GIT Radiological investigations and anatomy

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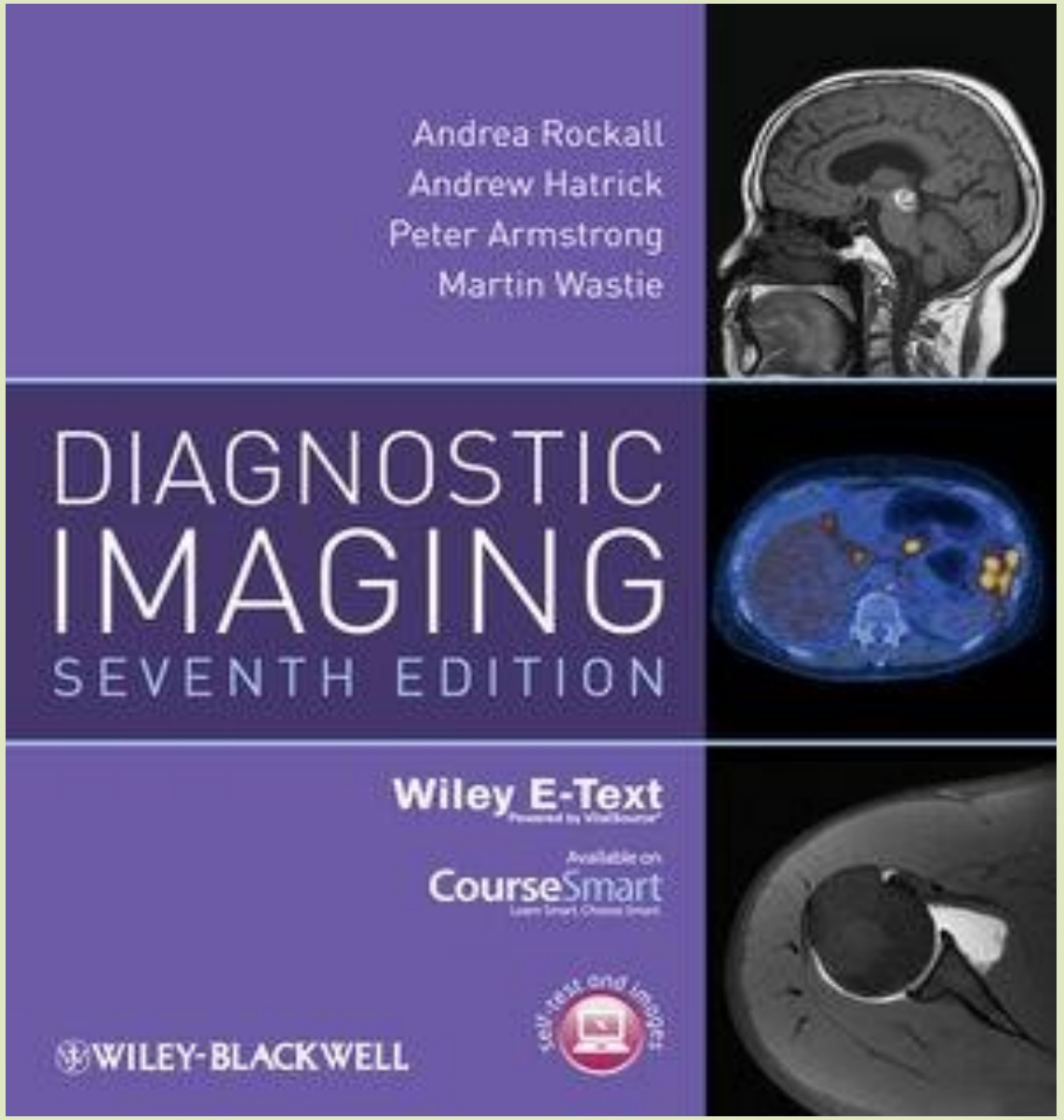
Objectives:

- 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.

Reference:

- Diagnostic imaging:
  - Chapter 5 and 6



What are radiological investigations that you know ?

IMAGING MODALITIES:

- **PLAIN X-RAY.**
- **FLUOROSCOPY (CONTRAST STUDY).**
- **ULTRASOUND ABDOMEN.**
- **CT ABDOMEN.**
- **MRI.**
- NUCLEAR MEDICINE.
- ANGIOGRAPHY.

What is peculiar about GIT?

GIT characteristics:

- Hallow viscus (not solid)
- Usually filled with gas.
- Motility.

I. PLAIN X-RAY:

- **Remember the 5 basic densities on x-rays**:

- Gas → Black.
- Fat → Dark Grey.
- Soft tissue/fluid → Light Grey.
- Bone/calcification → White.
- Metal → Intense White.

X-ray (plain radiography)

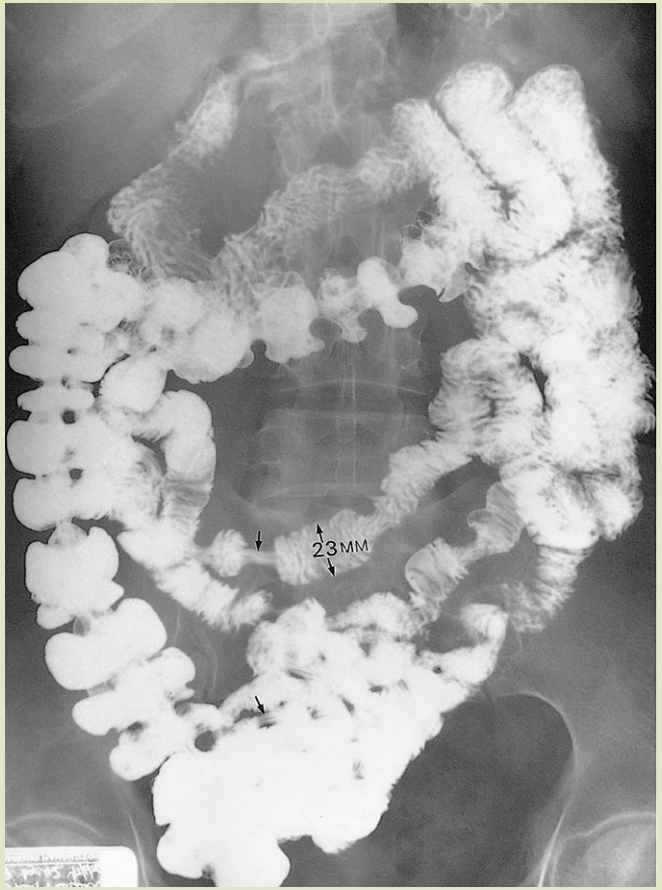
- Often used as first imaging modality.
- Cheap.
- Fast.
- Can be done bedside (portable)
- Useful for free gas or bowel obstruction.

Common Abdomen Films:

- Antero-posterior Supine (KUB).
- Antero-posterior Erect.
- Left Lateral Decubitus.

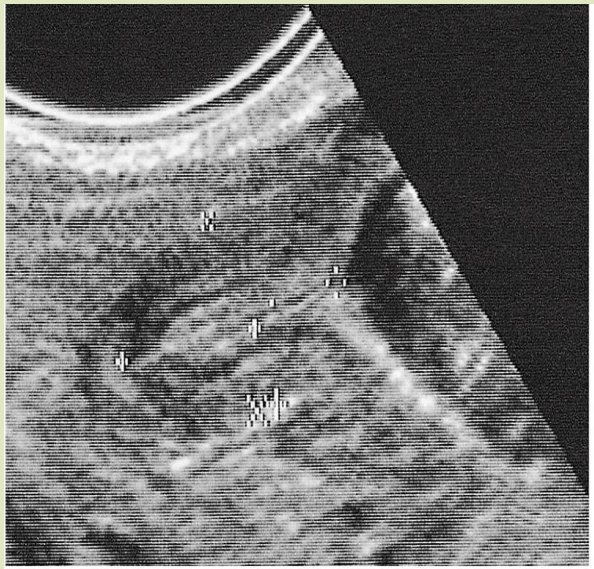
Fluoroscopy (contrast study)

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



Ultrasound

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



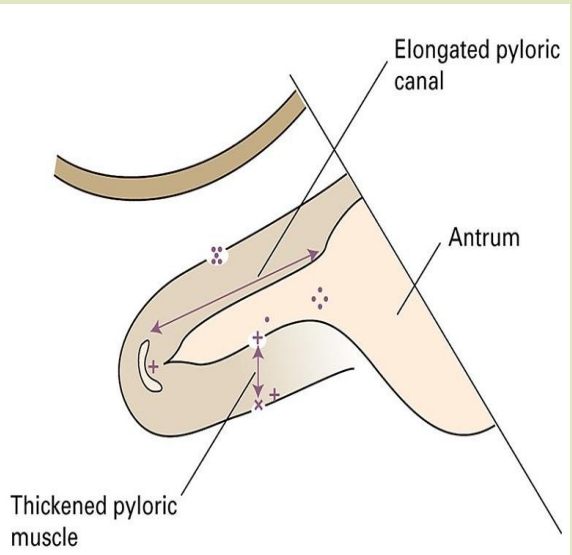
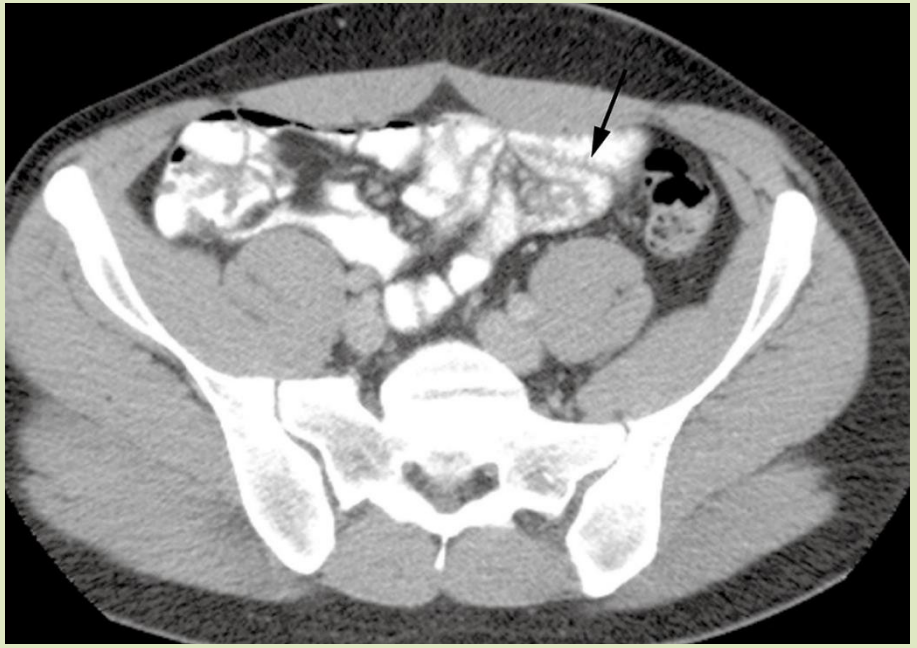


Fig. 6.29 Pyloric stenosis. Ultrasound scan in a neonate showing a thickened, elongated pyloric canal.

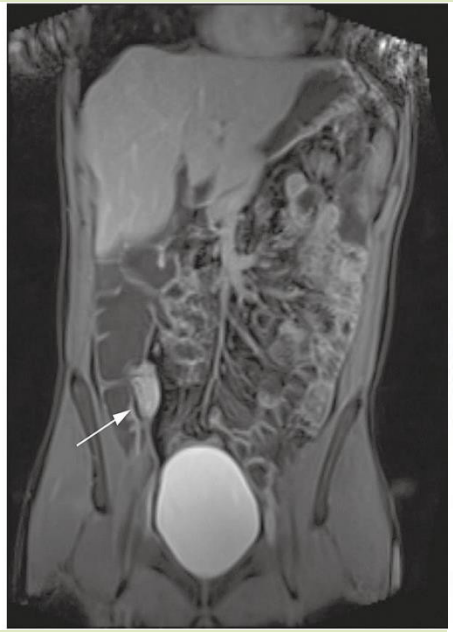
CT (computer tomography)

- Expensive.
- More radiation.
- Fast.
- Contrast (iv, oral &rectal) usually used.
- Used in emergency department.

