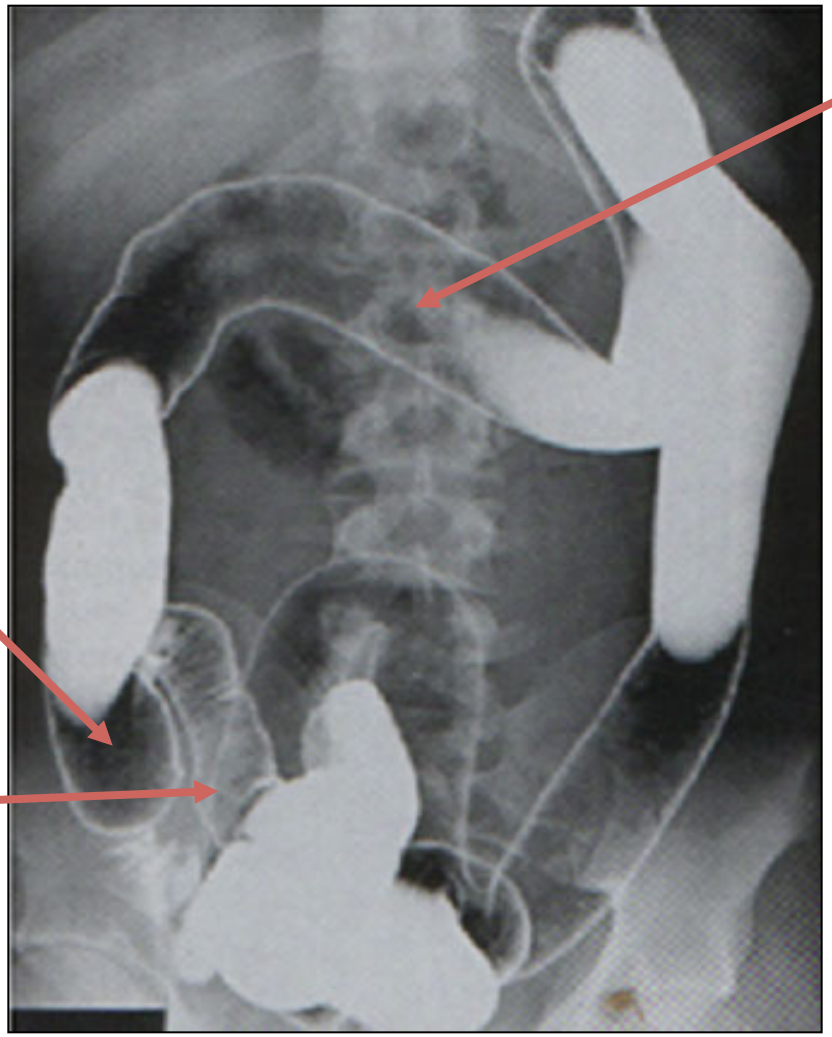
We look for any polyps through the GIT, because they may become canerous over time.



Multiple Small & Round Filling Defects

DDx: Multiple Polyps

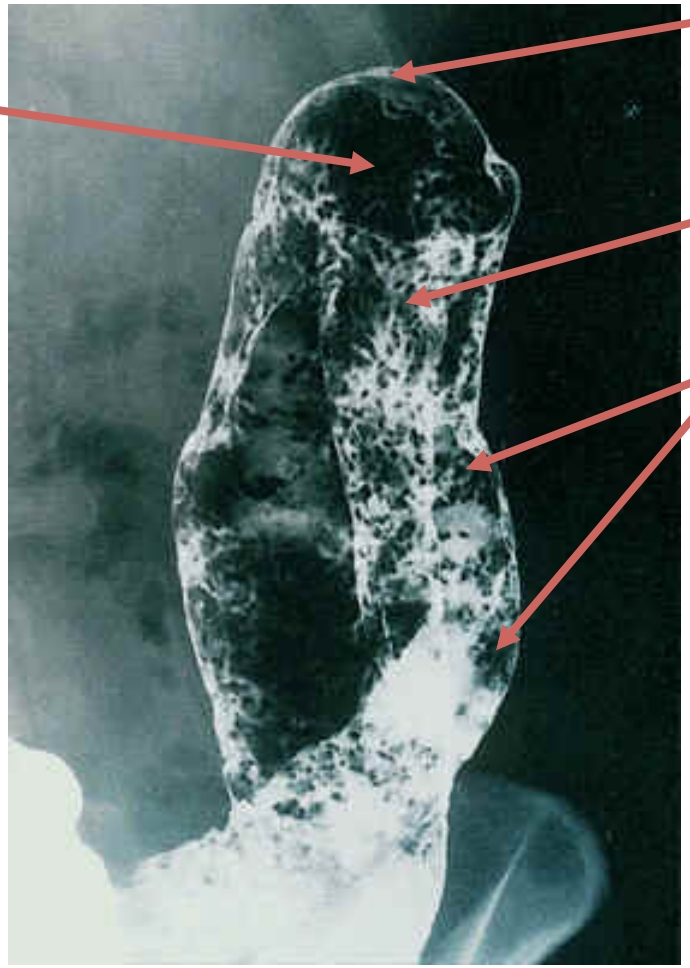
Barium Enema, Double Contrast



Ulcerative Colitis (Pancolitis)

Barium Enema, Double Contrast

- Granular mucosa and complete absence of haustra which confirm total colitis.
- 2 short strictures are present in the descending colon, but there were no malignant features radiologically



Ulcerative Colitis

Crohn's Disease vs. Ulcerative Colitis

Distinguishing characteristics

Feature	CD	UC
Location	SB or colon	colon
Anatomic distribution	Skip lesions	Continuous
Rectal involvement	Rectal spare	Involved in >90%
Gross bleeding	Only 25%	Universal
Peri-anal disease	1/3	Rare
Fistulization	Yes	No
Granulomas	30%	No

Endoscopic features

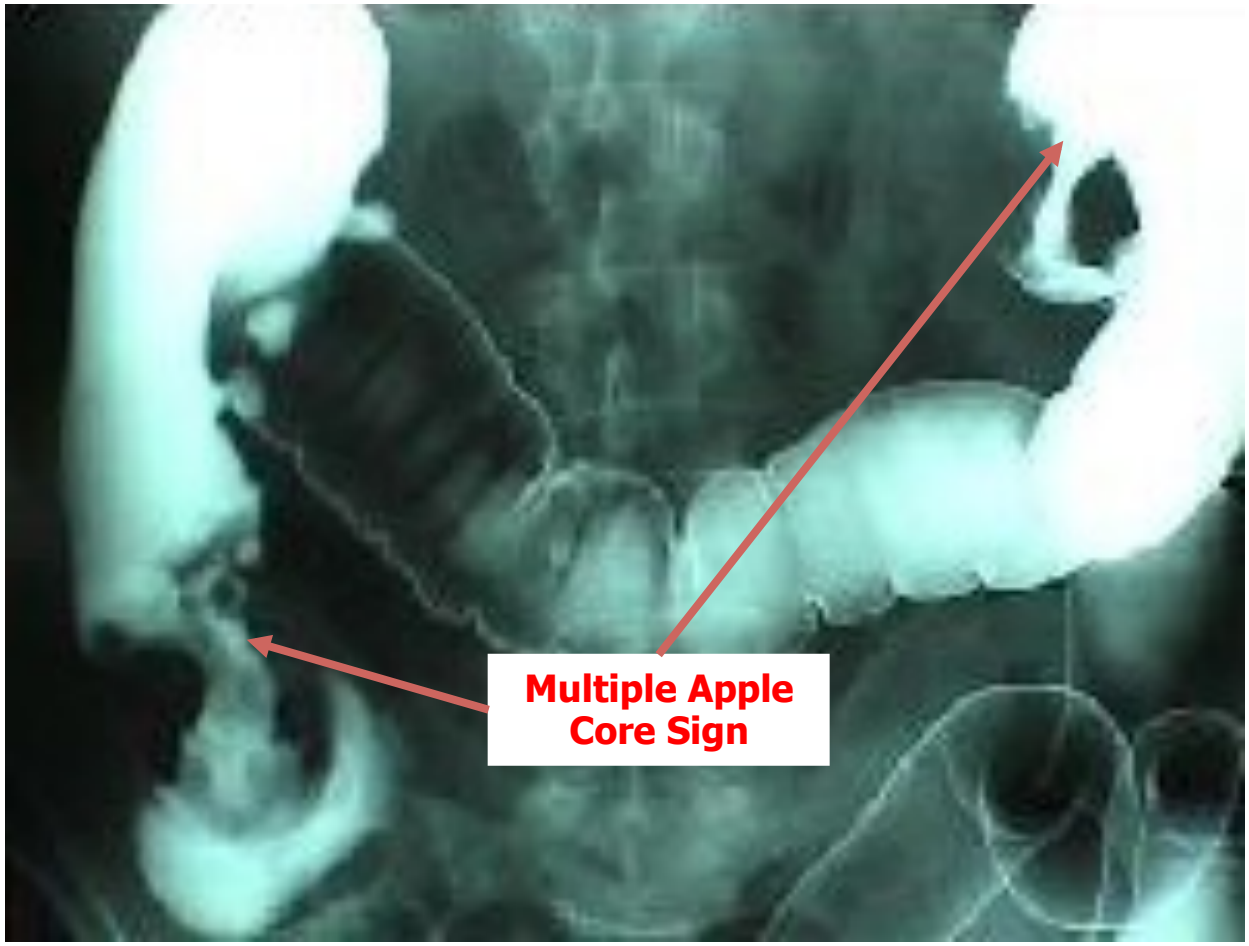
Feature	CD	UC
Mucosal involvement	Discontinuous	Continuous
Aphthous ulcers	Common	Rare
Surrounding mucosa	Relatively normal	Abnormal
Longitudinal ulcer	Common	Rare
Cobble stoning	In severe cases	No
Mucosal friability	Uncommon	Common
Vascular pattern	Normal	distorted

