MED437
King Saud University

RADIOLOGY 437 TEAM

Radiological anatomy and investigation of the GIT

Color Index:

- ✓ Important
- ✓ Notes
- ✓ Extra

Editting File

objectives:

- ➔ To know various radiological investigations used for GIT.
- ➔ To understand step wise approach in requesting GIT radiology investigations.
- ➔ To be familiar with radiological appearance (anatomy) seen in various imaging modalities.
- ➔ To interpret plan x-ray radiograph of abdomen with common pathologies.

Sources

Lecturer:
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Same 436 lecture Slides:
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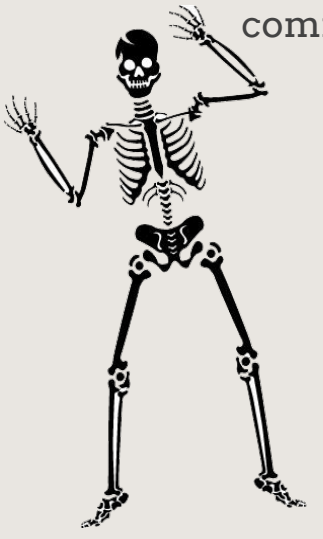


Introduction:

What is peculiar about GIT? (GIT Characteristics):

1. Hollow viscous (Not solid).
2. Usually filled with gas.
3. Motility.

Radiological Modalities : X-ray and fluoroscopy are for detection

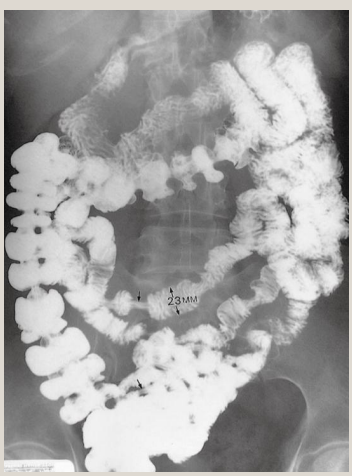
- Plain X-ray
- CT
- Nuclear Medicine
- Ultrasound
- Fluoroscopy
- Angiography
- MRI

X-ray (Plain radiography):

- Often used as first imaging modality.
- Cheap
- Fast.
- Can be done bedside (portable).
- Useful for free gas and bowel obstruction.

Fluoroscopy (contrast study) :

- Can be used as first imaging modality.
- Cheap.
- Use of contrast .
- Recently replaced by CT & MRI.
- Useful for intraluminal pathology.
- Can give clue about motility (function).



Ultrasound:

- Relatively cheap.
- No radiation.
- Limited use in gas filled structures .
- Used in pediatrics and pregnant ladies.

Indications for US is : Acute Abdomen-Appendicitis-Pyloric stenosis
Keep in mind that in appendicitis it might have its own limitations according to how the appendix is positioned

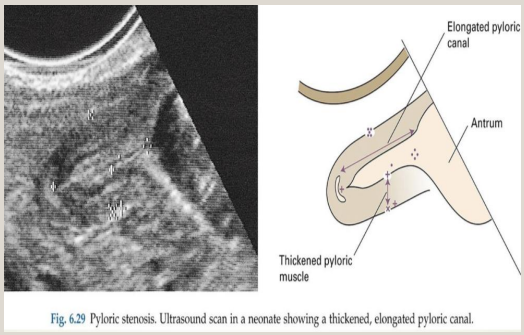
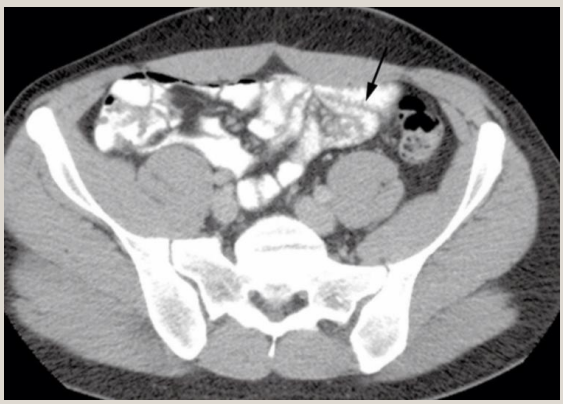


Fig. 6.29 Pyloric stenosis. Ultrasound scan in a neonate showing a thickened, elongated pyloric canal.

Pyloric stenosis. Ultrasound scan in a neonate showing a thickened, elongated pyloric canal. In babies, 4 weeks old, males with swelling in epigastric area and projectile vomiting.