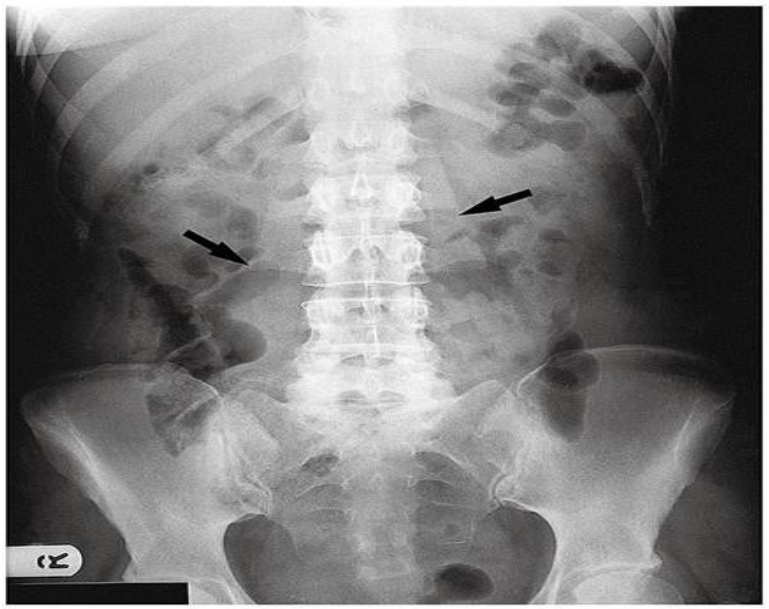


MRI (Magnetic resonance imaging)

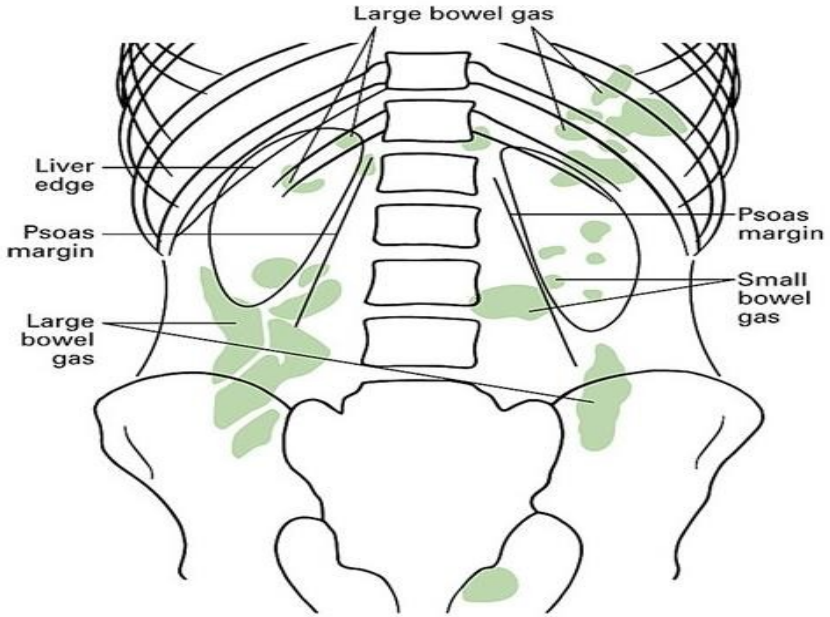
- More expensive than CT.
- No radiation.
- Slow and affected by artifacts.
- Excellent for soft tissue.



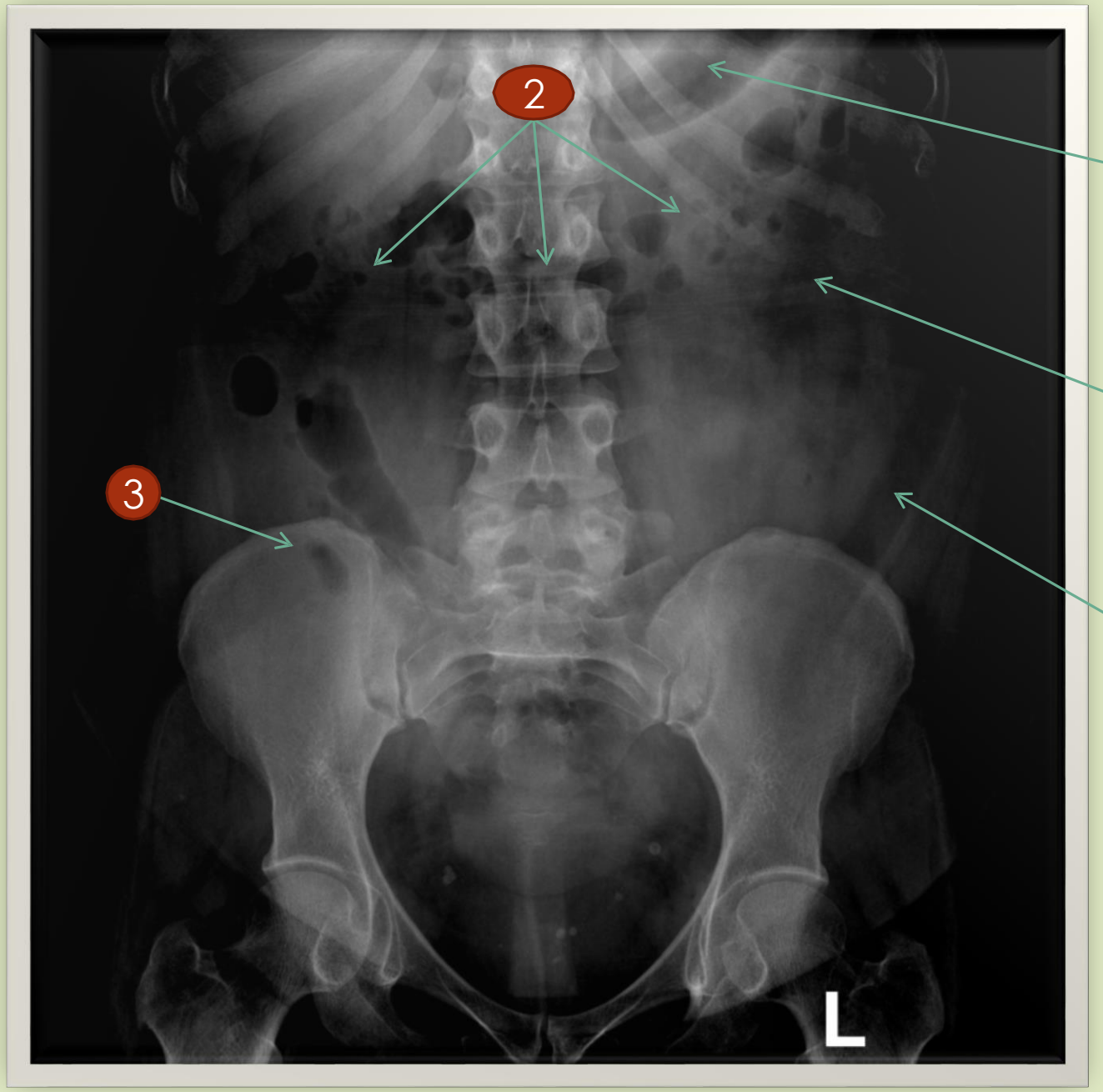
Radiological appearance of GIT



(a)


Large bowel gas
Liver edge
Psoas margin
Large bowel gas
Psoas margin
Small bowel gas


R
SUPINE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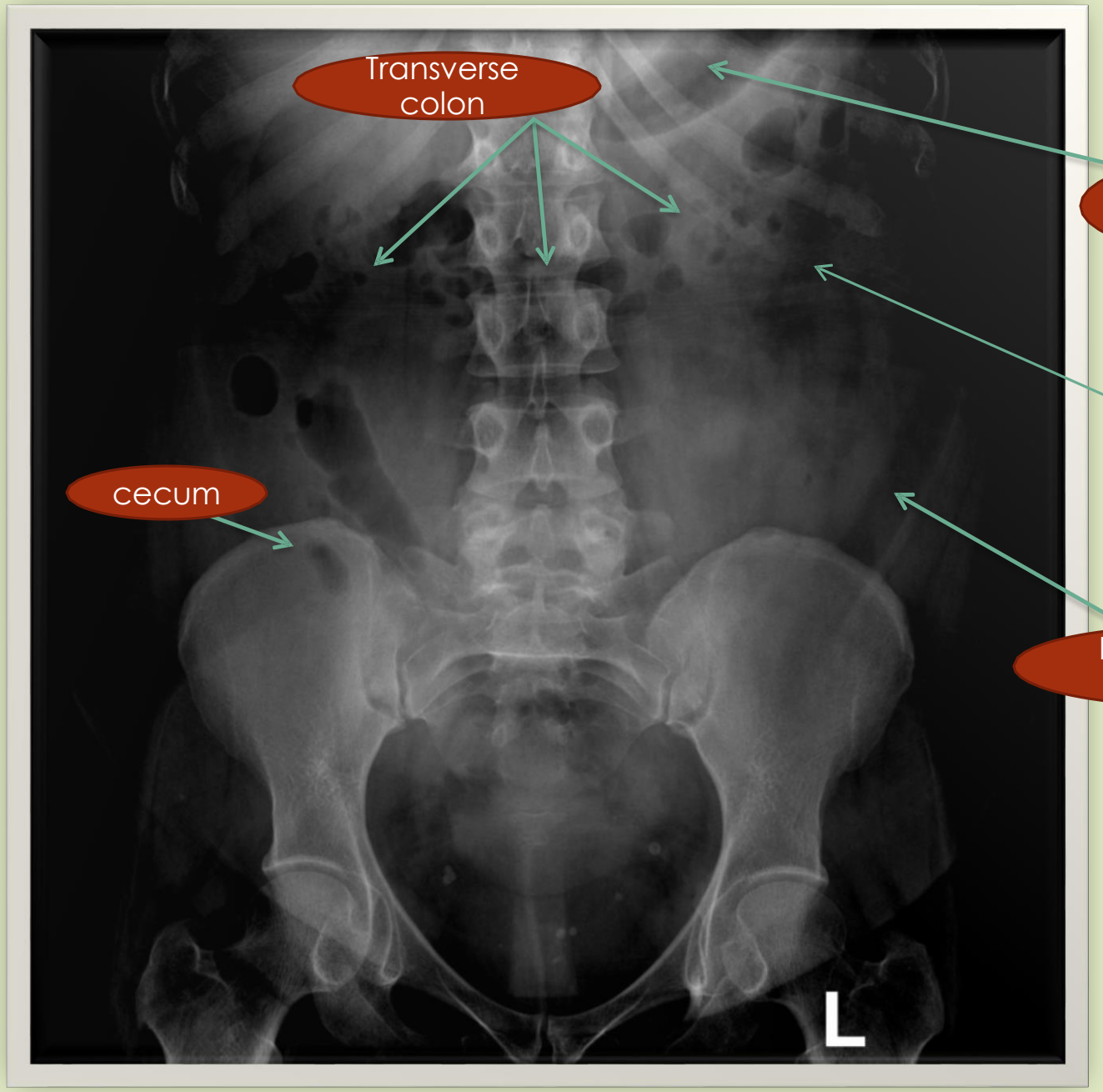
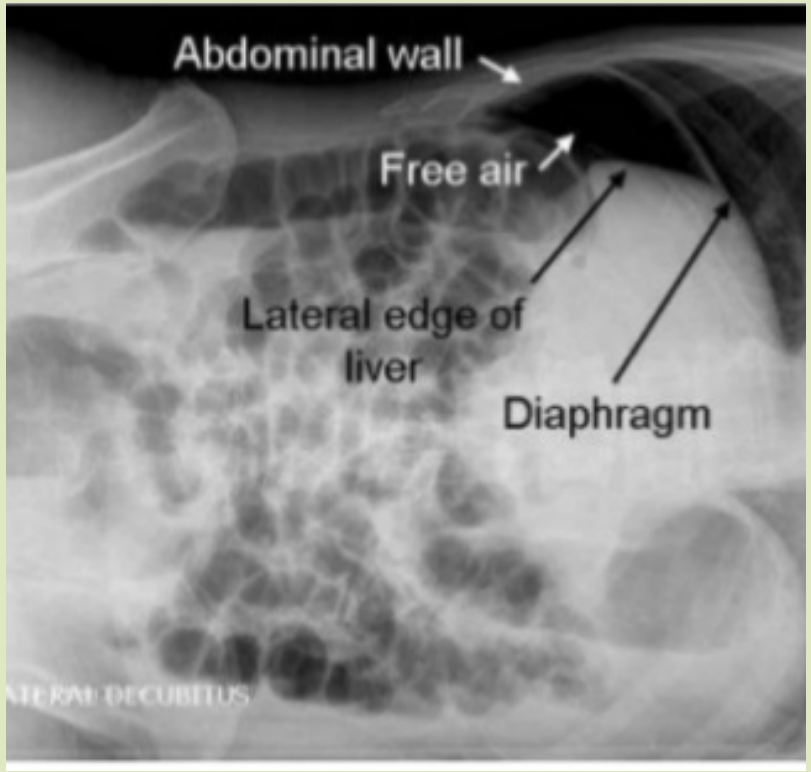

Transverse colon
stomach
Small bowel
cecum
Descending colon
L

Look at the diaphragm

X-ray erect abdomen reveals crescentic gas under diaphragm in keeping with a visceral perforation

Look at the diaphragm



Lateral decubitus view shows free air between liver, right hemidiaphragm and lateral abdominal wall

Look at the Liver

X-ray abdomen shows enlarged liver displacing the ascending and transverse colon downward

Look at the Spleen

X-ray abdomen shows enlarged spleen

Look at the Kidneys

X-ray abdomen shows ovale white density to of spine ----> stone in left ureter

Look at the Psoas Muscles

X-ray abdomen often shows lateral edges of psoas muscles as a near straight line

Look at the bowel gas pattern

- Where are the bowel loops located (central vs. peripheral?
- What is the distribution of the gas in the abdomen?
- What is the caliber of small and large bowel ?
- Are any dilatation of small +/- large bowel ?
- Identify any air-fluid levels ?