Pathologic features

Feature	CD	UC
Transmural inflammation	Yes	Uncommon
Granulomas	30%	No
Fissures	Common	Rare
Fibrosis	Common	No
Submucosal inflammation	Common	Uncommon

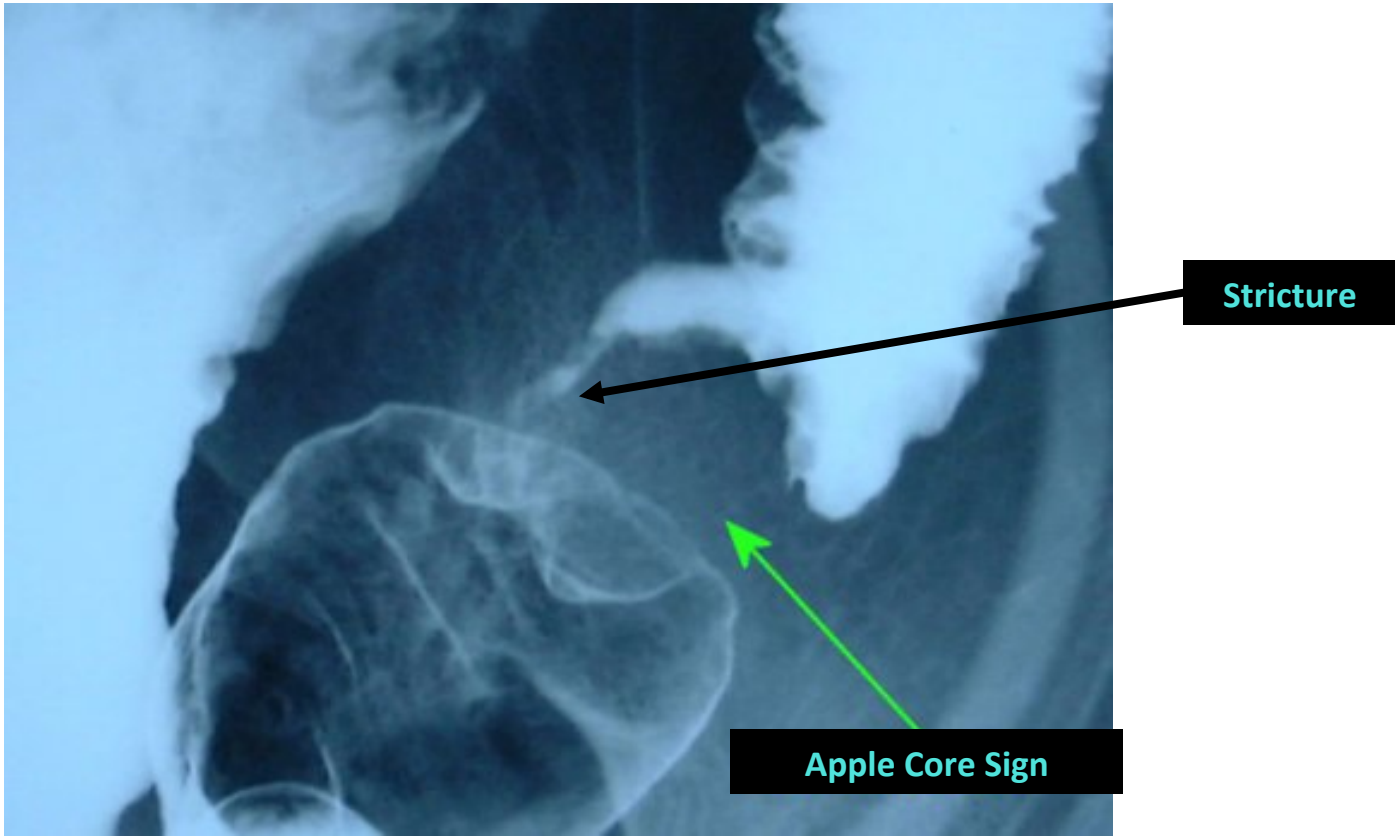
These tables are from 431 Medicine Team Work Lecture 21: IBD. Thank you Medicine Team ☺

Barium Enema, Double Contrast



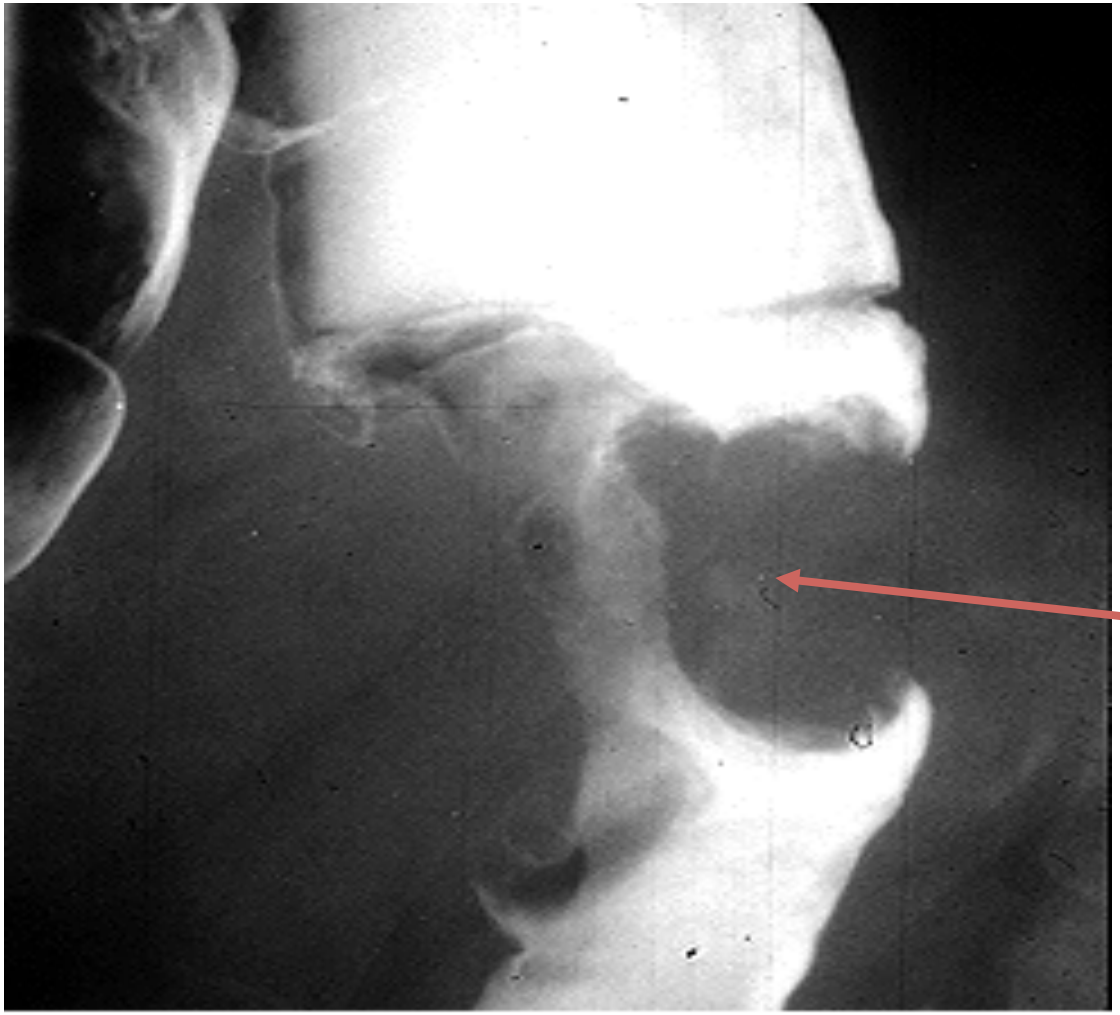
Colon Cancer

Barium Enema



Sigmoid Colon Cancer

Barium Enema



Apple Core Sign in sigmoid

Cancer of the colon Double contrast barium enema shows an apple-core lesion surrounding the lumen of the descending colon. Courtesy of Jonathan Kruskal, MD.

Barium Enema

Sigmoid cancer developing in ulcerative colitis Barium enema study demonstrates a focal stricture in the sigmoid colon caused by an infiltrating cancer. The adjacent bowel is featureless and folds are absent, findings characteristic of chronic ulcerative colitis. Courtesy of Norman Joffe, MD.