CT:

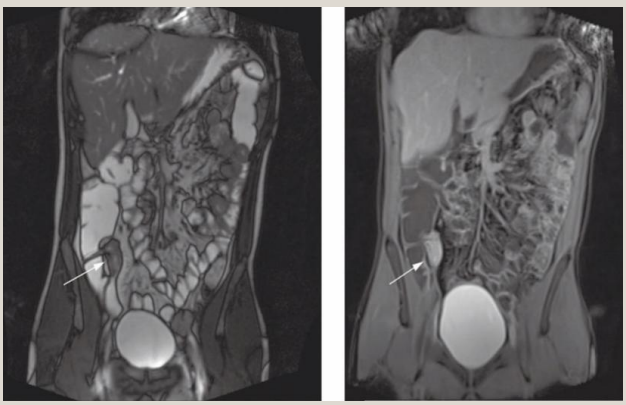
- Expensive.
- More radiation.
- Fast.
- Contrast (IV, Oral, rectal) usually used.
- Used in emergency department.



MRI :

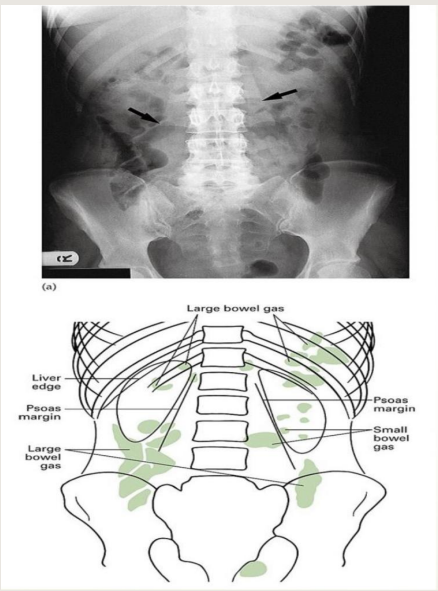
- More expensive than CT.
- No radiation.
- Slow and affected by artifacts.
- Excellent for soft tissue.
- Can't be reformatted. unlike the CT

We very rarely use it for emergencies



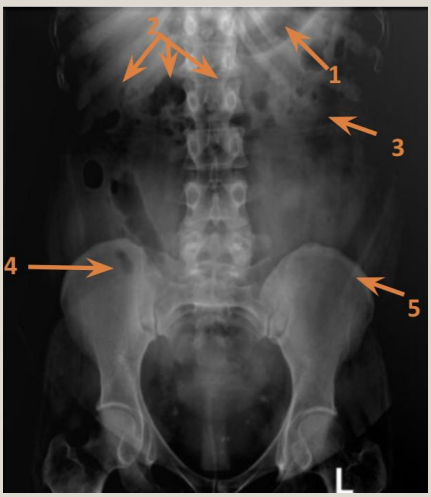
Radiological Appearance of the GIT:

The bowel in x-ray appears as gas so we describe the distribution of bowel gas (pattern)



Abdominal X-ray :

1- Stomach
2- Transverse Colon
3- Small bowel
4- Cecum
5- Descending colon



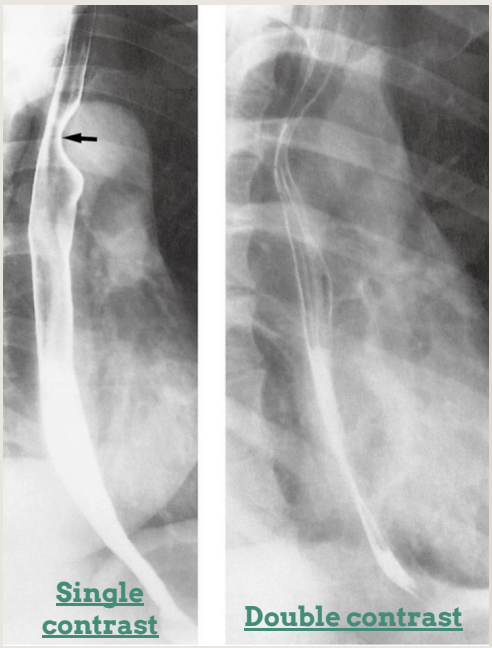
Esophageal Barium Swallow:

- We use contrast x-ray to assess the esophagus (fluoroscopy) (here there is no contrast)
- evaluating obstruction / stricture.
- Swallow is used to assess the esophagus and stomach and first part of duodenum
- We check for the motility,transit time, and to evaluate any obstruction/stricture

Esophageal Barium Swallow:



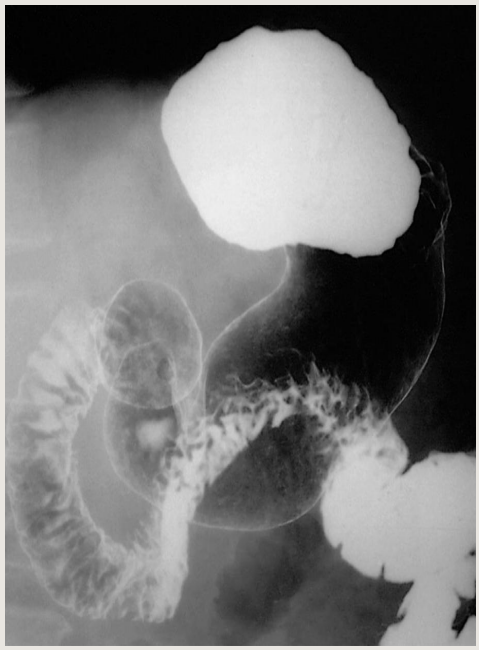
These narrowings are most likely due to normal peristalsis, unless it was persistent



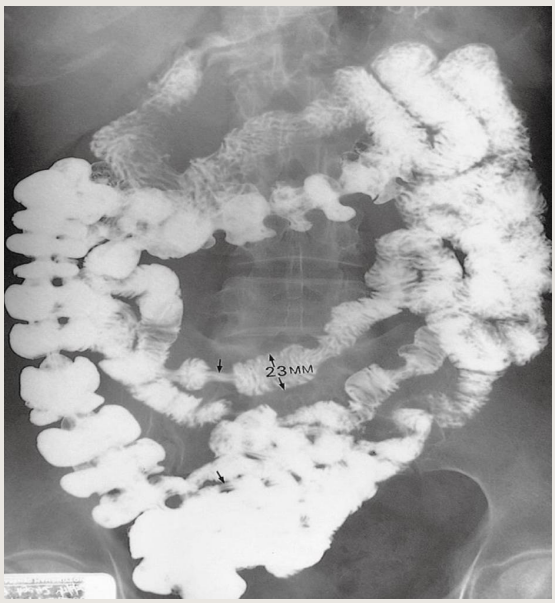
Single contrast is for checking the lumin

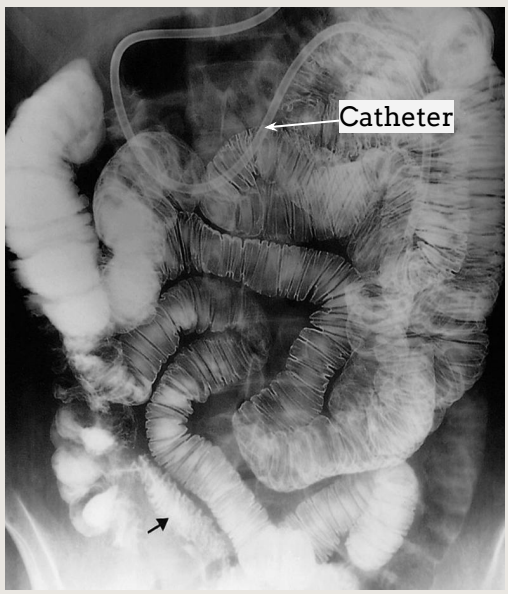
We add gas (double contrast) to see the mucosal lining which should be linear, straight no irregularity.

Esophagus: the **arrow** is pointing to a normal narrowing due to the aortic arch (anteriorly).
There is no bulging or any other abnormalities like strictures.



Barium follow through:



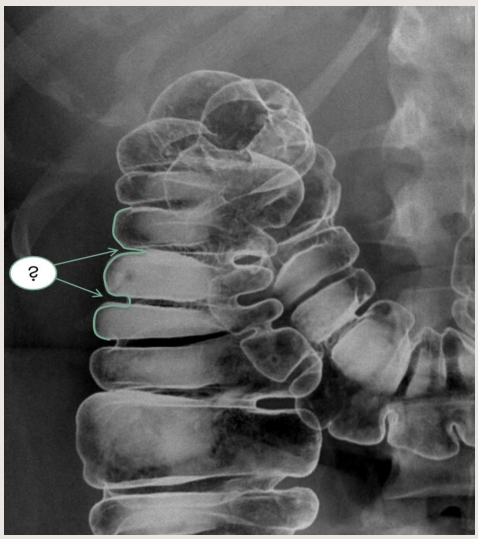


This is largely not done anymore and is replaced by CT and MRI
In the second picture they inflate the bowel by inserting contrast by catheter

Barium follow through :