Look at the bowel gas pattern

Valvulae Conniventes

Small Bowel

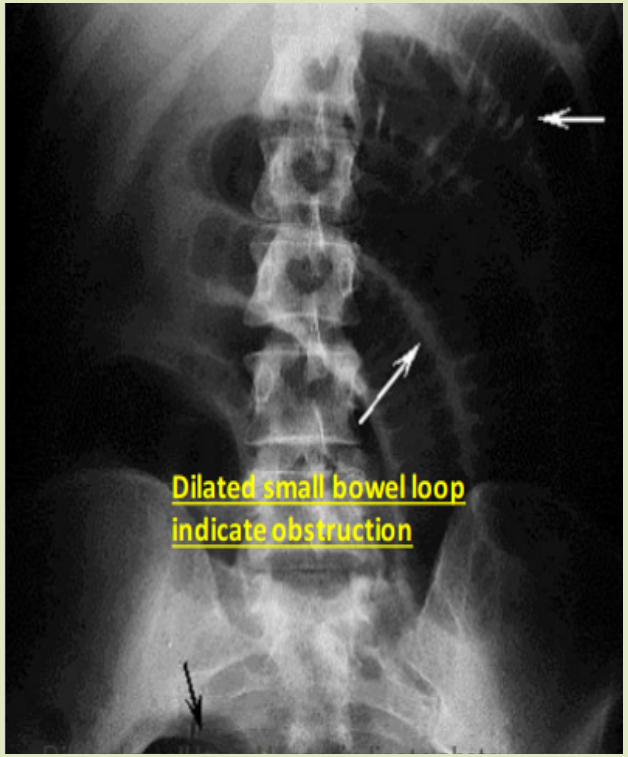
Haustra

Large Bowel

Look at the bowel gas pattern

Usually become visible when the small bowel is more distended

Look at the bowel gas pattern



II. Barium Study

- Barium Swallow
- Barium meal
- Barium Follow through
- Barium Enema

Barium Swallow

- It is a medical imaging procedure used to examine upper GIT, which include the **esophagus** and to a lesser extent the stomach

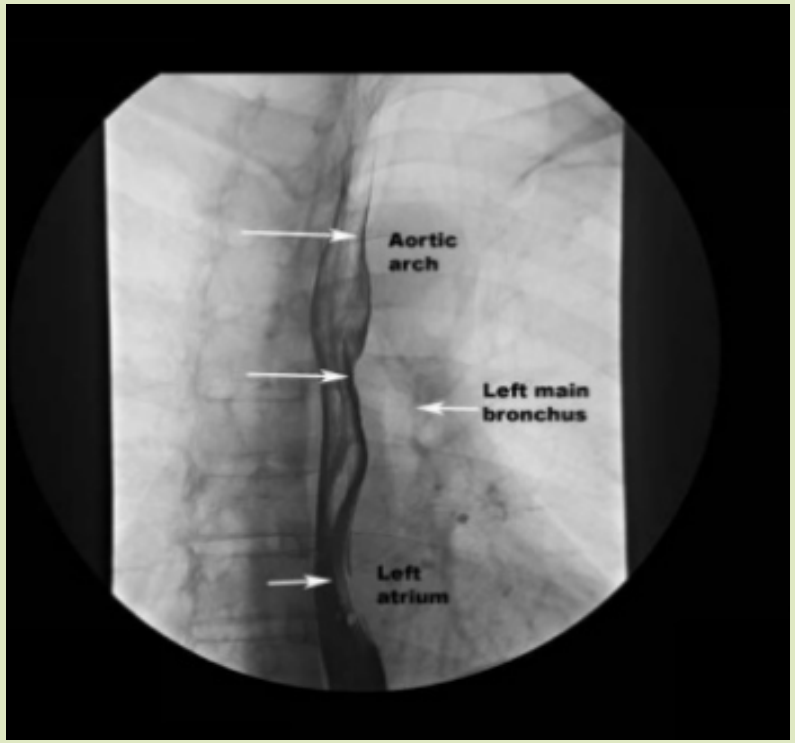
- The contrast used is barium sulfate

Barium Swallow

Esophagus starts at lower border of cricoid cartilage

Ends at GI junction

Courses through posterior mediastinum

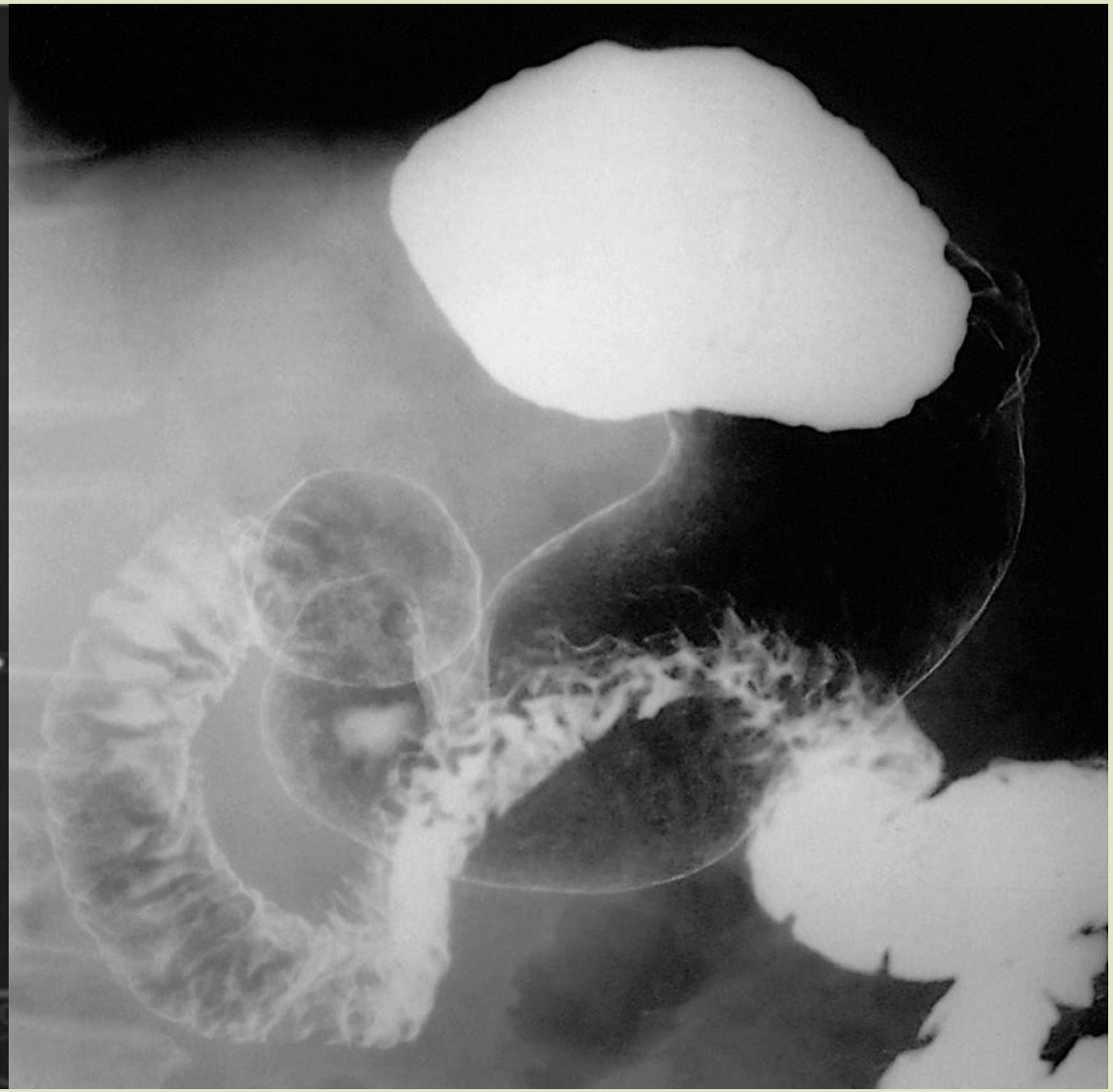


Normal impression in the Esophagus

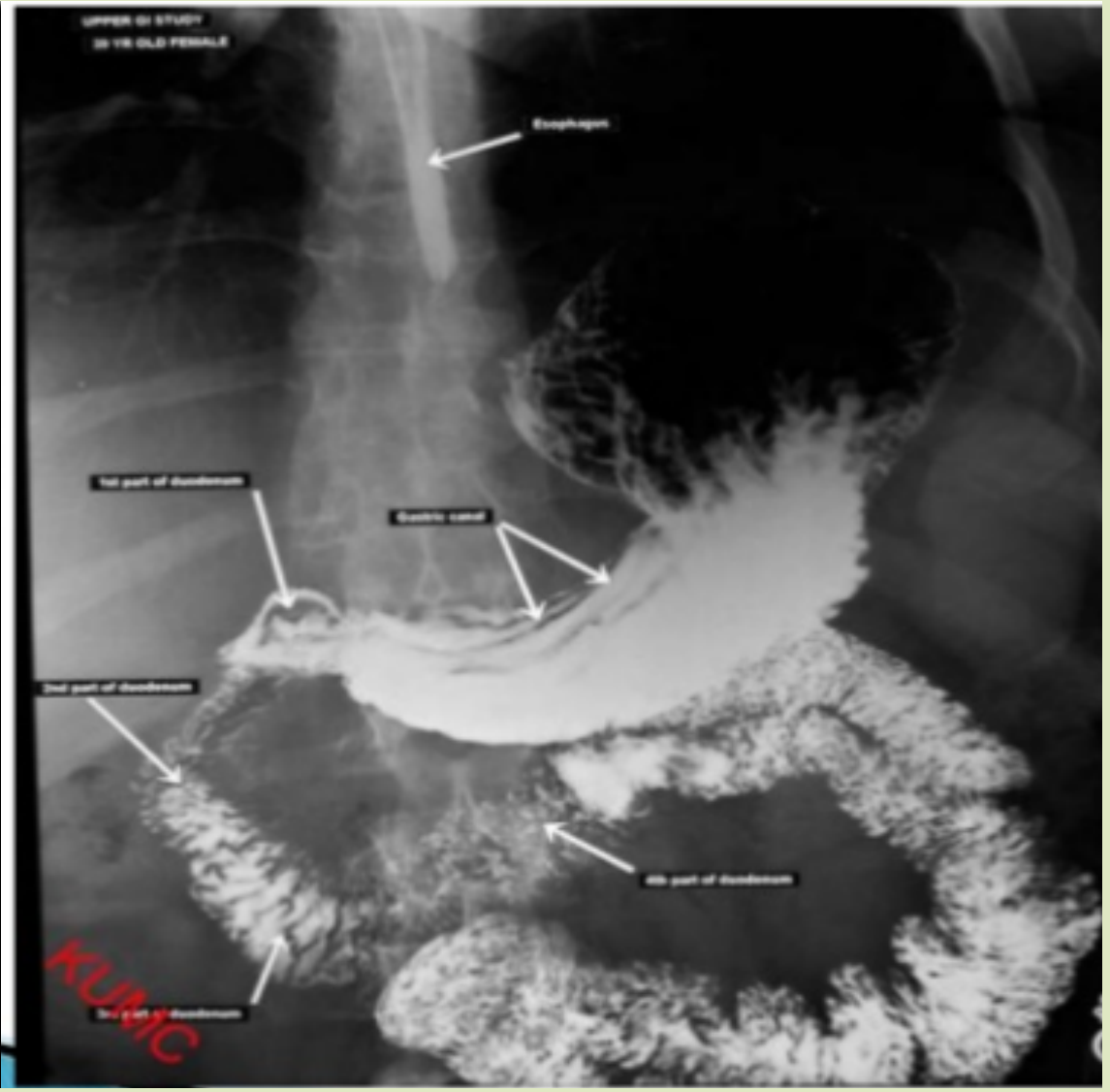
Barium Meal

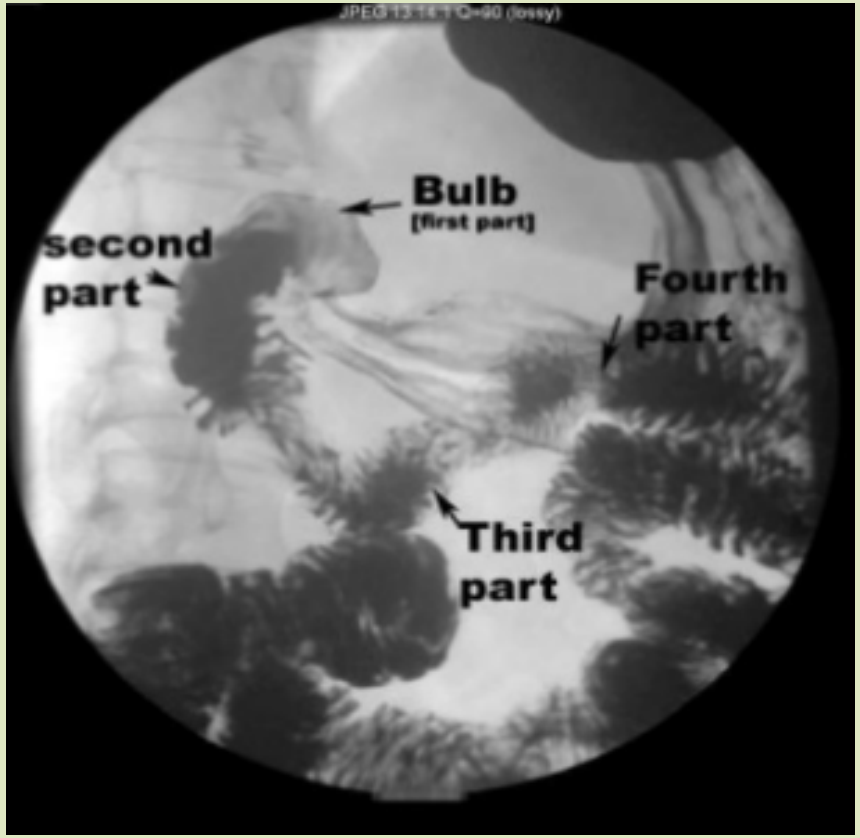
- In a barium meal test, X-ray images are taken of the **stomach** and the beginning of the **duodenum**.