A Sigmoid Stricture is always considered malignant until proven otherwise

Barium Enema, Double Contrast

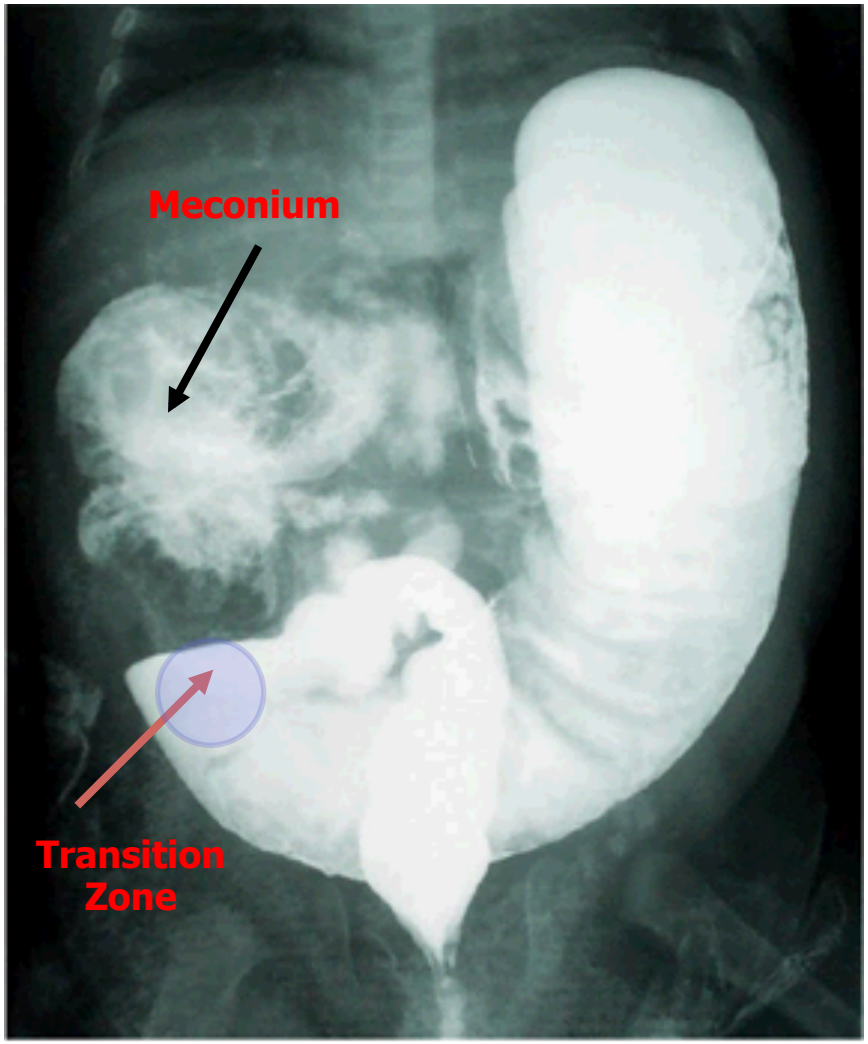
A huge right indirect hernia in the scrotum (bowl in scrutum)

Barium Enema, Double Contrast

A huge mass that has displaced the intestines

Alaways look at shadows
Here area of spleen, spleenomegaly

Barium Enema



Hirschsprung's disease Barium enema of an infant with Hirschsprung's disease showing the transition zone between the lower aganglionic bowel and the normal colon above. Courtesy of George D Ferry, MD.

Filling defects & dilated Descending & Sigmoid Colon

Transition Zone:
is the term applied to the region in which a marked change in caliber occurs, with the dilated, normal colon above and the narrowed, aganglionic colon below

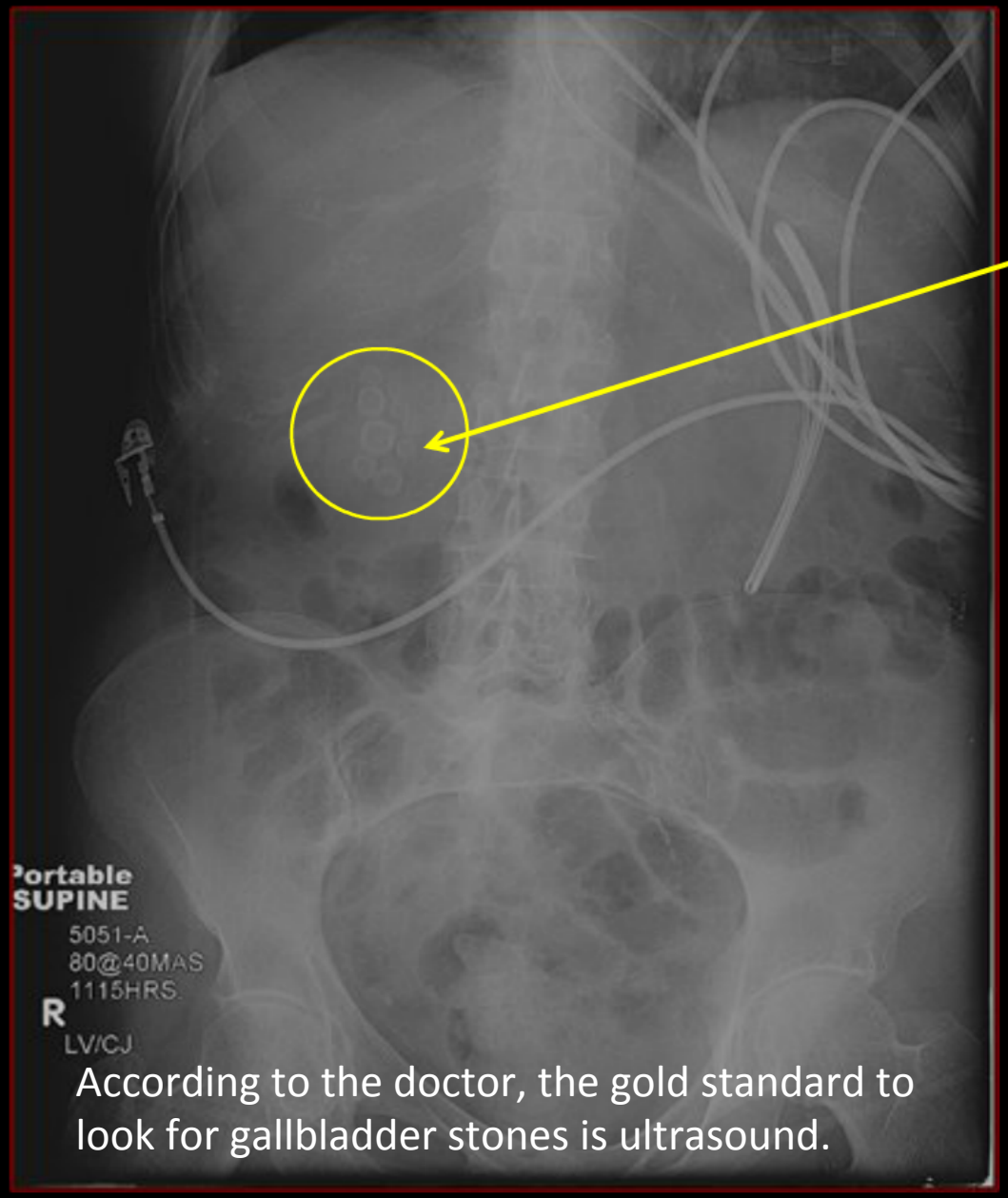
According to the Transition Zone:
Rectum → Ultra Short
Rectosigmoid → Short
Transverse Colon → Long
Beginning of the Colon→ Total (microcolon)

Diagnosis:
Hirschsprung disease
which is more definitively diagnosed by means of contrast enema examination, which can show the presence of a transition zone, irregular contractions, mucosal irregularity, and delayed evacuation of contrast material, among other findings

Although the hallmark of the diagnosis is the presence of transition zone but it's absence doesn't exclude the disease

A child with smooth stricture in the rectum → Hirschsprung's disease

For more info visit:
http://emedicine.medscape.com/article/409150-overview

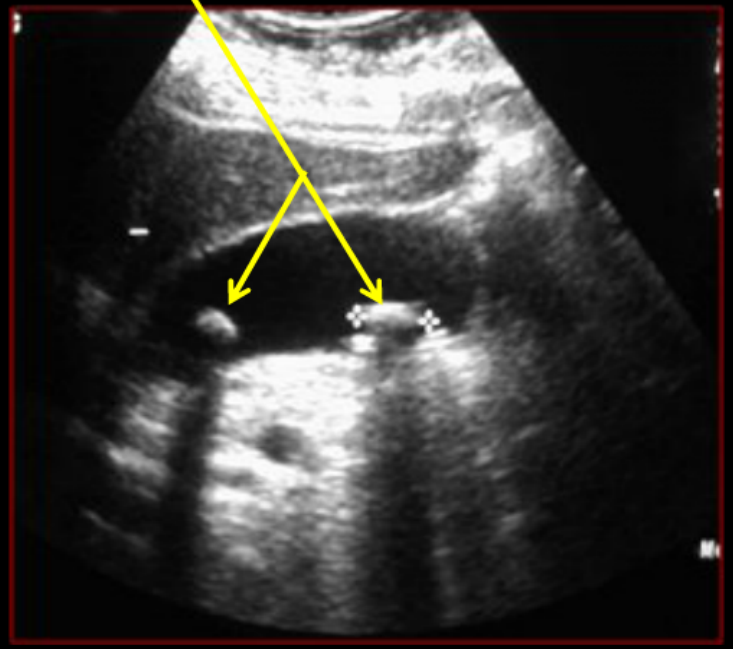


According to the doctor, the gold standard to look for gallbladder stones is ultrasound.