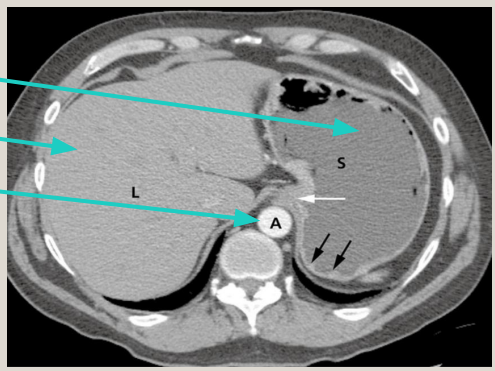
1- Rectum
2- Sigmoid Colon
3- Descending Colon
4-Splenic Flexure
5- Transverse Colon
6-Hepatic Flexure
7- Ascending Colon
8-Cecum

The light green line is the Hustra. This is a **double contrast** of the large bowel: first they inject the barium and the barium will make the outline clear.
After that the patient will pass the barium out then we will inflate gas which will make the outline more clear. Haustra can be missing or diminished in the left side of the colon normally. But in right and transverse it MUST be present. Absent haustra in right or transverse is pathological.

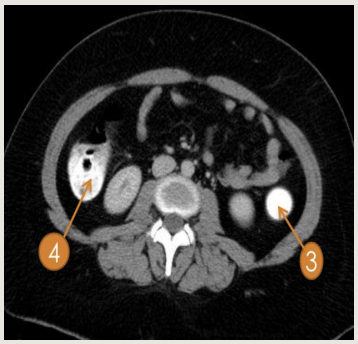


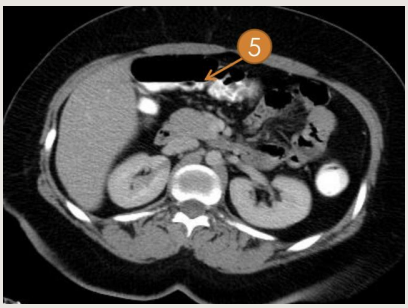
CT scan :

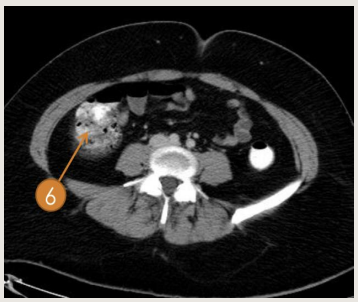
Stomach
Liver
Aorta



so we need to see the pulmonary artery by CT with contrast, CT pulmonary angio within 9-12 seconds after injection)

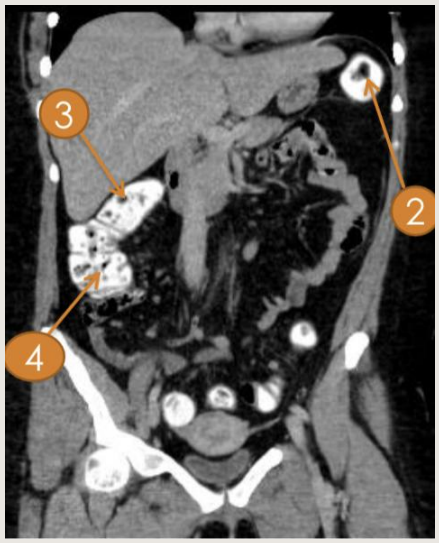


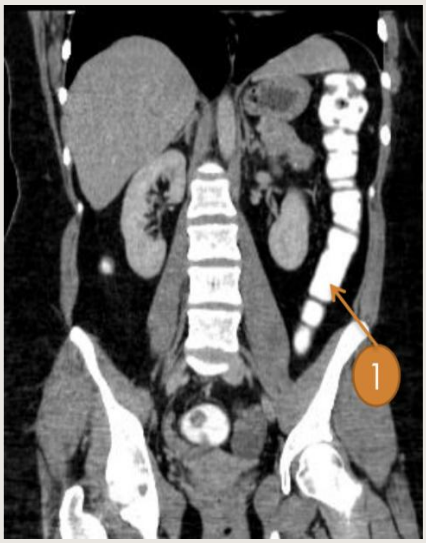




1- Rectum.
2- Sigmoid Colon.
3- Descending Colon.
4- Ascending Colon.
5- Transverse Colon.
6- Cecum.