UPPER GI STUDY
Lesser curvature
Greater curvature
Gastric rugae
Jejunum
KUMC




UPPER GI STUDY
Esophagus
Gastric fundus
Gastroesophageal junction
Gastric body
Duodenal bulb
Pylorus
Gastric antrum
4th part of duodenum
KUMC

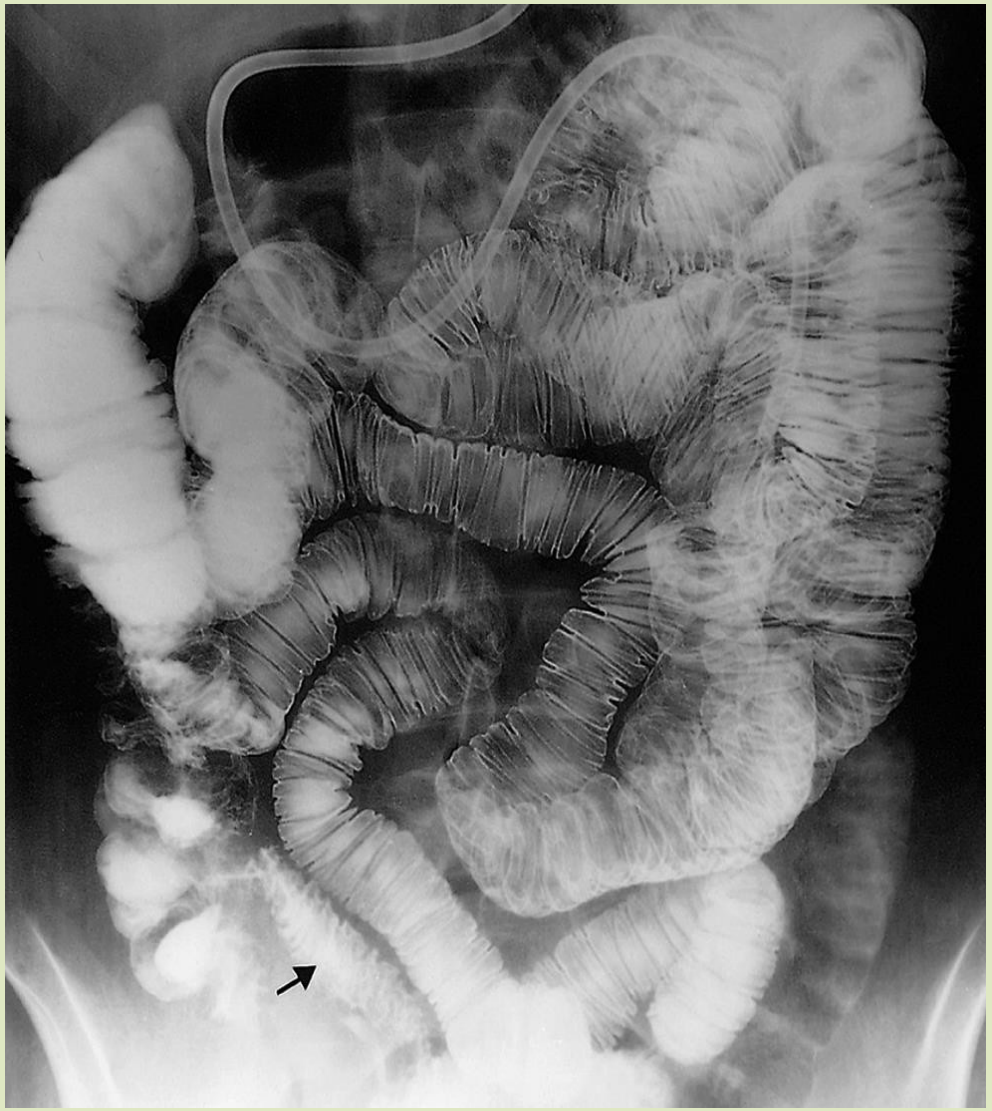

UPPER GI STUDY
Esophagus
1st part of duodenum
Gastric canal
2nd part of duodenum
4th part of duodenum
KUMC


Bulb
[first part]
second
part
Fourth
part
Third
part

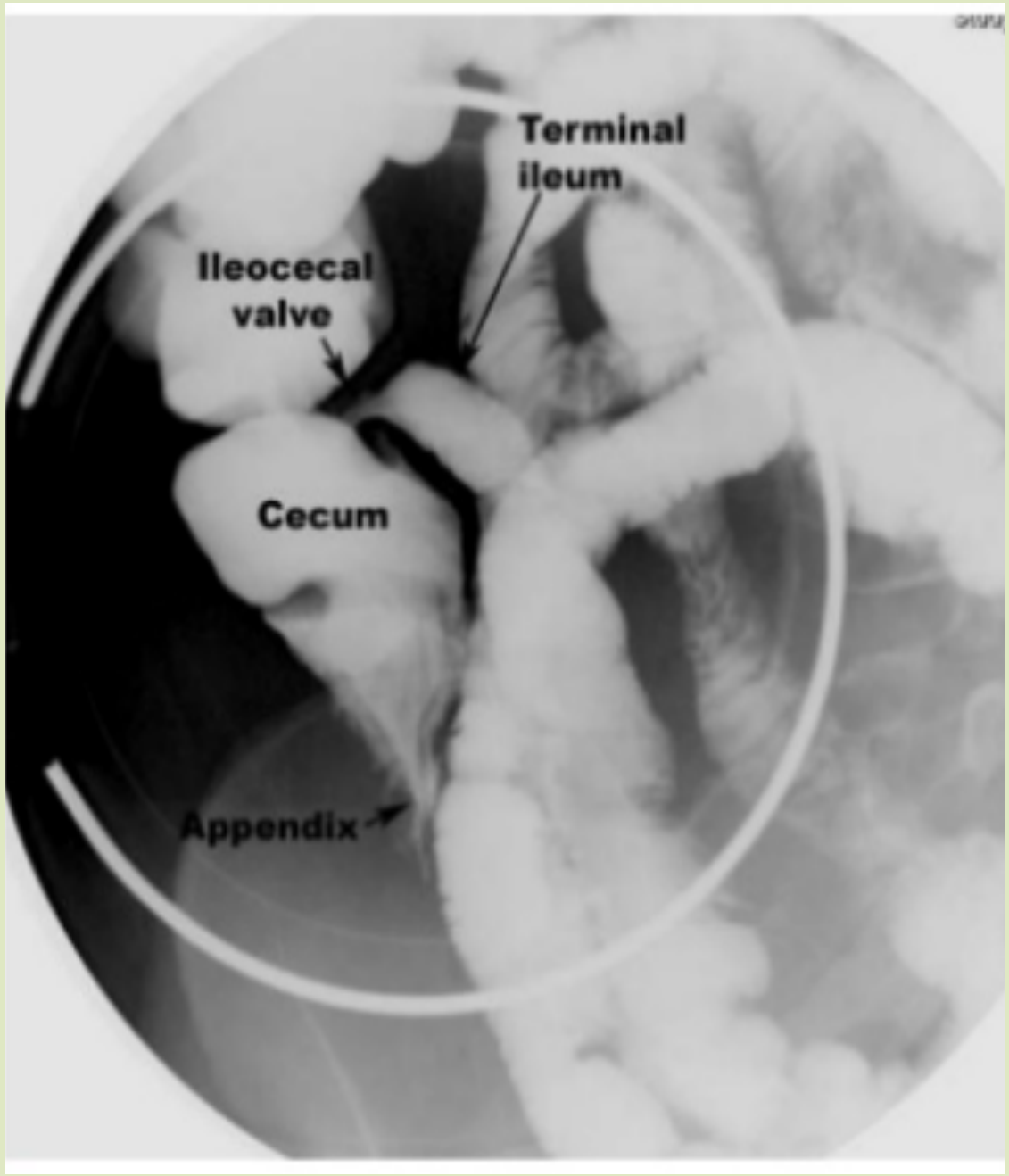
Barium Follow Through

- In a barium meal test, X-ray images are taken for the **small bowel loops**.

Small bowel follow through



Small bowel enema


Terminal
ileum
Ileocecal
valve
Cecum
Appendix

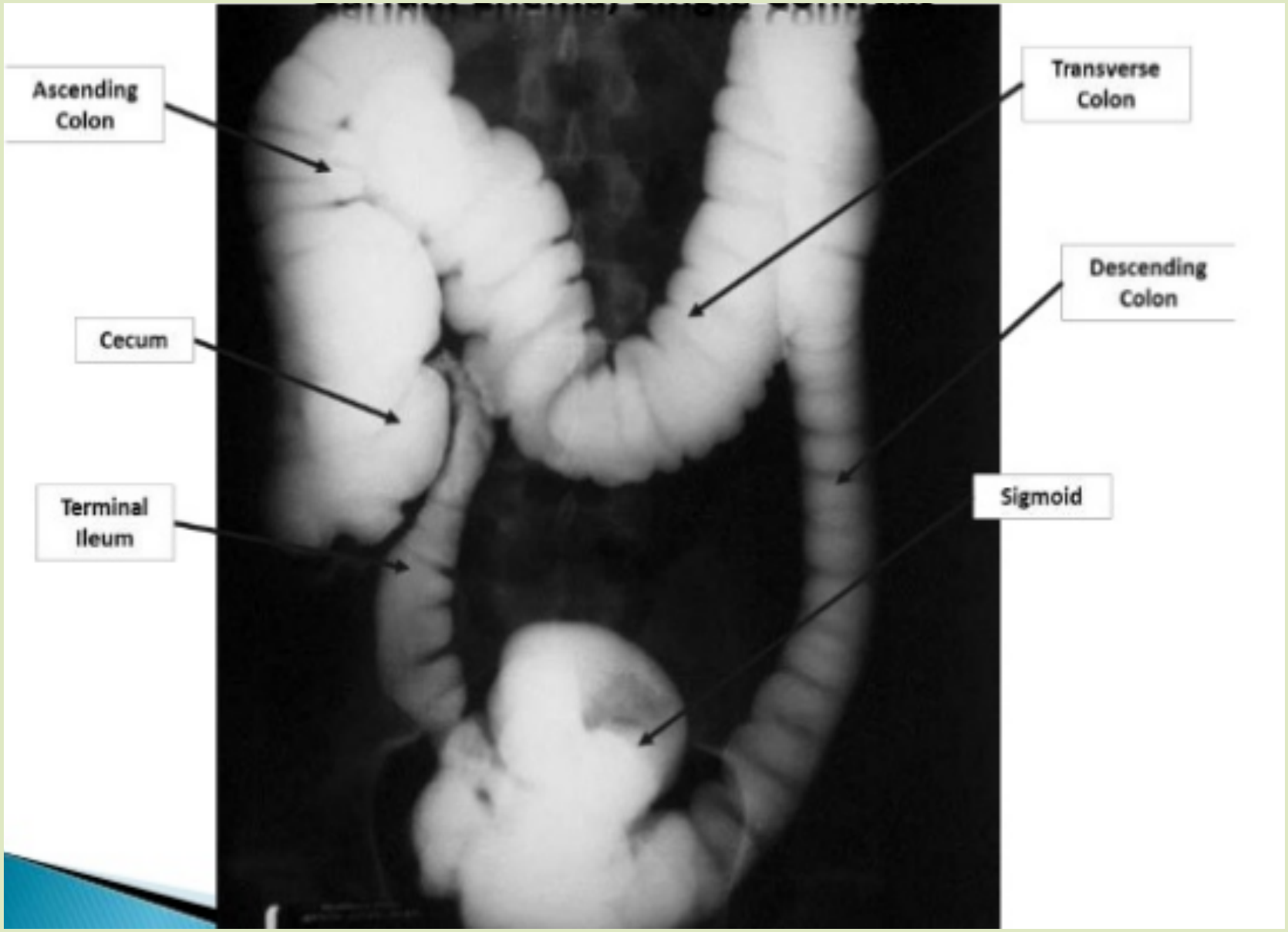
Barium Enema

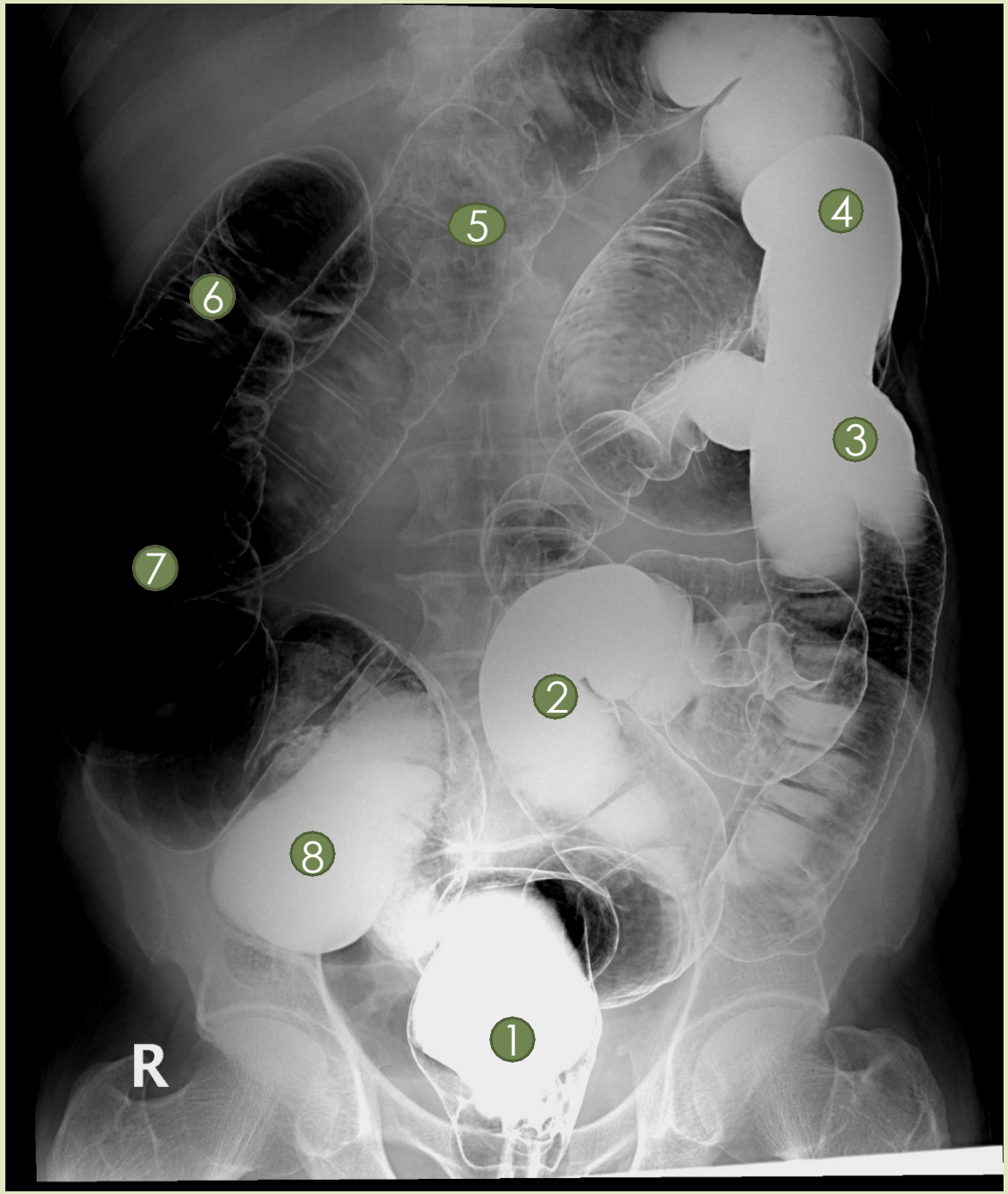
SINGLE CONTRAST STUDY

The colon is filled with barium which outlines the intestine and showing gross abnormalities.