Acoustic shadowing is seen

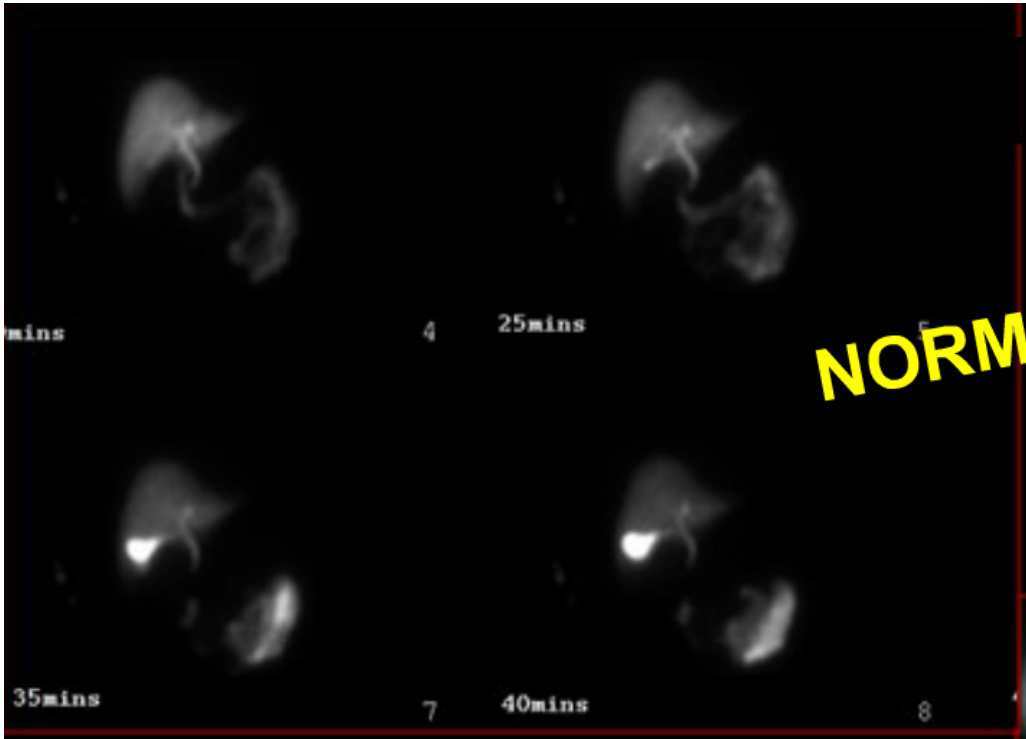
GALLSTONES

-15-30% calcify



Ultrasound

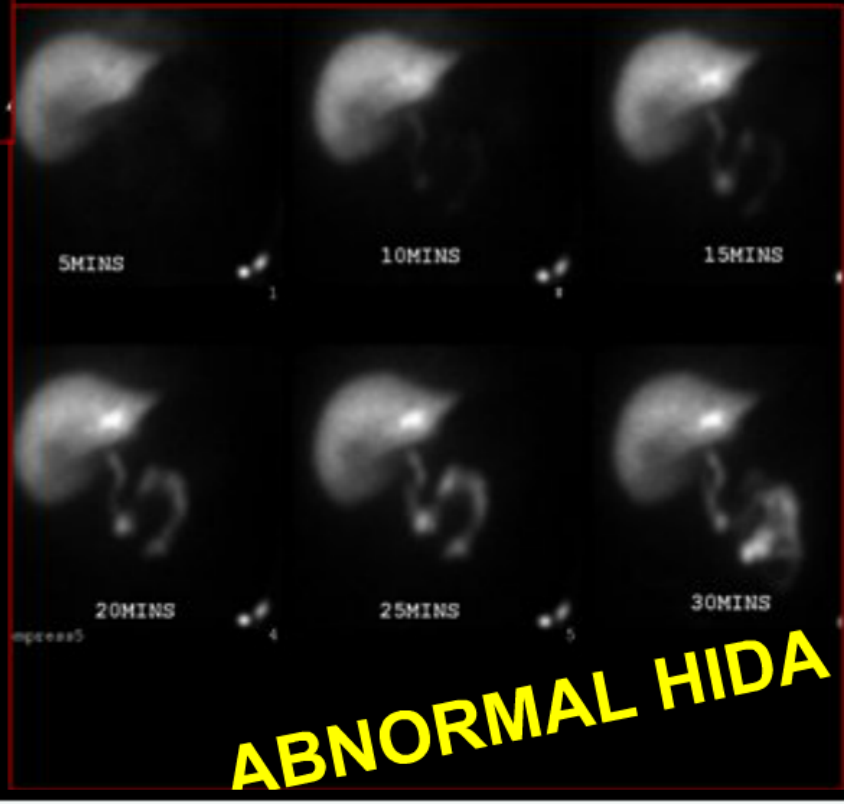
Hepato-biliary scintigram



NORMAL HIDA

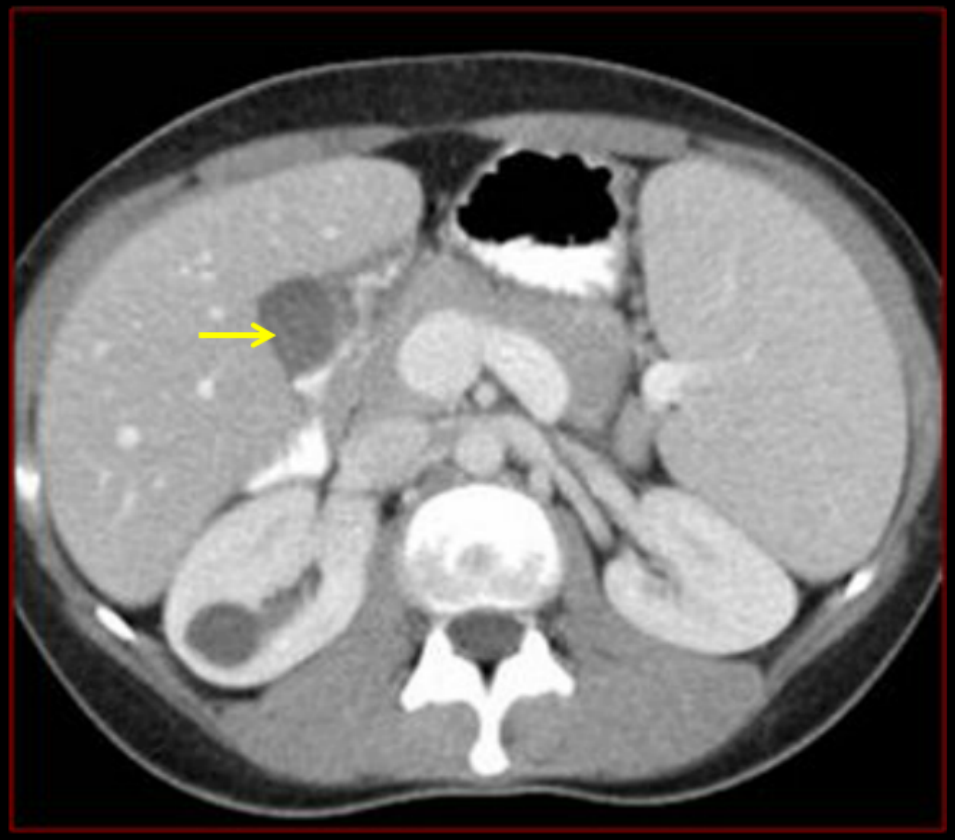
HIDA: Hepatobiliary Iminodiacetic Acid scan.