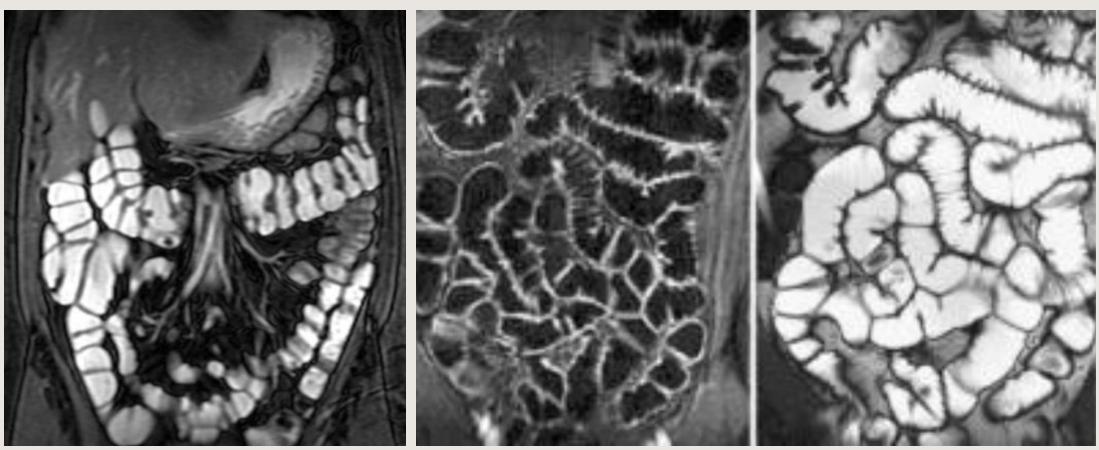
Coronal CT scan (reconstructed):





1- Descending Colon.
2- Splenic Flexure.
3- Hepatic Flexure.
4-Ascending colon.
5- Cecum.
6- Sigmoid colon

MRI Enterography: Not important for the exam



Used mainly to diagnose IBD (inflammatory bowel disease) and (Crohn's disease)
You can even do a semi-mode to see which areas are dead/not moving

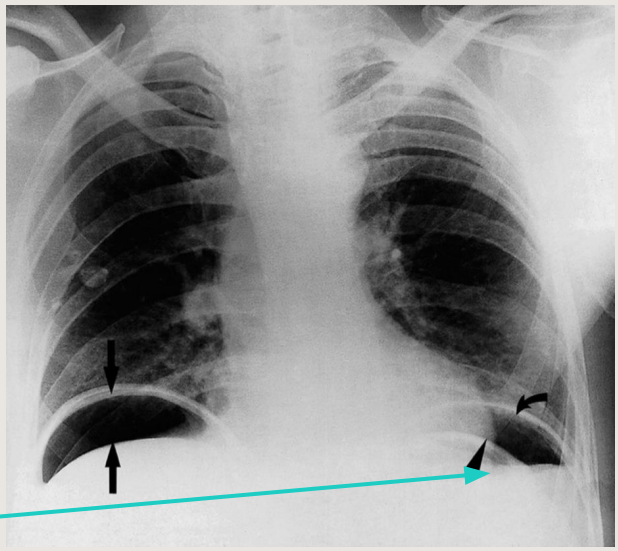
Common plain X-ray abdomen radiograph finding: It is very IMP to know how to read plain X-ray

Free gas in the peritoneal

On this chest radiograph, air can be seen under the domes of both hemidiaphragms. The curved arrow points to the left hemidiaphragm and the arrow head to the wall of the stomach. The two vertical arrows point to the diaphragm and upper border of the liver.

Pneumoperitoneum due to perforation of viscus like colon cancer or peptic ulcer that give meniscus shaped free gas in abdomen.

Don't mistake the small shadow on the right! it's the stomach gas (fundus)



Why did the radiologist apply chest X-ray rather than abdominal X-ray?

- To exclude lower lobe pneumonia that caused by legionella which the abdominal pain is one of it's symptoms.

What are the findings?

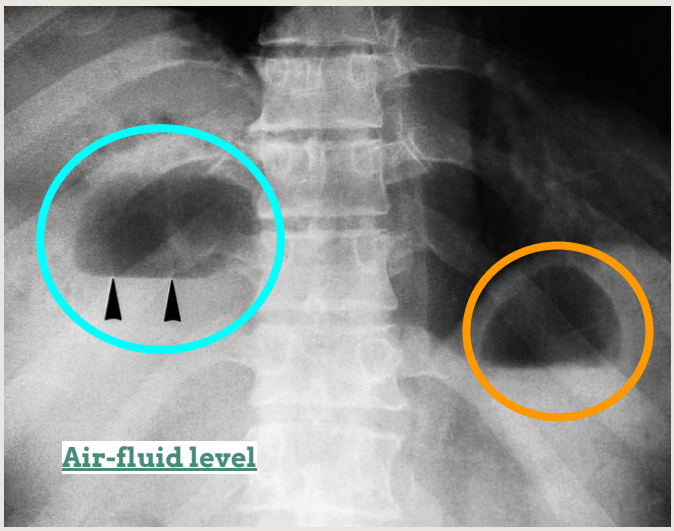
-Black arrows pointing to the air bubbles.