DOUBLE CONTRAST with AIR

1. The colon is first filled with barium
2. Then the barium is drained out leaving only a thin layer of barium on the wall of colon
3. The colon is then filled with air


Ascending Colon
Transverse Colon
Descending Colon
Cecum
Terminal Ileum
Sigmoid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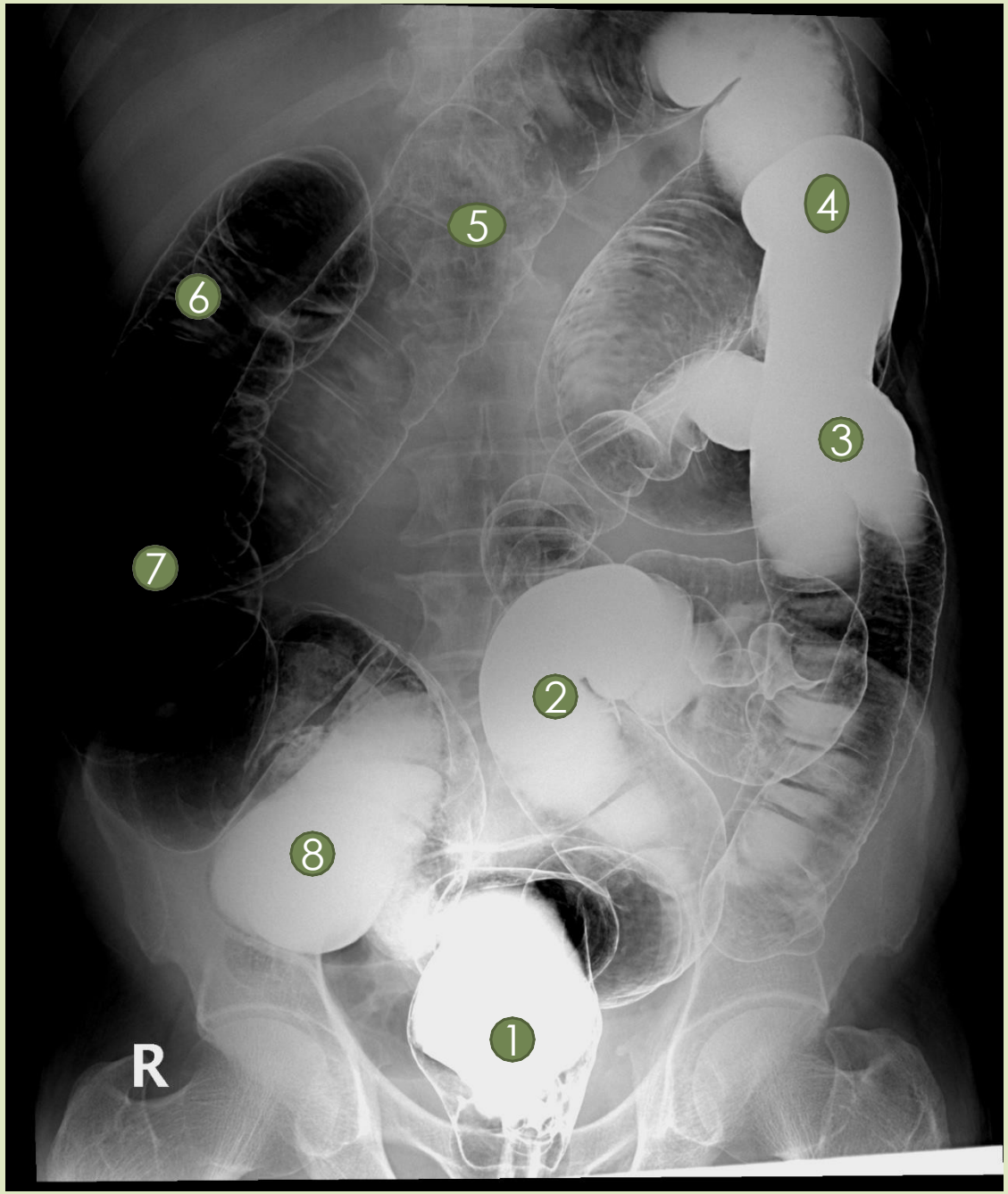
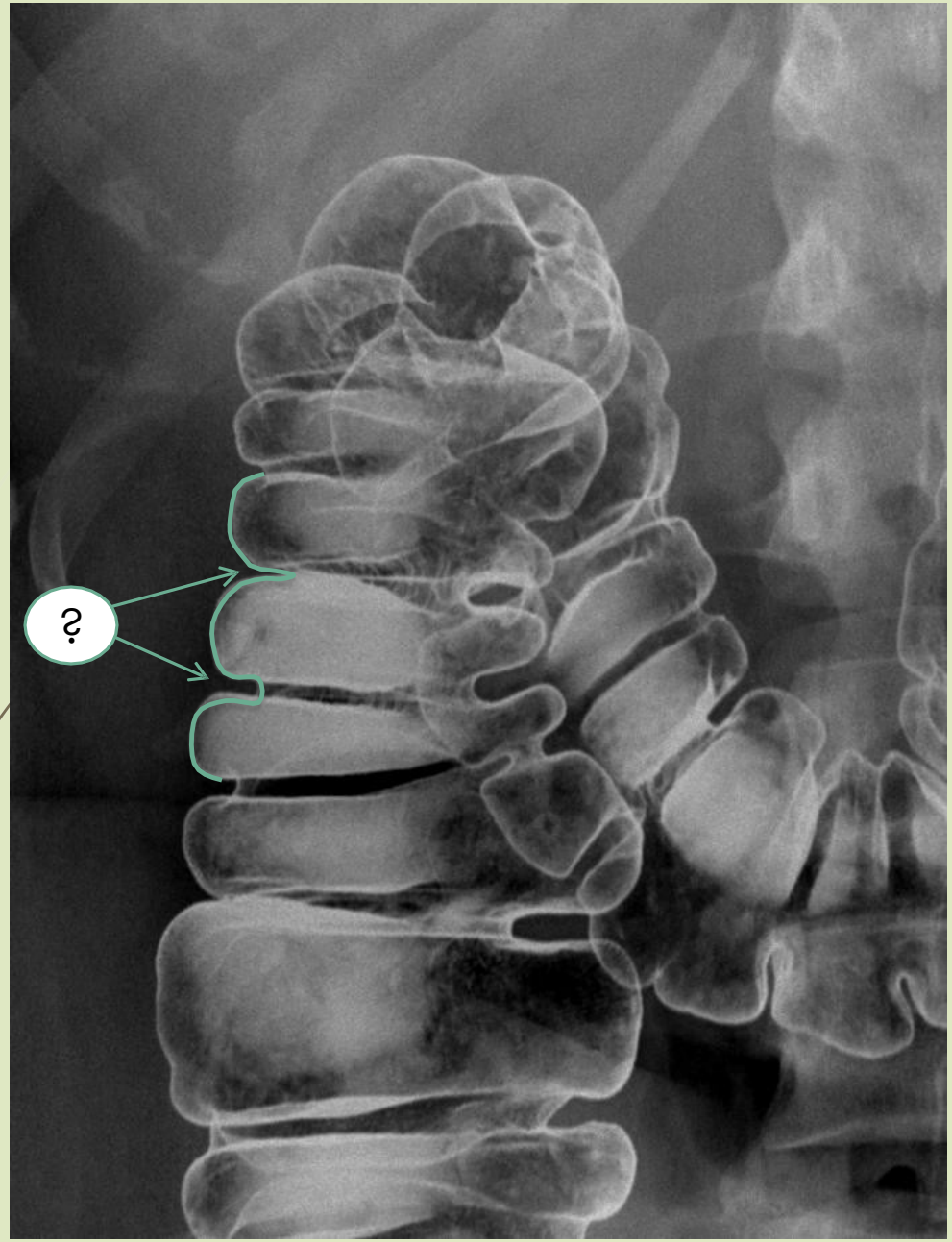
R

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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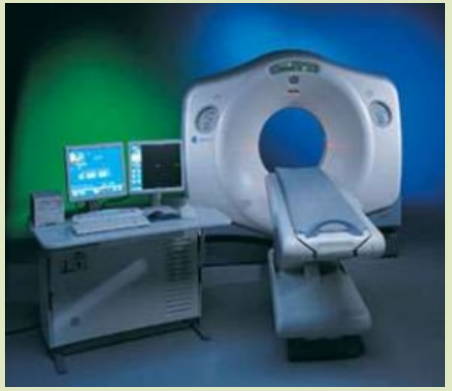
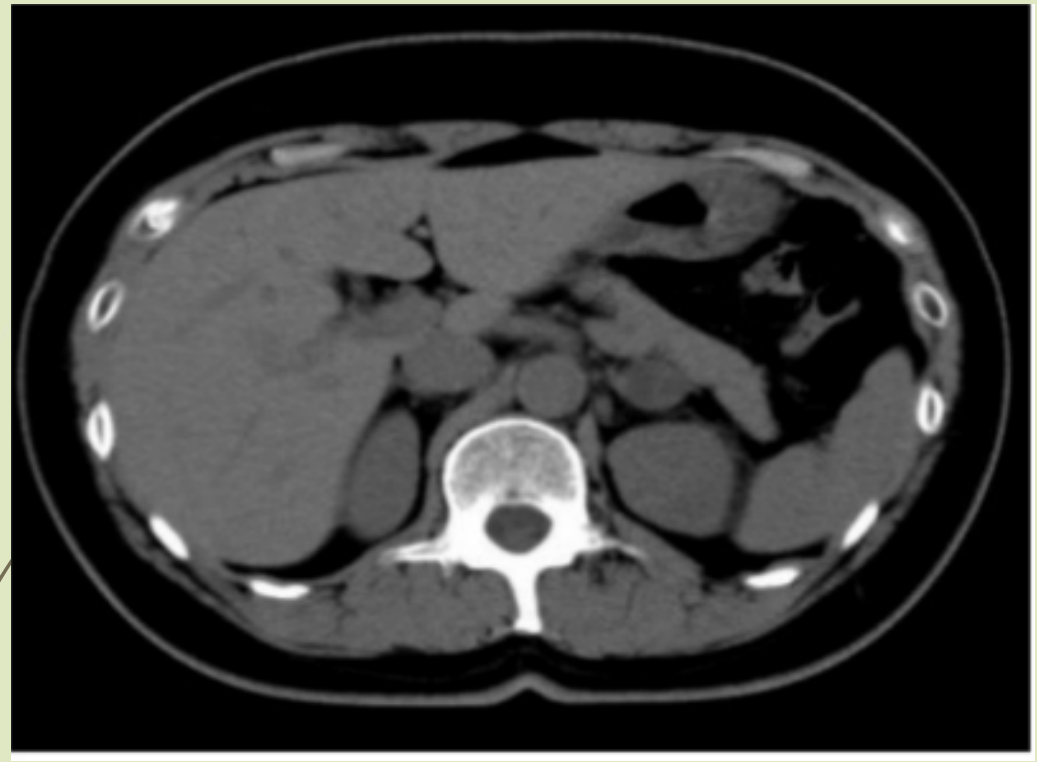
L

III. CT SCAN

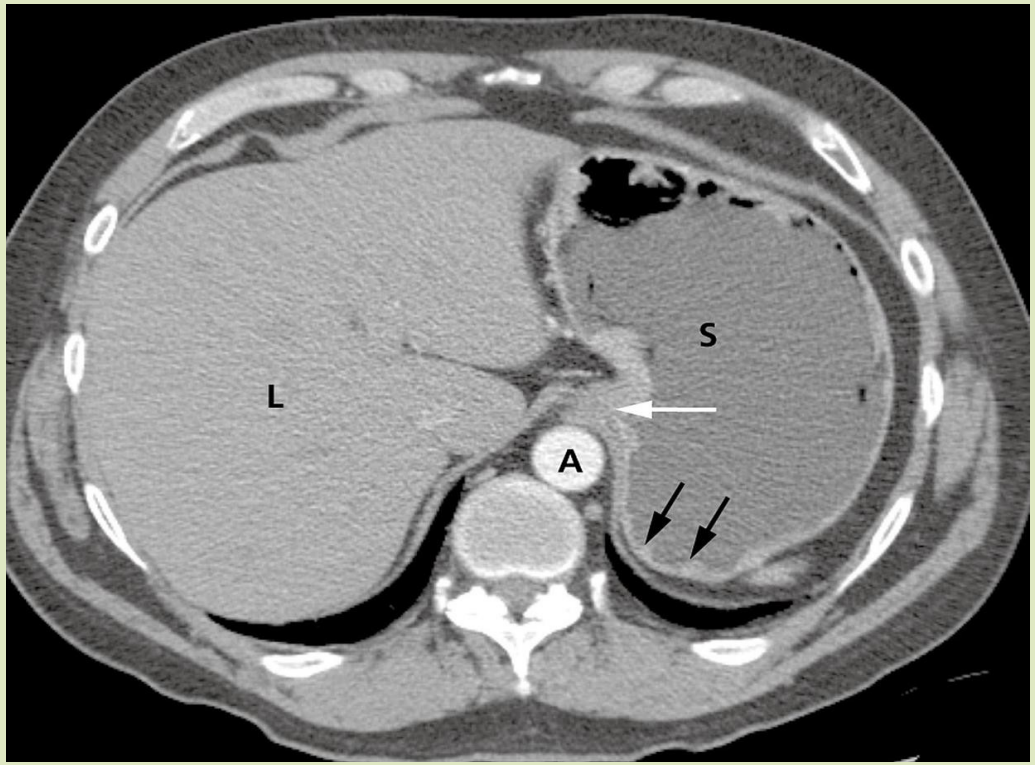


- CT provides cross-sectional images of the abdominal organs.
- Multiple images are taken → Digitized in the computer →Reconstructed → viewed on a monitor.