Obstructed cystic duct doesn't allow for filling of radionuclide

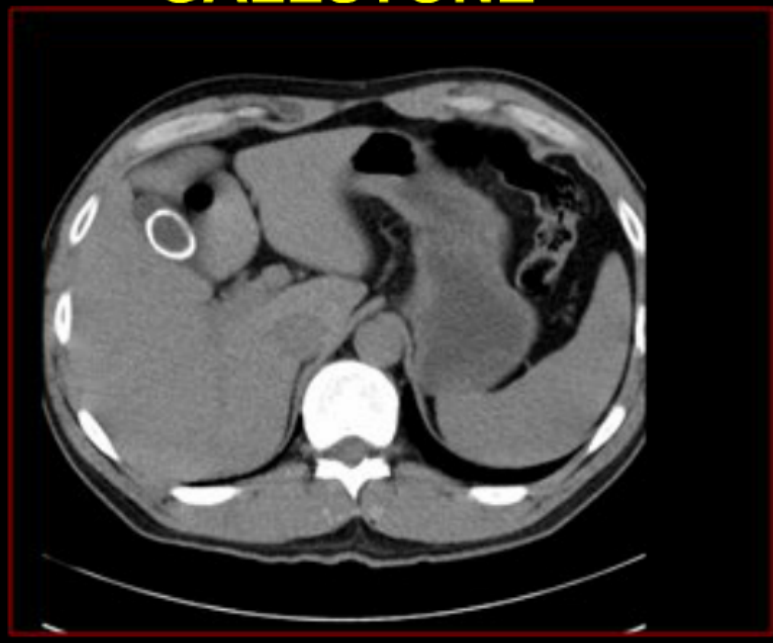


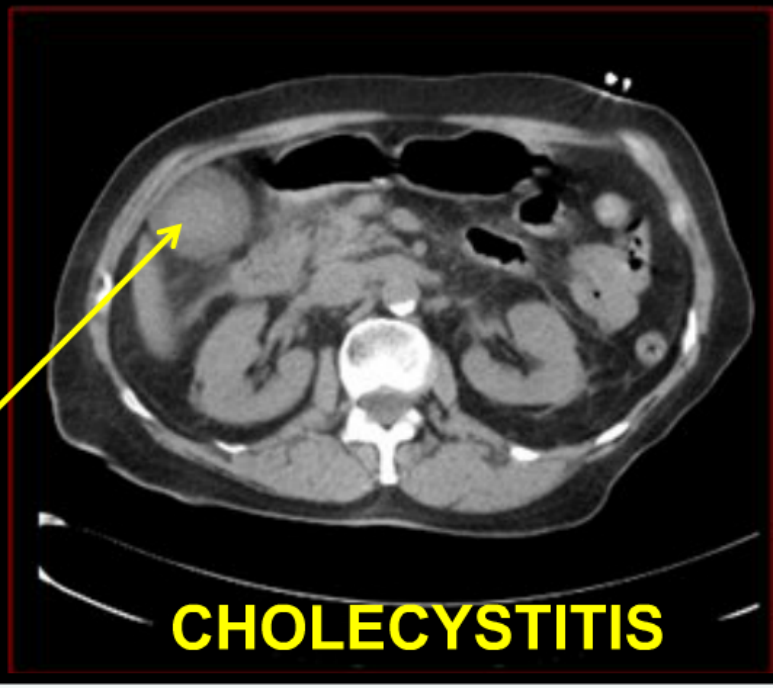
ABNORMAL HIDA

NORMAL GALLBLADDER



GALLSTONE



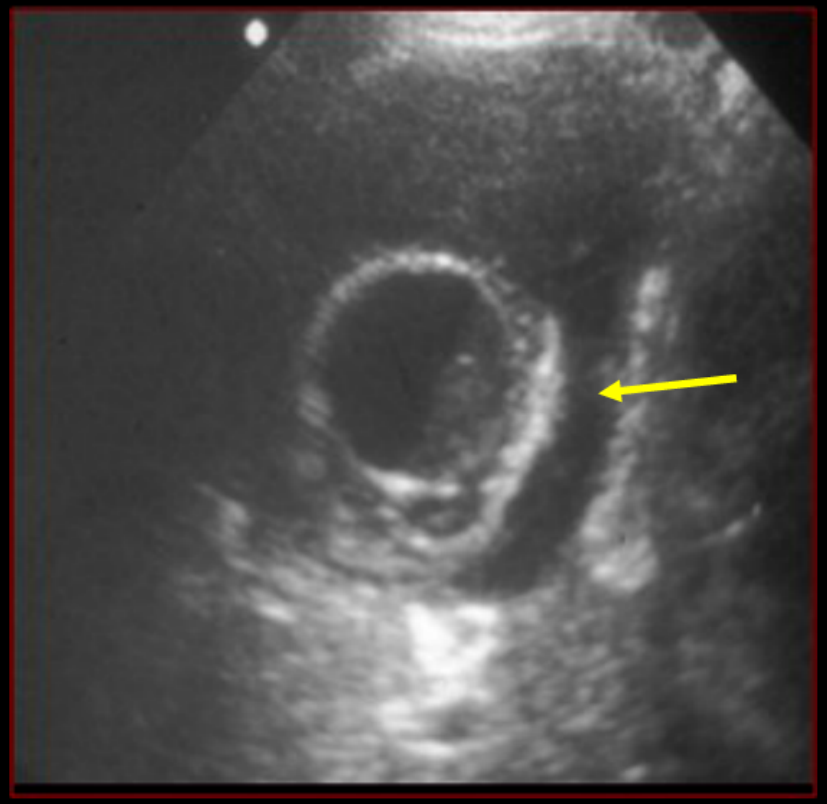


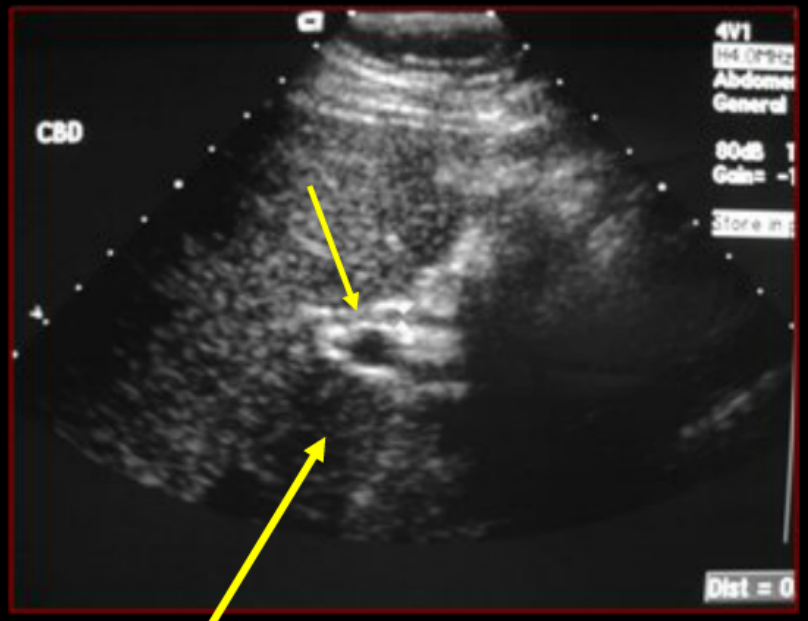
Thickened edematous gallbladder wall with cholecystitis on CT

CHOLECYSTITIS

CHOLECYSTITIS

With diffuse wall thickening and edema

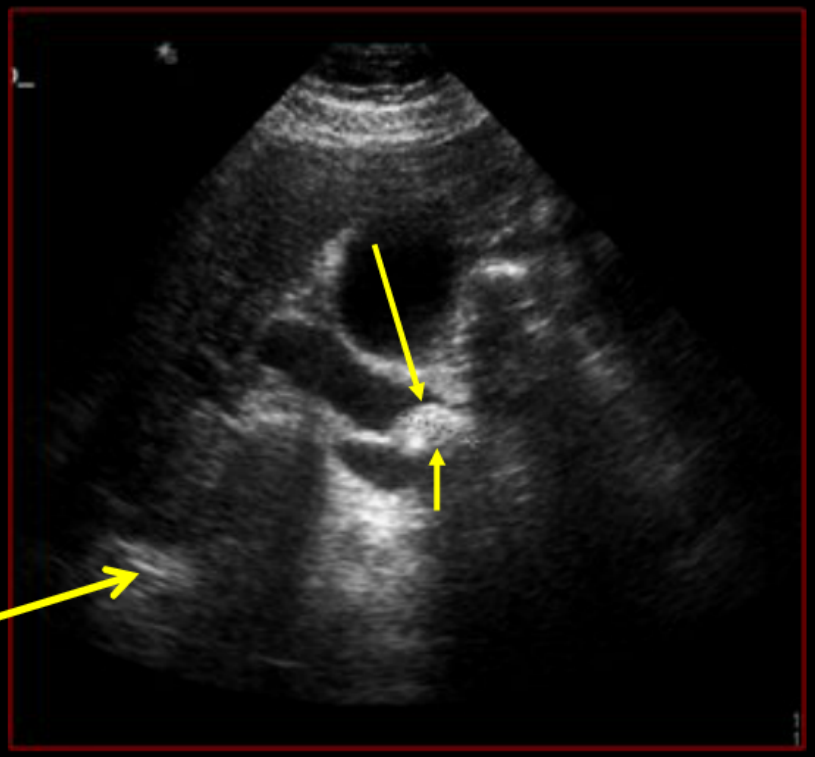




Presence of a stone distally → dilation proximally. Acoustic shadowing is seen.

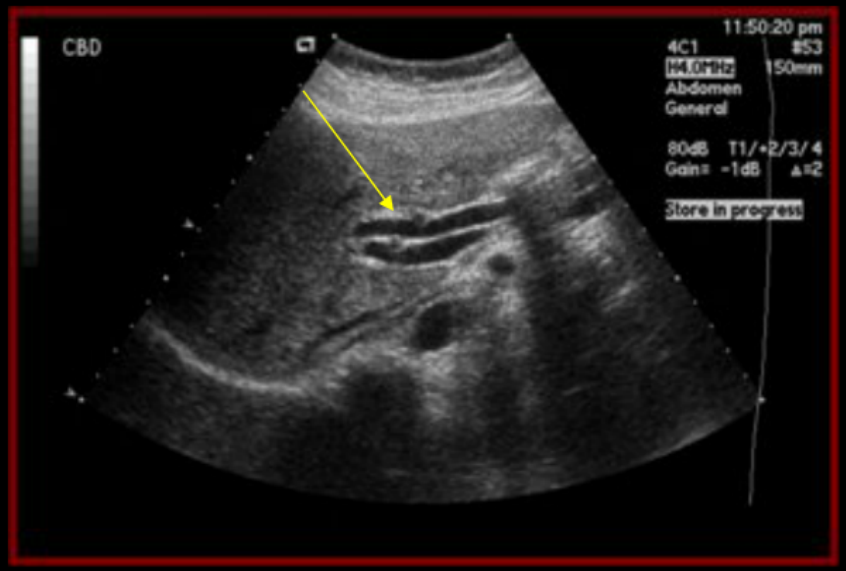
Diagnosis: cholangitis.

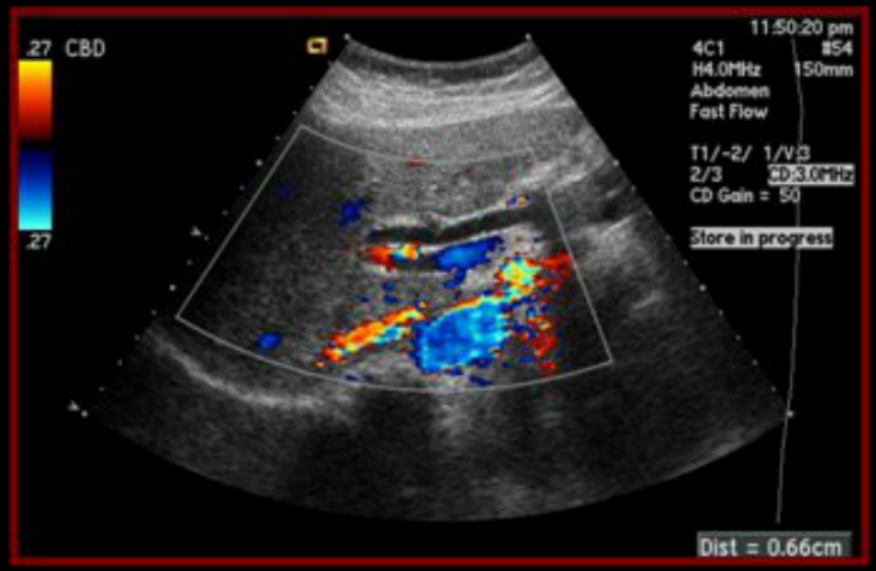
Normal bile duct



Obstructed duct due to distil calculus

Longitudinal – CBD dilated duct note Doppler signal in vessels

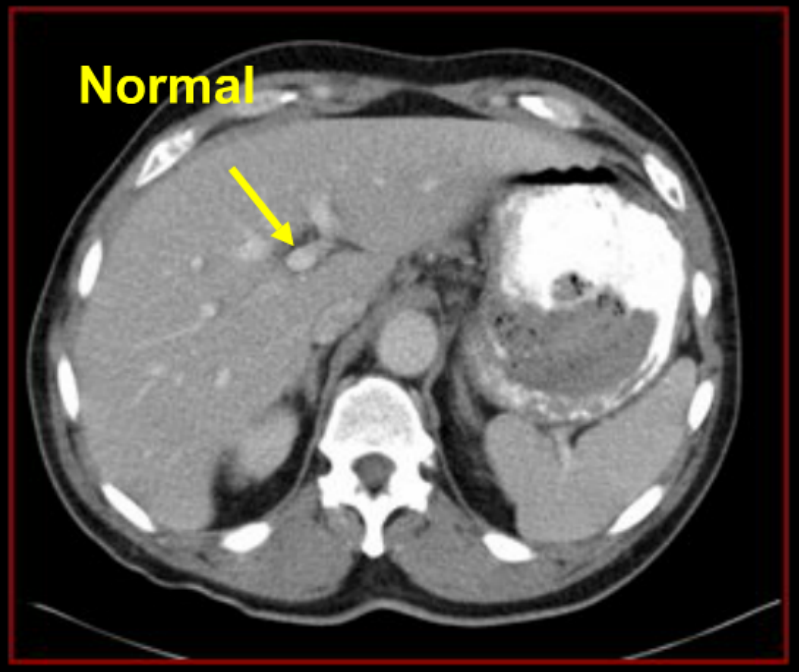




How to differentiate between common bile duct and blood vessels (portal and hepatic veins) using Doppler?