- If the air bubble was at the site of stomach, it would be normal bubble (left side).
- While if it was on the right side, it indicates the perforation due to peptic ulcer.
- We can see normal air fluid level in the stomach and cecum

Blue circle: Gas in a right subphrenic abscess. There are several collections of gas within the abscess. The largest of these contains a fluid level (arrowheads).

Could be due to infection (pseudomonas, gas forming organism) of the liver causing abscess.

Orange circle: The air–fluid level under the left hemidiaphragm is normal. It is in the stomach. (we can see normal air-fluid level in the cecum also)



Small bowel :

Supine position:

There is no air fluid level because air is projecting over fluid.
- Stack of coin appearance.
Well demonstrated in the supine film. Note the large bowel contains less gas than normal.
- This is radiographic image shows gas filled structure (**small bowl markedly dilated**) and shows air-fluid levels in the erect film. And this presentation is due to small bowel obstruction.
- We do abdominal erect and supine film in bowel obstruction.

Erect position:

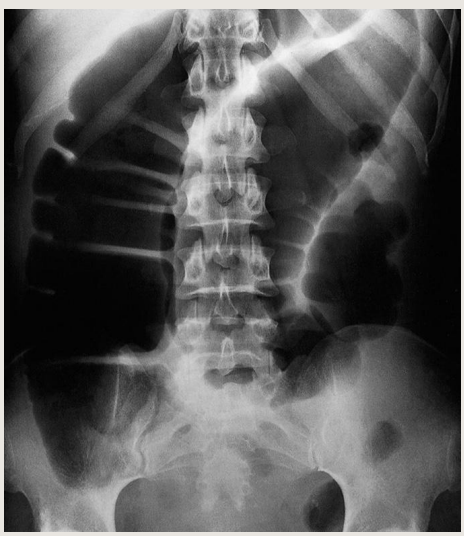
The jejunal loops are markedly dilated and show air-fluid levels the air fluid level, the jejunum is recognized by the presence of valvulae conniventes .
Multiple air-fluid levels that are located at the center so it's in the **small bowel**
The fluid goes down and air goes up why! **Gravity.**
In this patient he has small bowel obstruction due to adhesions

Large bowel :

Large bowel obstruction (megacolon)

Due to carcinoma at the splenic flexure. There is marked dilatation of the large bowel from the caecum to the splenic flexure.

You can't know the underlying etiology from x-ray **only**

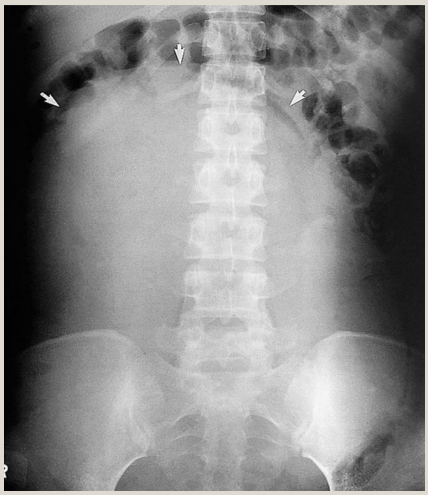


Paralytic ileus

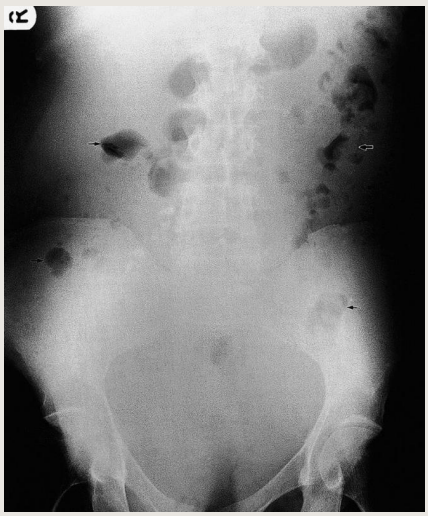
There is considerable dilatation of the whole of the large bowel extending well down into the pelvis. Small bowel dilatation is also seen.

The density of the abdomen is increased due to Mass arising (originating) from the pelvis (arrows), displacing the bowel to the upper left side. This mass is cystadenocarcinoma of the ovary.