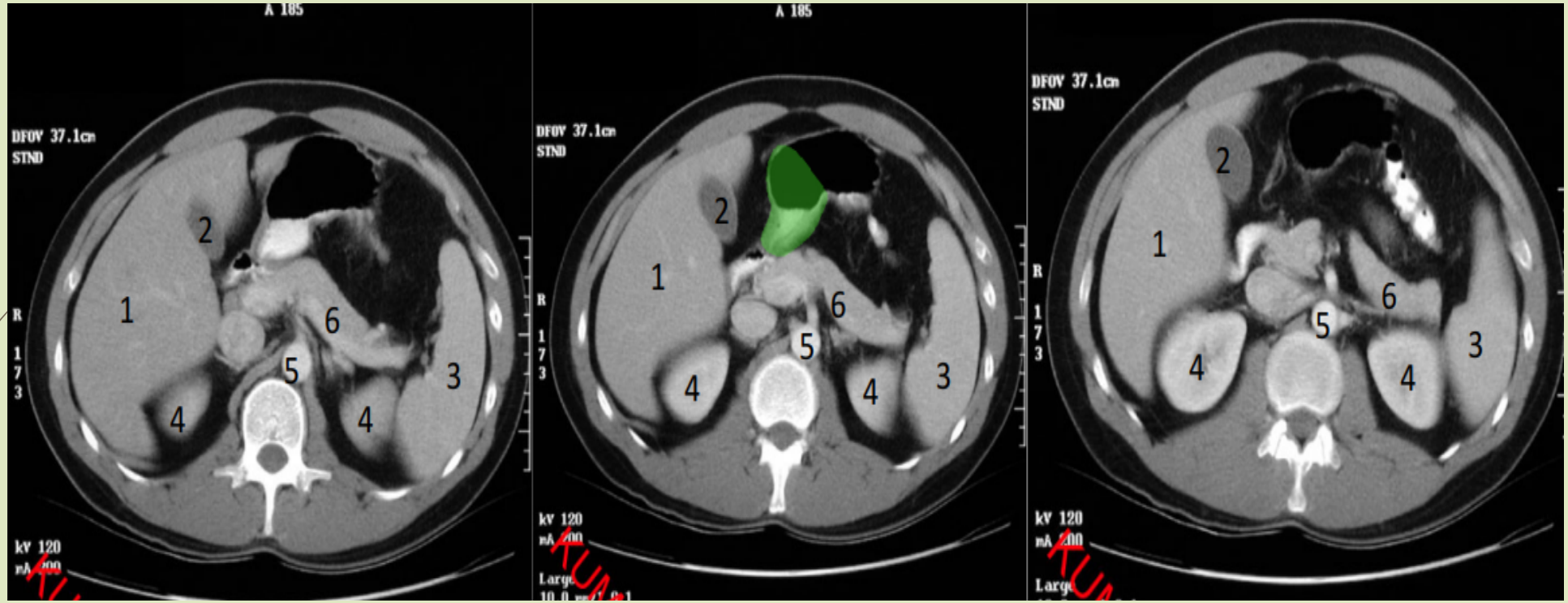


Non-Contrast study

Contrast study



S stomach.
L liver.
A aorta.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DFOV 37.1cm
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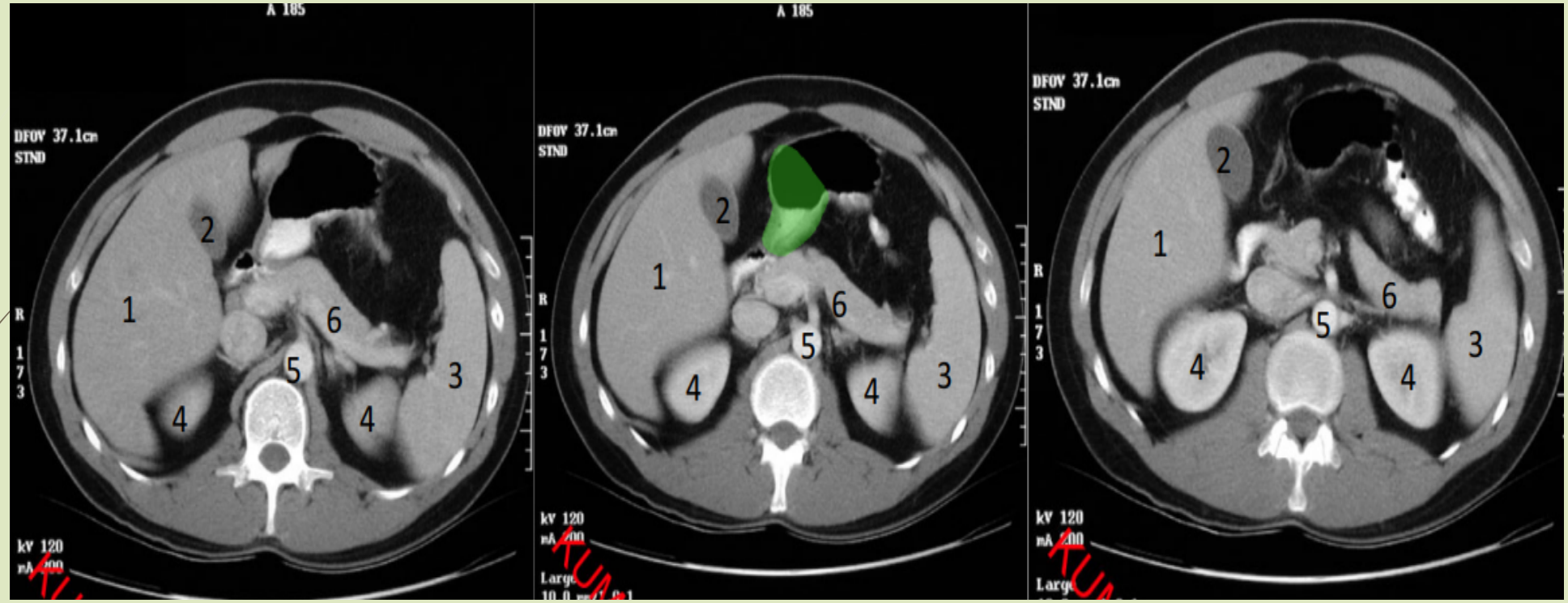
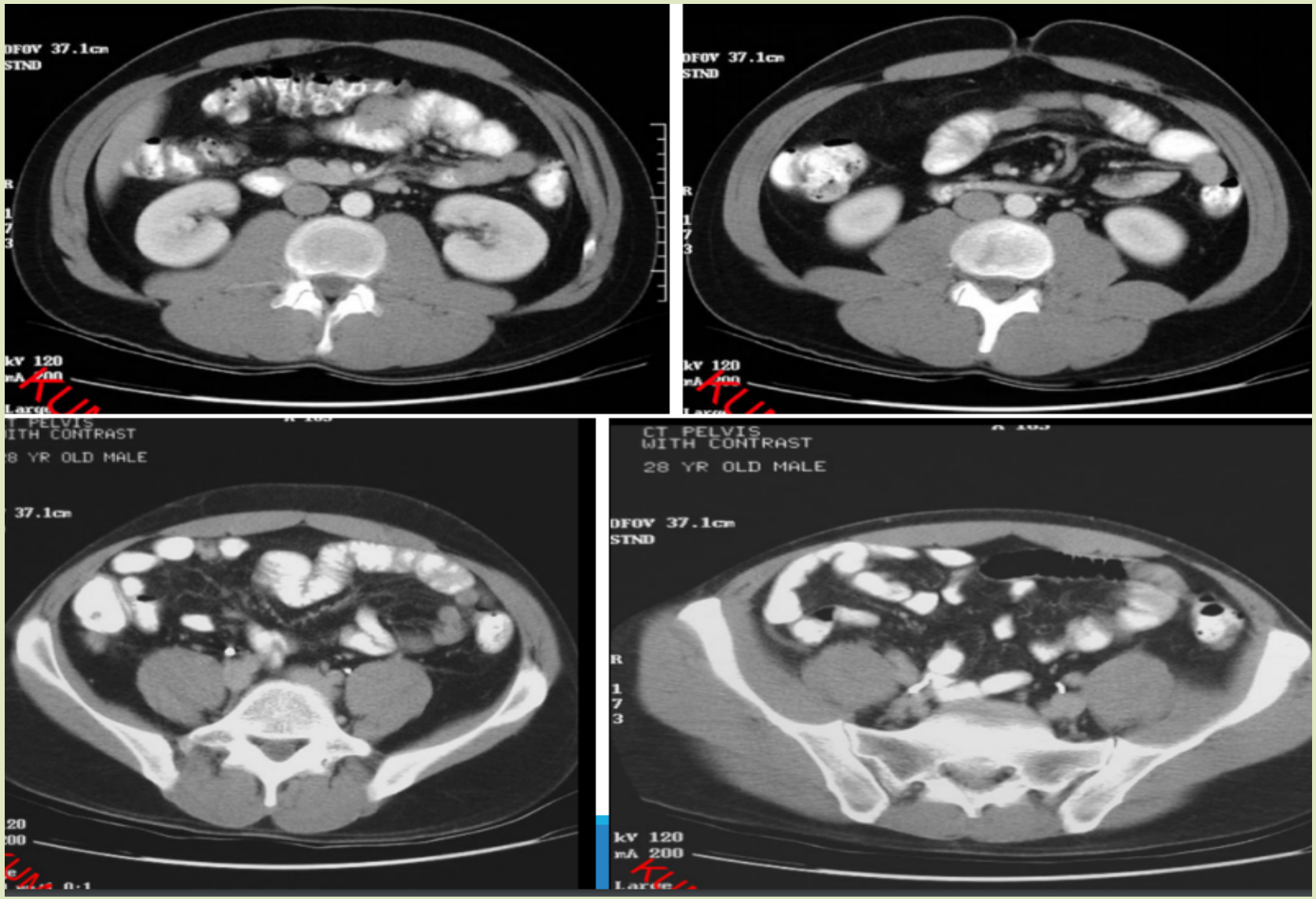
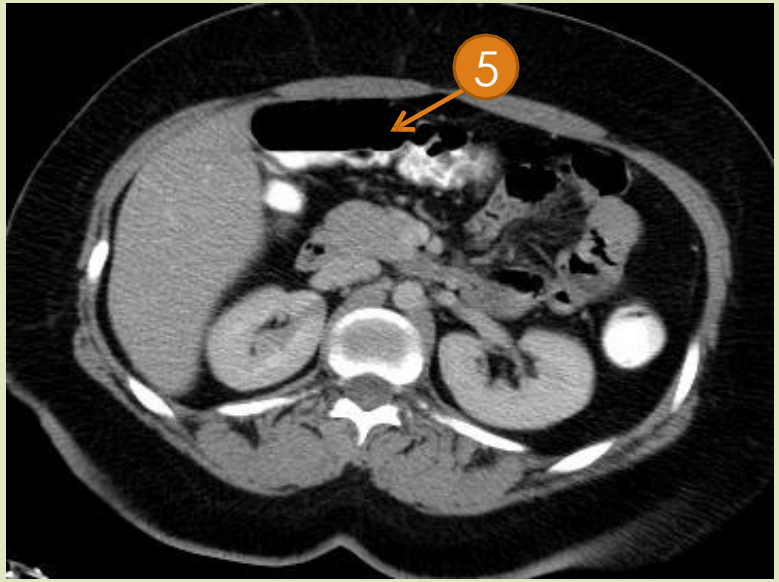
kV 120