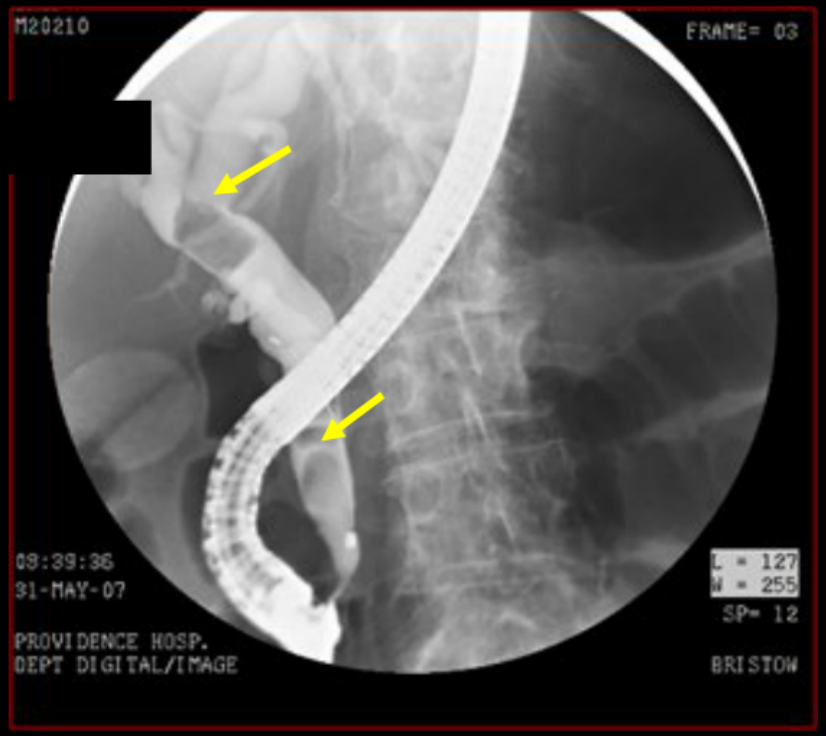
The vessels will be blue and red, the common bile duct will be colourles.

*Note dilated bile ducts. (Low density branching structures anterior to portal veins)



DILATED BILIARY TREE

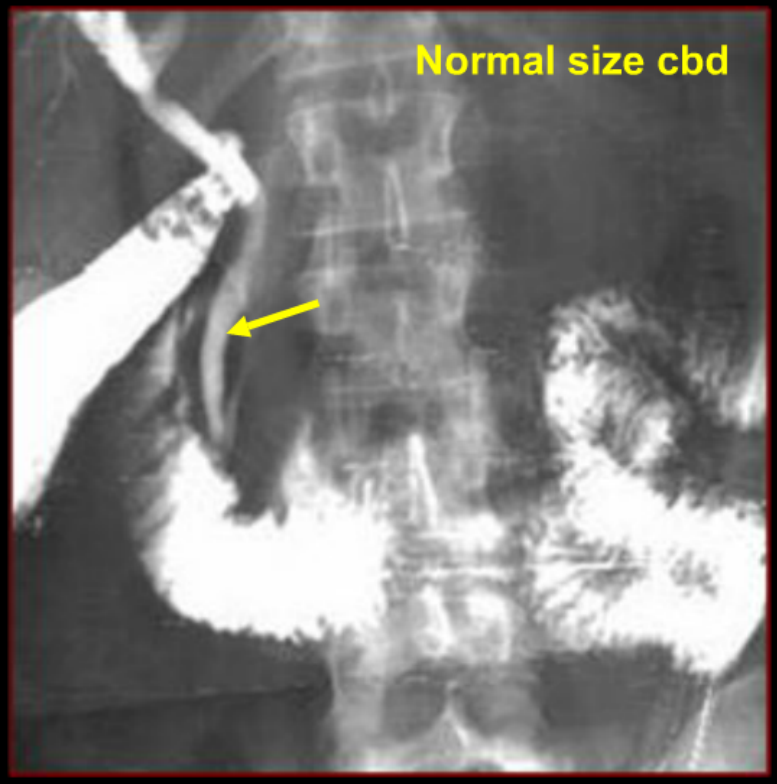
CT and ULTRASOUND



CBD: common bile duct.

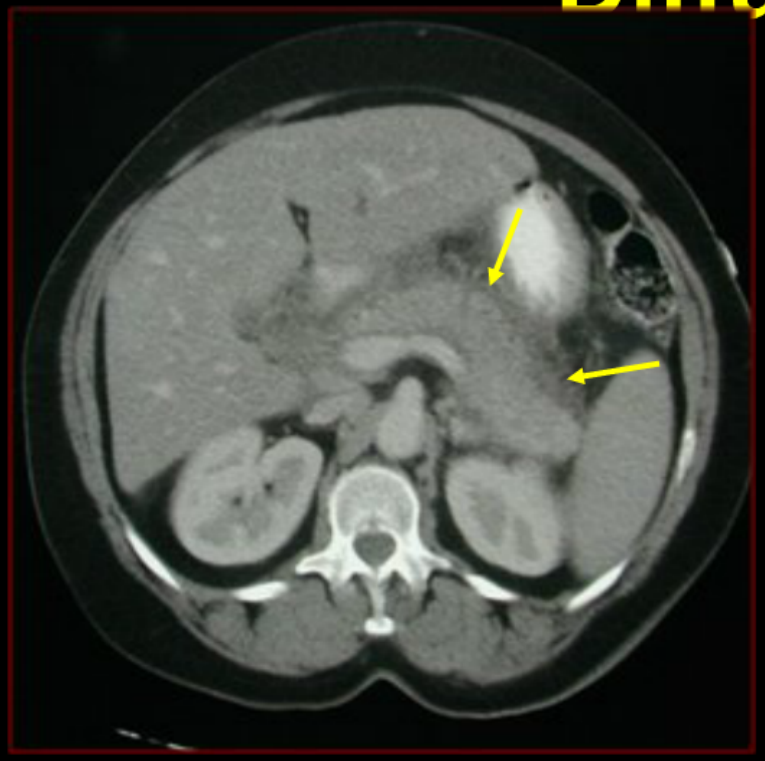
Dilated CBD with calculi

Endoscopic retrograde Cholangiopancreatography ERCP

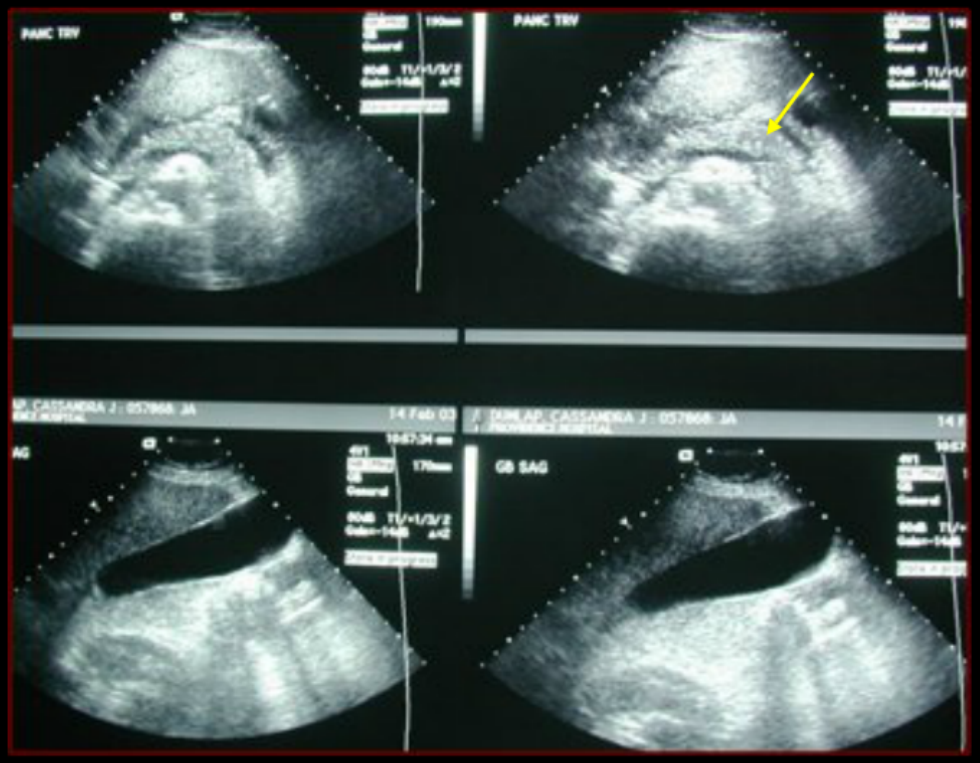


Contrast in biliary tree shows filing defect with smooth tapering → stones.
Smooth = benign
Irregular = malignant
Multiple stones in biliary tree