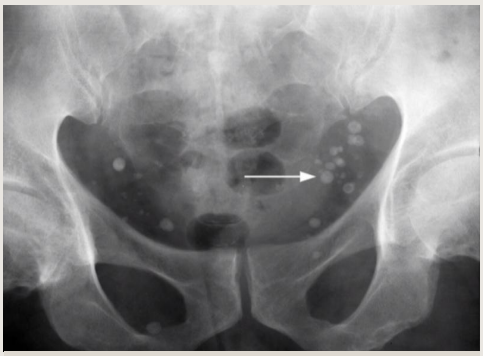
Why not ascites? Because here the mass is displacing (pushing) the bowel to one direction only (Upwards)



Ascites. Note how the gas in the ascending and descending colon (arrows) is displaced by the fluid away from the side walls of the abdomen.
Its displacing the bowel in many directions here.
- Could be fluid or blood or ascites. ascites goes everywhere, we see gas everywhere but decreased.
- There is scanty (little) amount of gas



Calcification of the abdomen:



Calcification within the pelvic base (phleboliths)

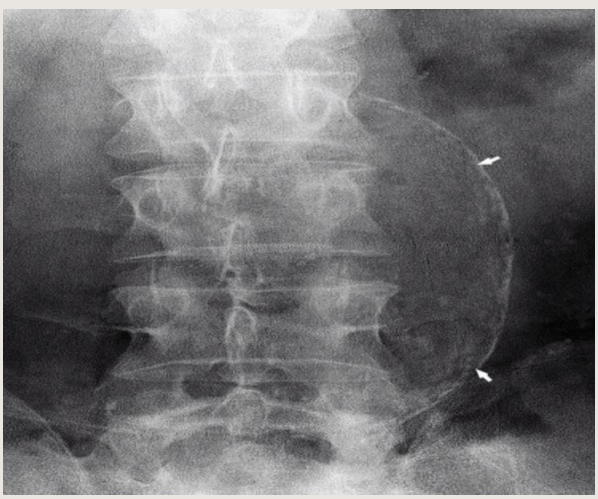
Calcified large uterine fibroid (leiomyoma)

Calcification in the pancreas (Chronic pancreatitis)

It is important to differentiate a calcified nodule (phleboliths) from a distal ureteral stone:

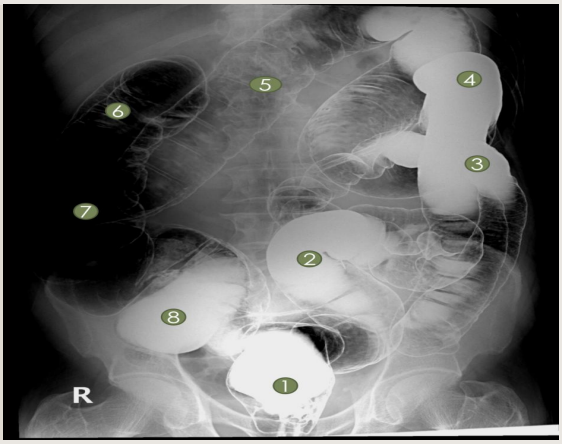
A calcified nodule will have a hollow structure or lucency in it's centre (black dots) unlike the ureteric stone. The ureteric stone is also more medial than the nodule

This is calcified abdominal aortic aneurysm. The aneurysm measured 8 cm in diameter on the lateral view. This is a classic picture of a calcified AAA (white arrows)



SUMMARY

1- Rectum
2- Sigmoid Colon
3- Descending Colon
4-Splenic Flexure
5- Transverse Colon
6-Hepatic Flexure
7- Ascending Colon
8-Cecum