1- Liver 2- Gall bladder 3- Spleen 4- Kidneys 5- Aorta 6- Pancreas

Normal bowel

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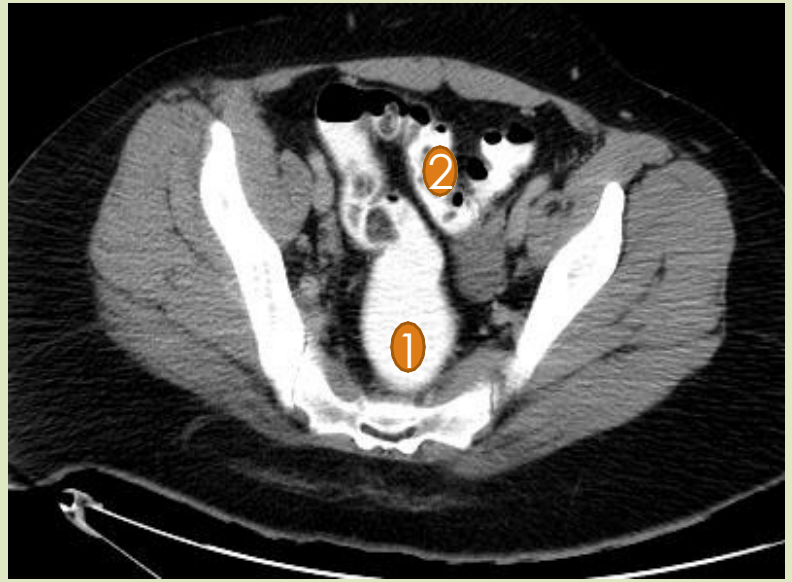
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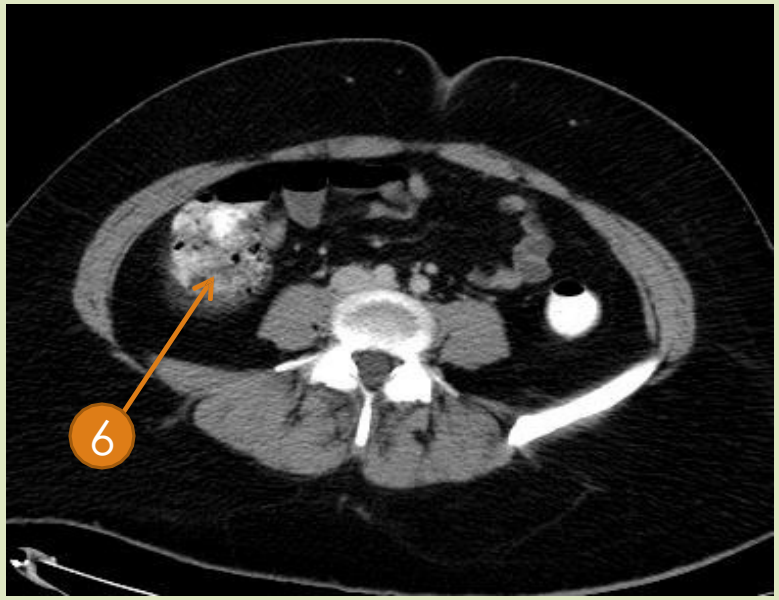
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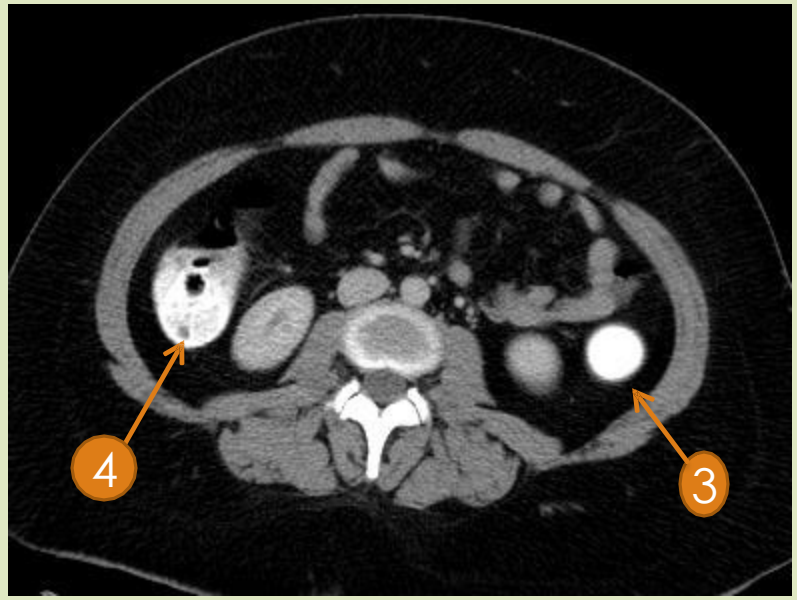
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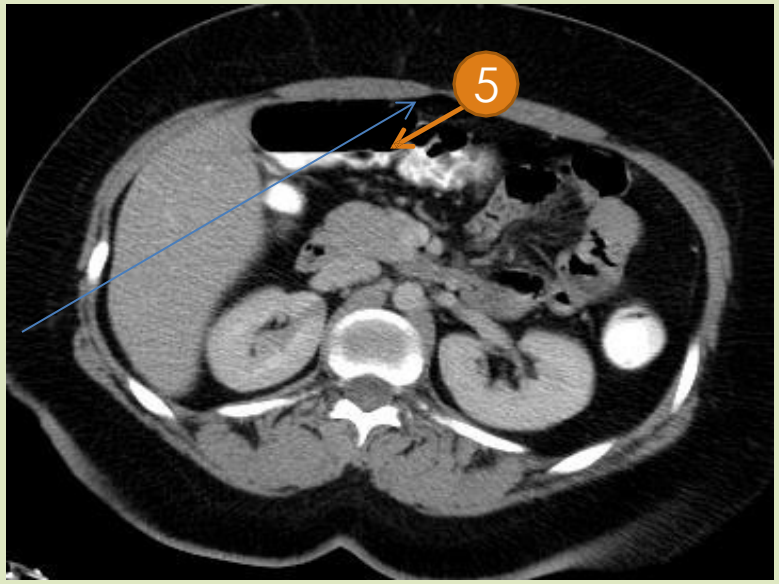
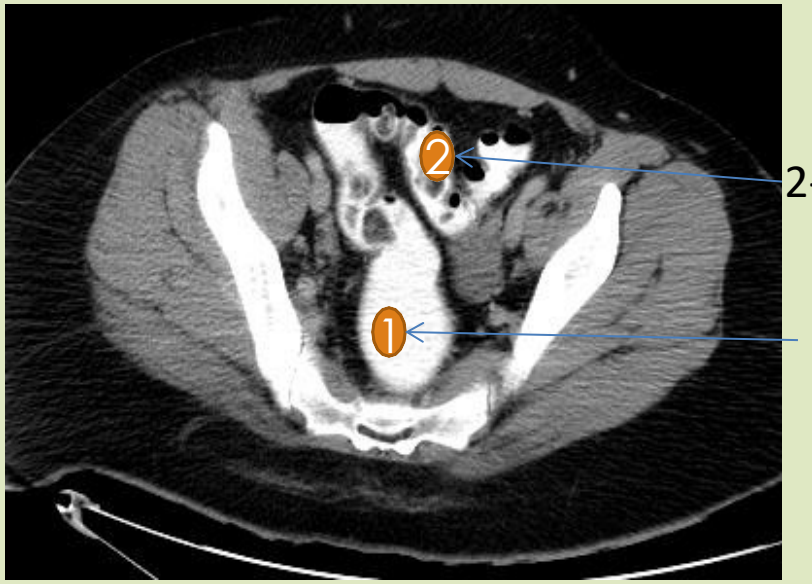
5-Transverse colon