PANCREATITIS CT AND US
Diffuse edema

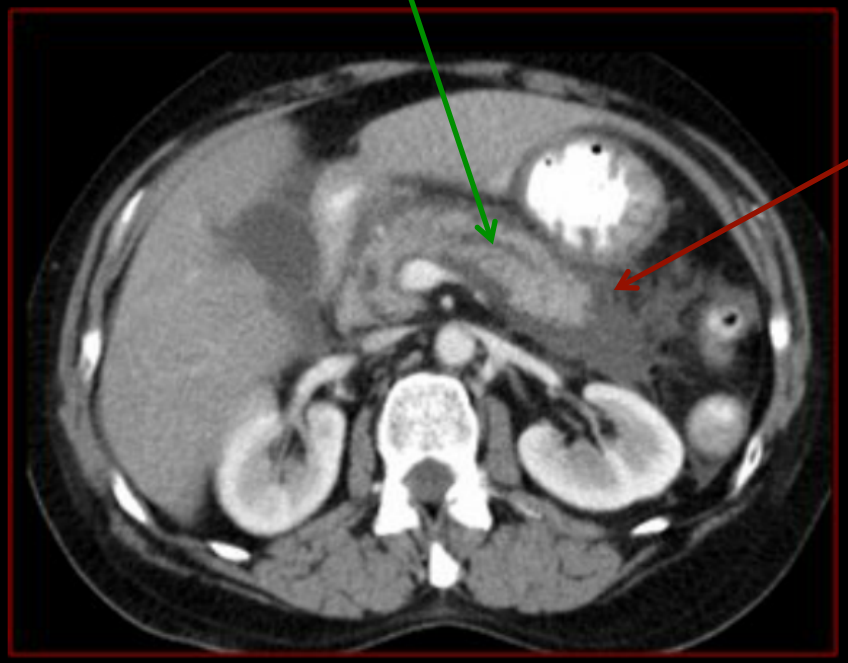


Markedly thick and enlarged pancreas surrounded by fluid → pancreatitis



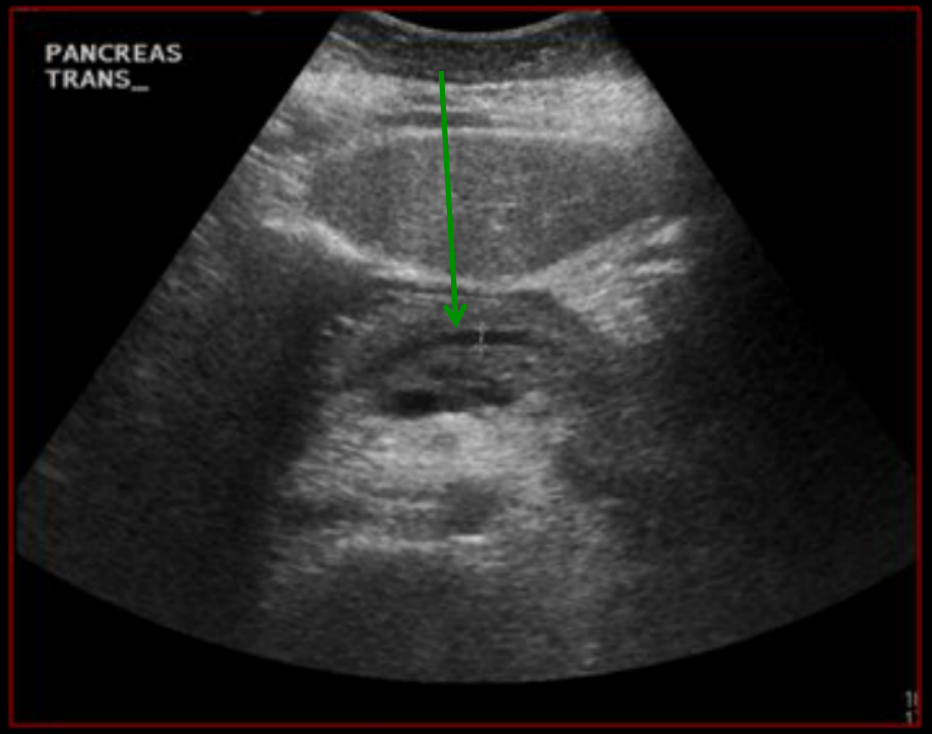
Most common causes:
1) Stones (When gallstones block the ampulla of vater → pancreatitis)
2) Alcohol

Pancreatitis
Biliary calculi
Alcohol toxicity



Red arrow: fluid

Green arrow: dilated pancreatic duct

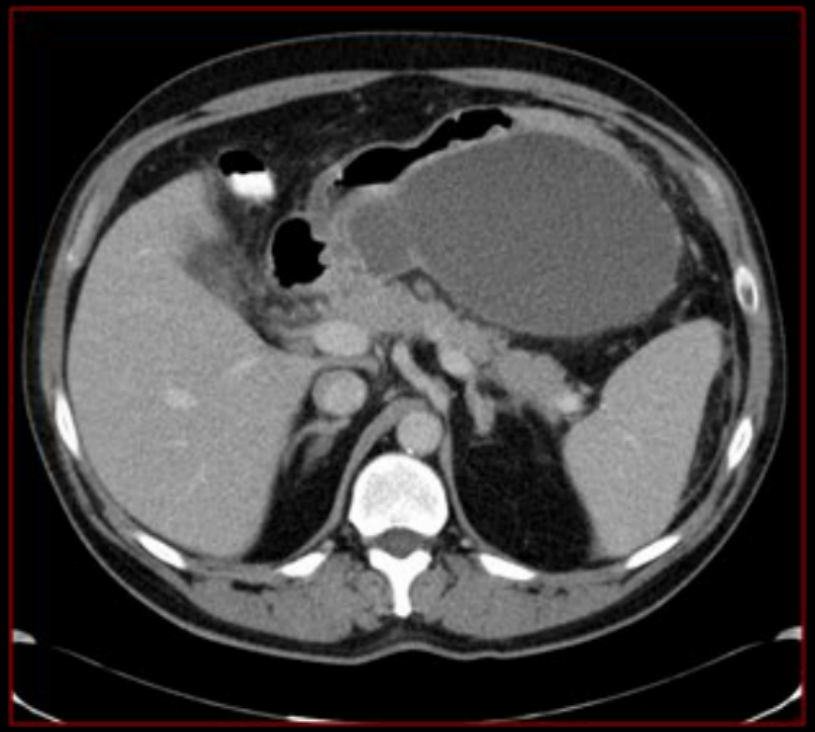


Complication of pancreatitis :
Pseudocyst
Fluid collection or abscesses in the lesser sac