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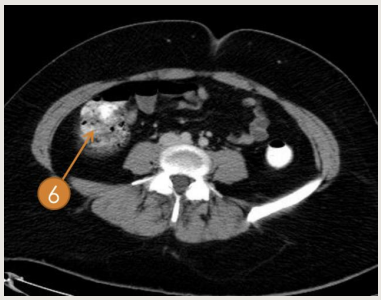
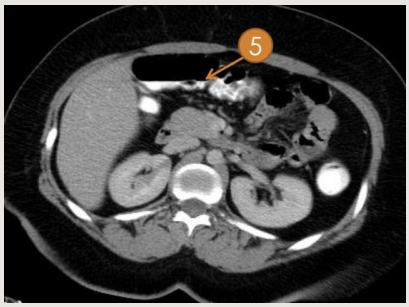
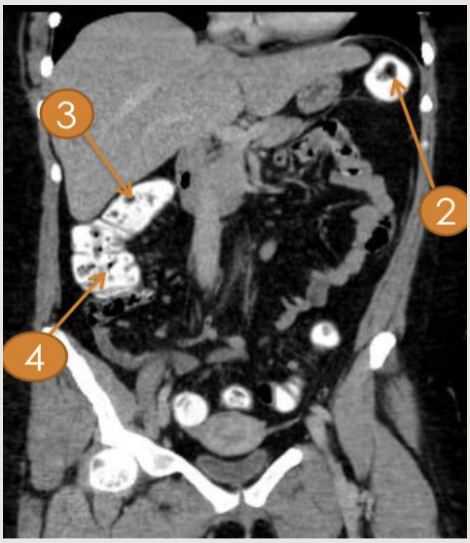
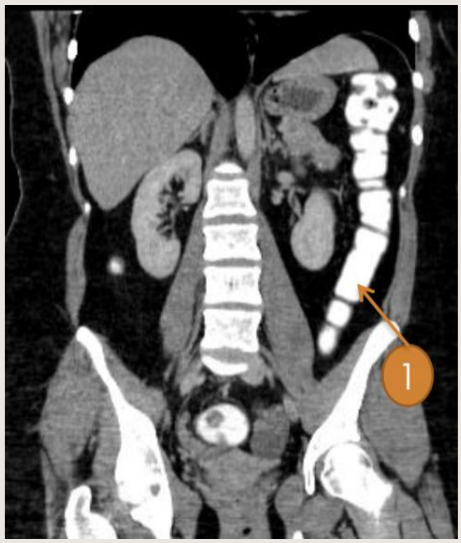








1- Descending Colon.
2- Splenic Flexure.
3- Hepatic Flexure.
4-Ascending colon.
5- Cecum.
6- Sigmoid colon

SUMMARY

Supine position	Erect position:
	
- There is no air fluid level because air is projecting over fluid (Stack of coin appearance) - Note the large bowel contains less gas than normal. - Small bowl markedly dilated and there is air-fluid levels in the **erect** film(this presentation is due to small bowel obstruction)	The jejunal loops are markedly dilated and show air-fluid levels the air fluid level, the jejunum is recognized by the presence of valvulae conniventes .

QUESTIONS

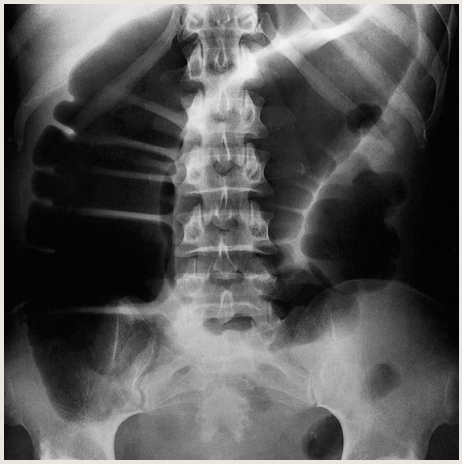
1-Abdominal X-ray was taken to a patient , which one of the following you think he has based on the X-ray:

A- Large bowel obstruction

B- Perforation.

C- Scoliosis.

D- Normal abdominal X-ray.



2- Which of the following modalities can be initially used:

A-X-ray

B- MRI.

C- CT.

D- US

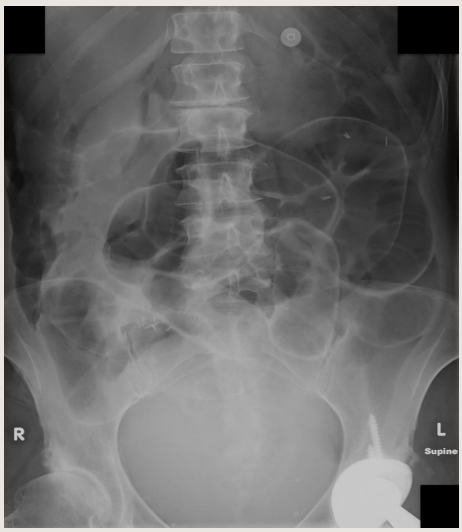
3- 55 y.o female came to ER with Abdominal pain and distension. Significant abdominal trauma 2 years earlier.

A- Large bowel obstruction

B- Perforation.

C- small bowel obstruction.

D- Normal abdominal X-ray.



4-a
3-c
2-a
1-a

4-A 60 years old patient referred to us with a history of dysphagia for both solids and liquids from one year ago.

A- alchelesia

B- Perforation.

C- diffuse spasm

D- normal peristalsis

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References

✓ Slides
✓ 436 Teamwork
✓ Diagnostic imaging: Chapter 5 & 6

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