Chronic pancreatitis may lead to calcification

RETROGASTRIC FLUID COLLECTION

PSEUDOCYST



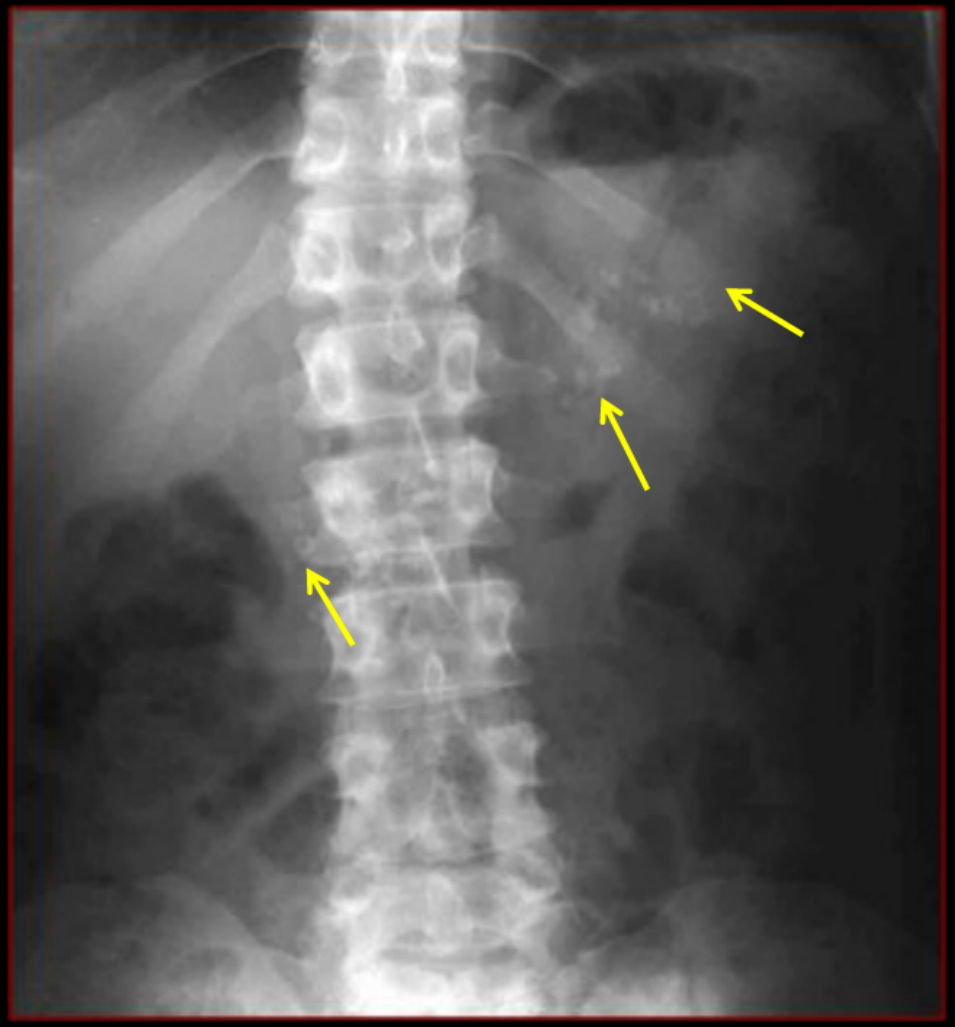
COMPLICATIONS

Pain

Infection

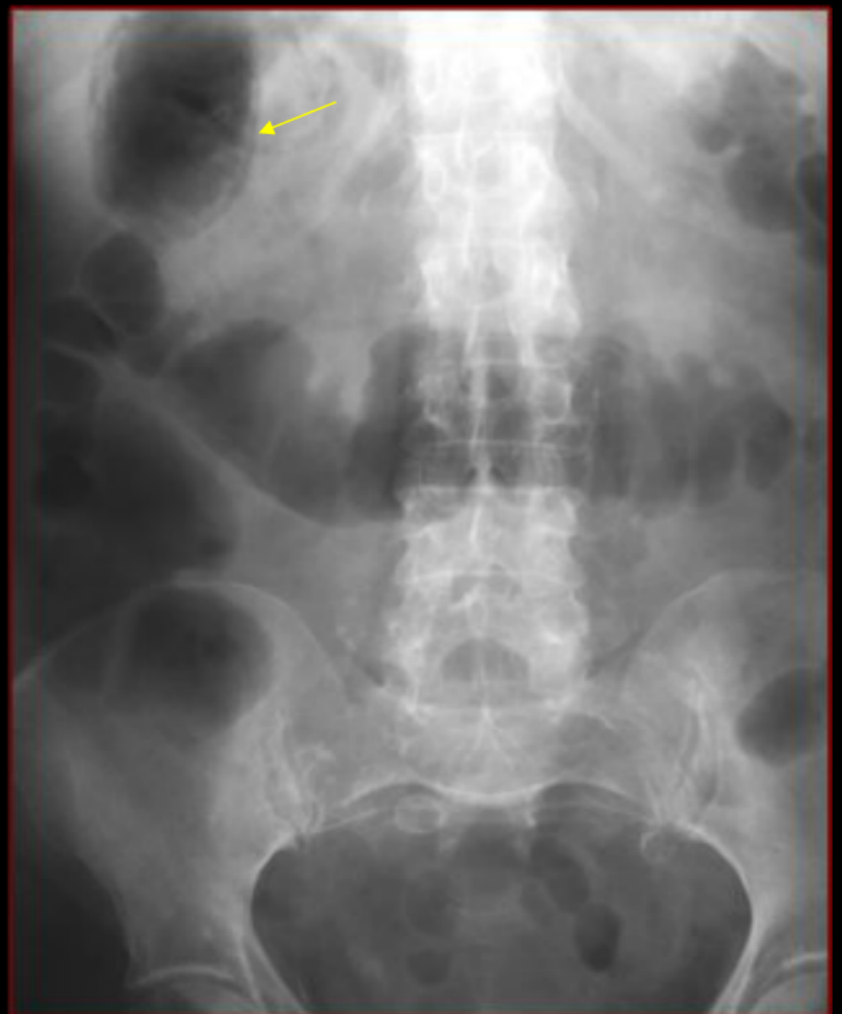
Hemorhage-pseudoaneurysm

Chronic calcific pancreatitis

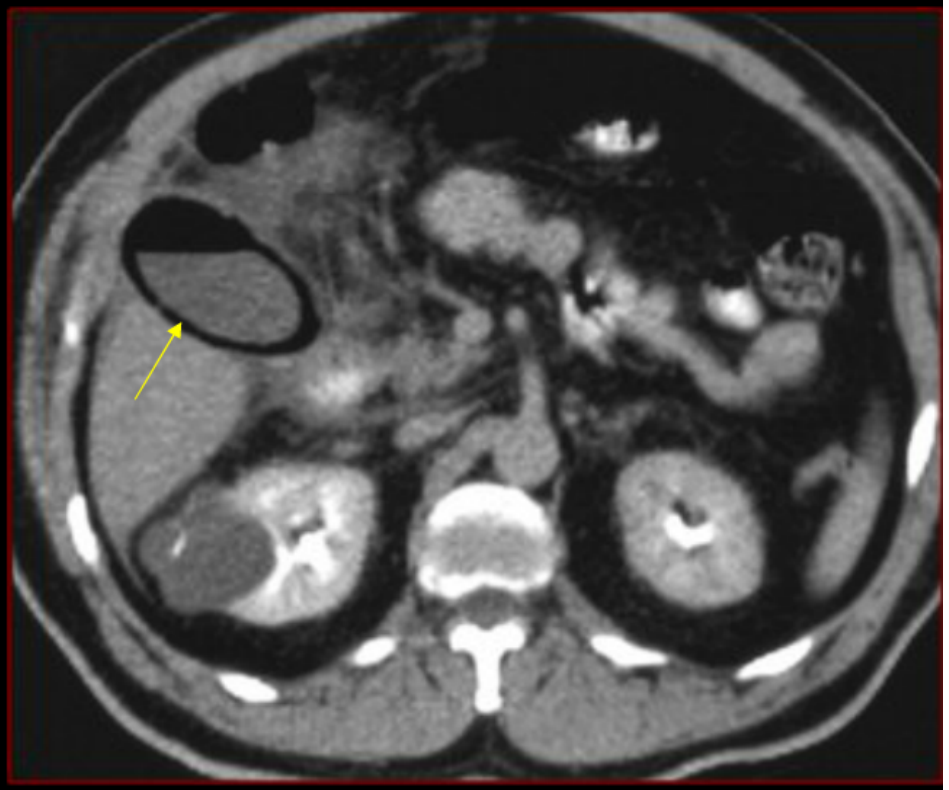


EMPHYSEMATOUS CHOLECYTIS

DIABETIC PATIENTS -AIR IN WALL



Air in the gallbladder wall



Also in diabetic: urinary bladder cystitis

ACALCULOUS CHOLECYSTITIS

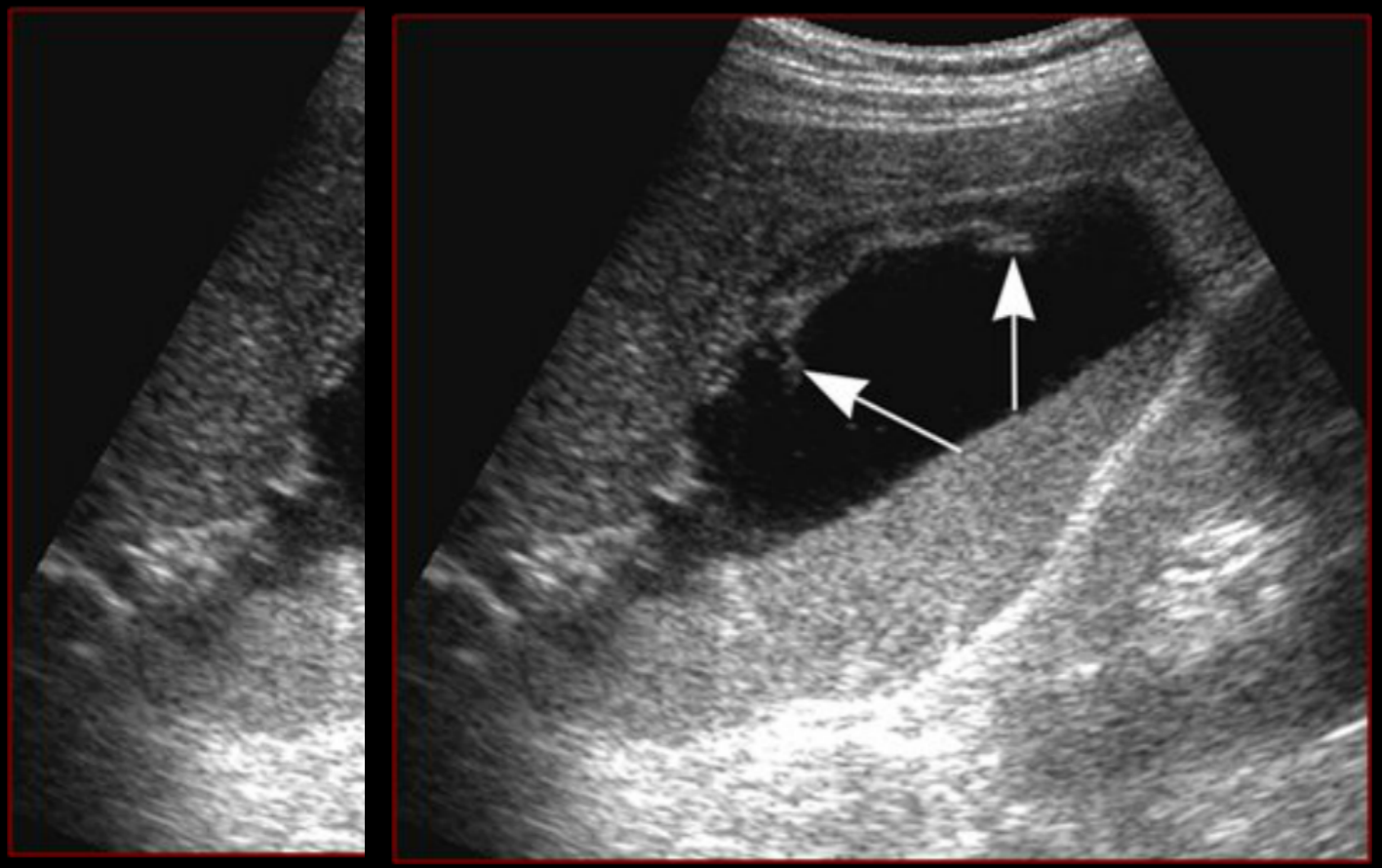
BILIARY STASIS- FASTING/ICU PATIENTS

What do you see?

Dilated gall bladder without stones

-Abnormal liver enzymes

-After diagnosis you need to puncture the gallbladder with ultrasound as a guider and put a tube in.



GALLSTONE ILLEUS

Small Bowel Obstruction at IC valve due to migration of gallstones