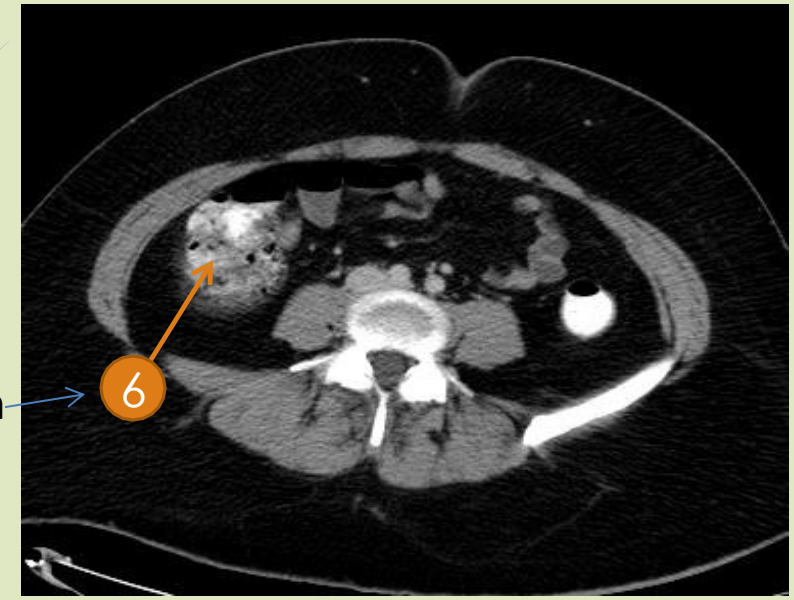


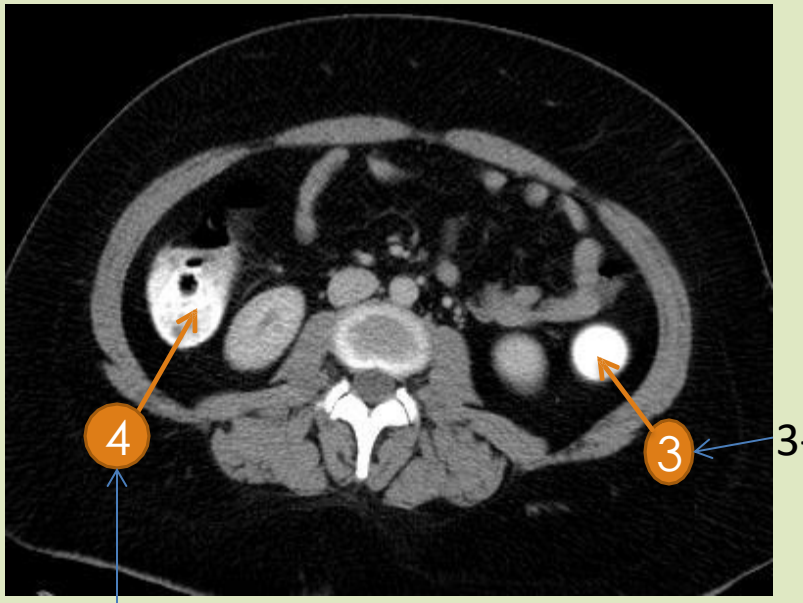


2- Sigmoid colon

1- Rectum

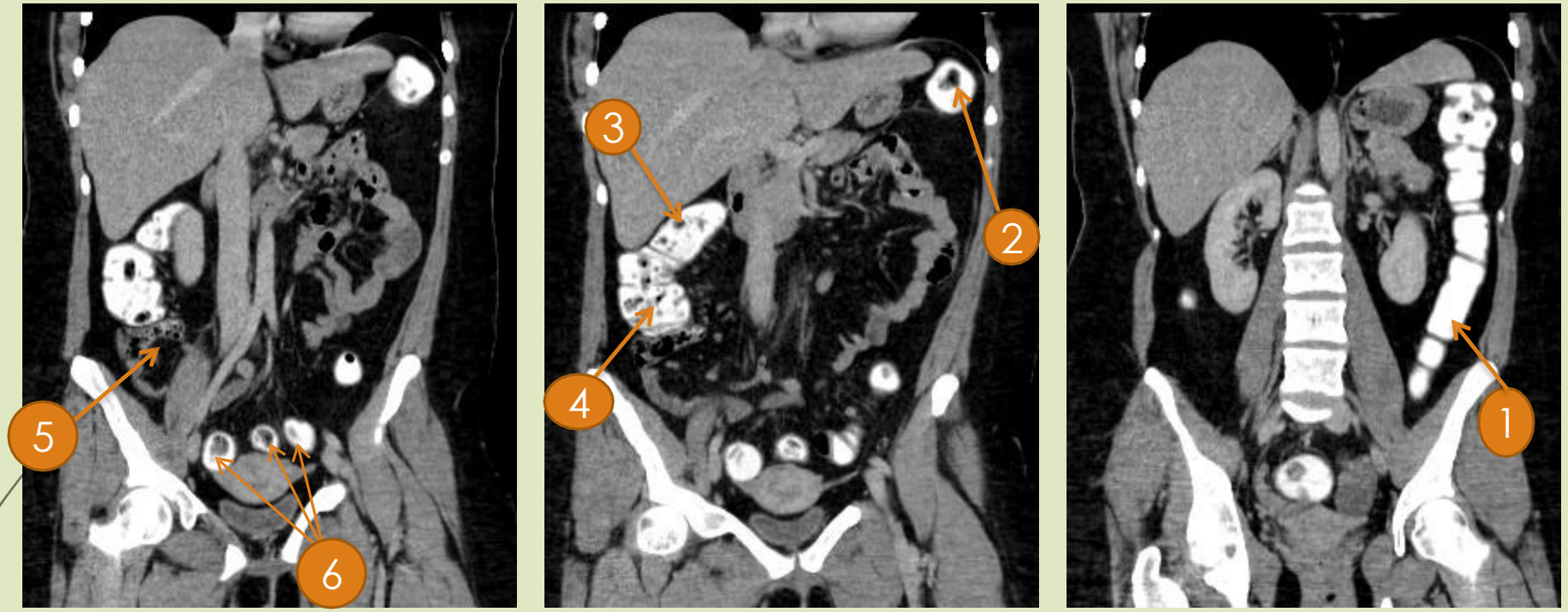
6- Cecum





3- Descending colon

4- Ascending colon


5
6
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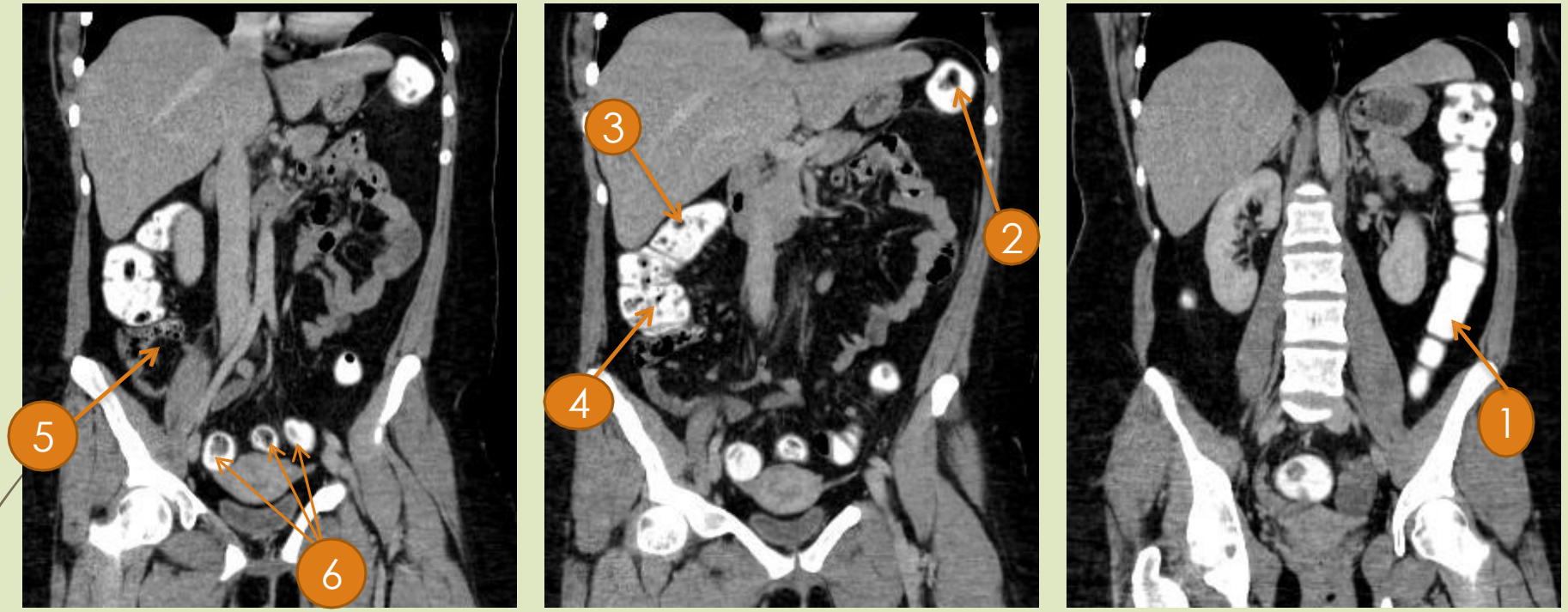
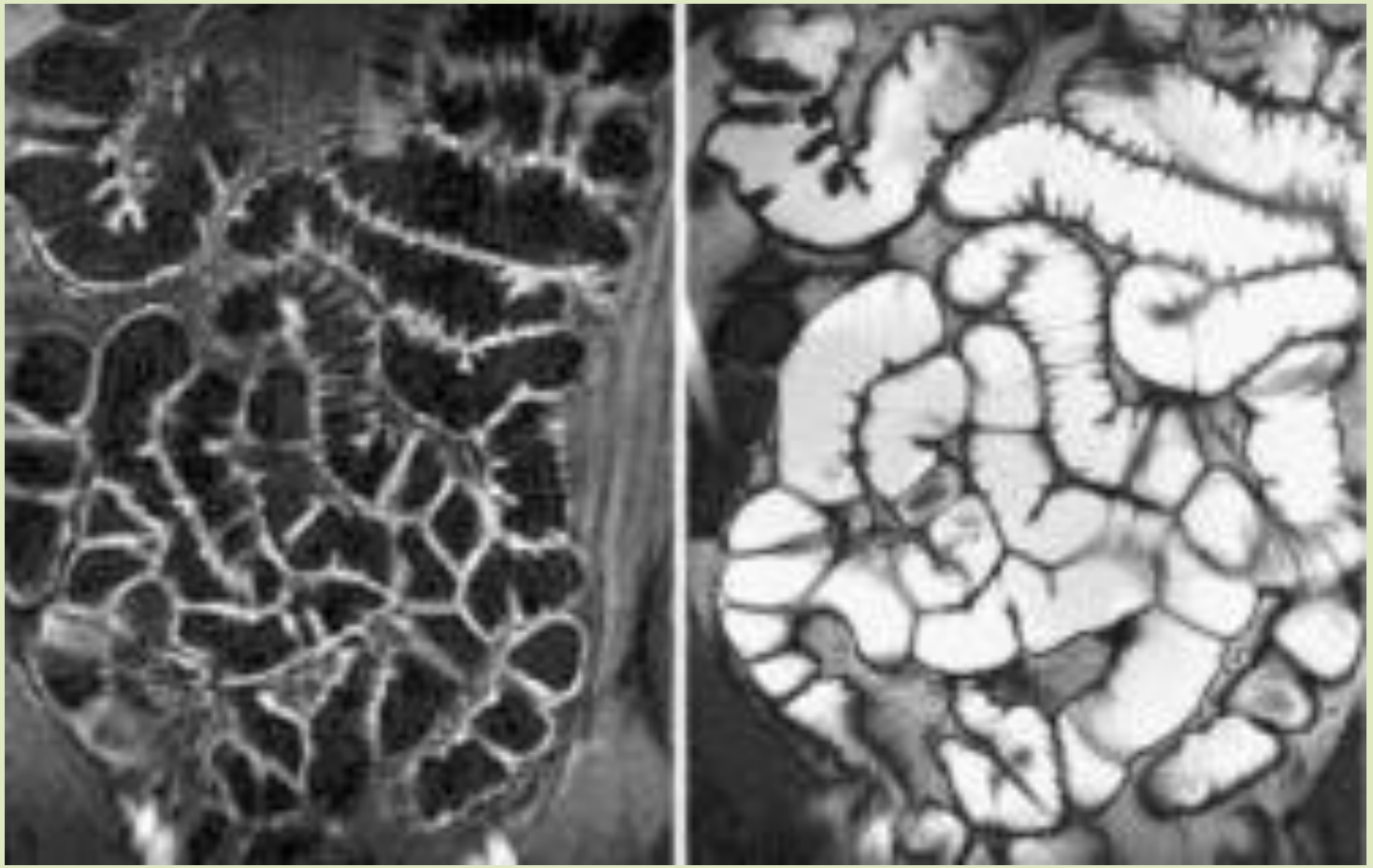


1. Descending colon
2. Splenic flexure
3. Hepatic flexure
4. Ascending colon
5. cecum
6. Sigmoid colon

IV. MRI STUDY

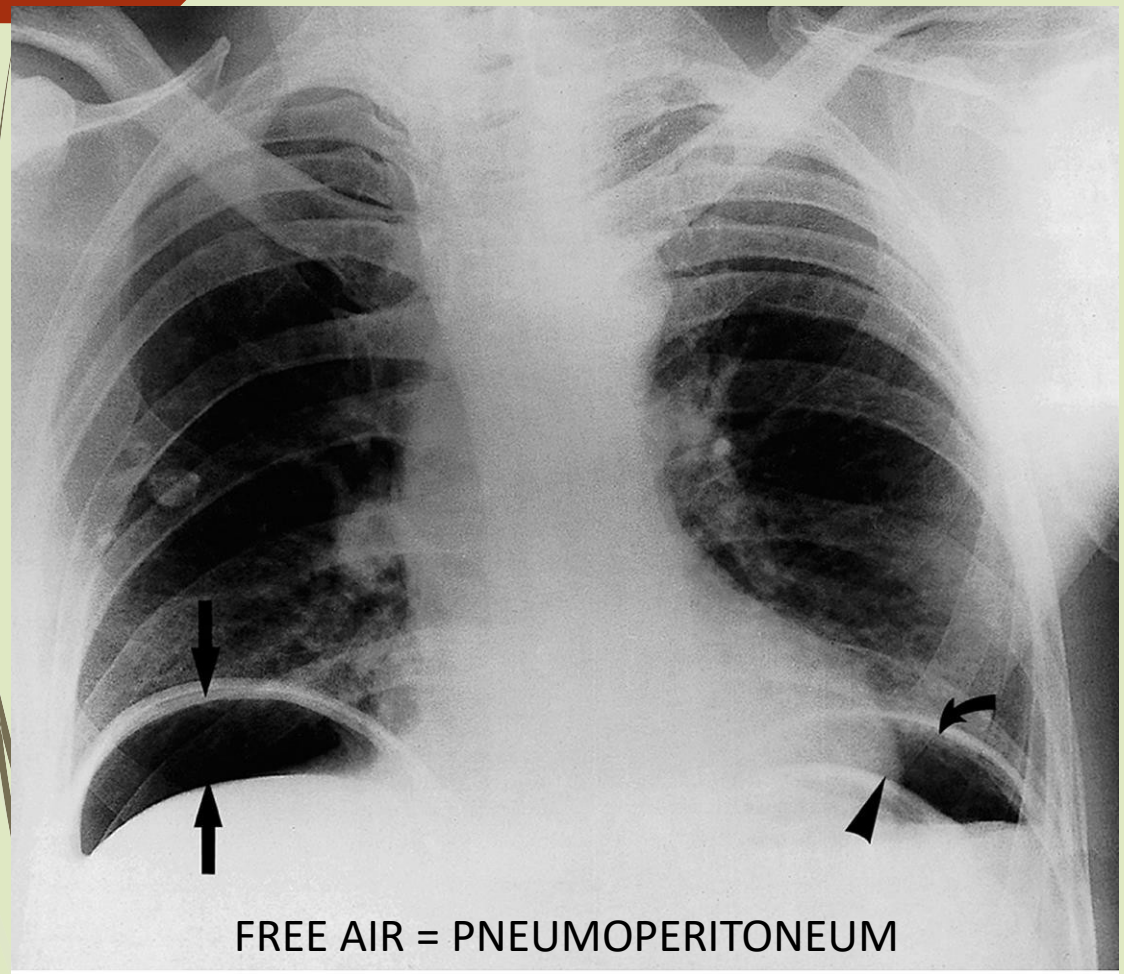
- MRI is useful in evaluating abdominal soft tissues.
- MRI is a type of non-invasive test that uses magnets and radio waves to create images of the inside of the body.



MRI enterography

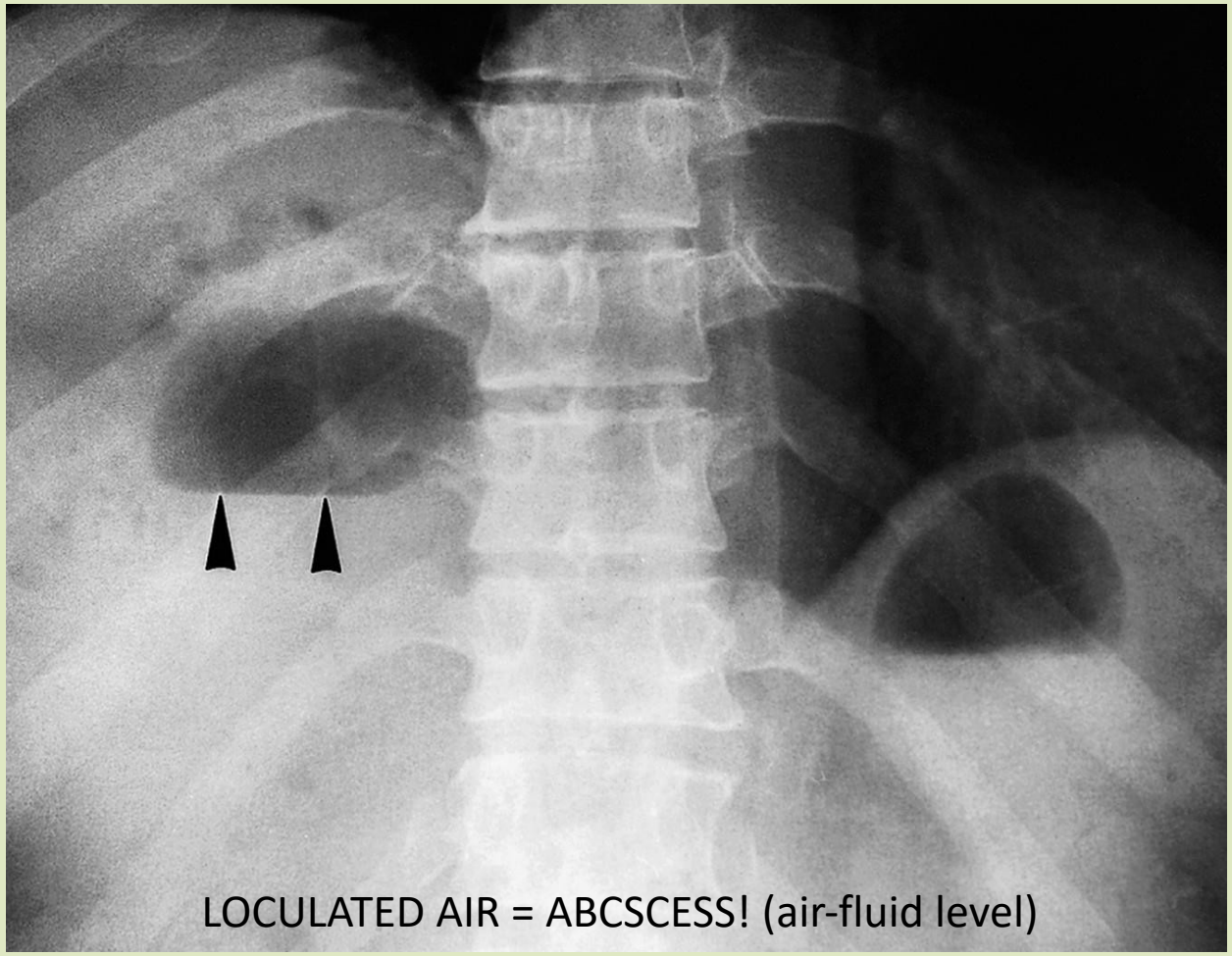
Common plain x-ray abdomen radiograph findings

CASE 1



FREE AIR = PNEUMOPERITONEUM

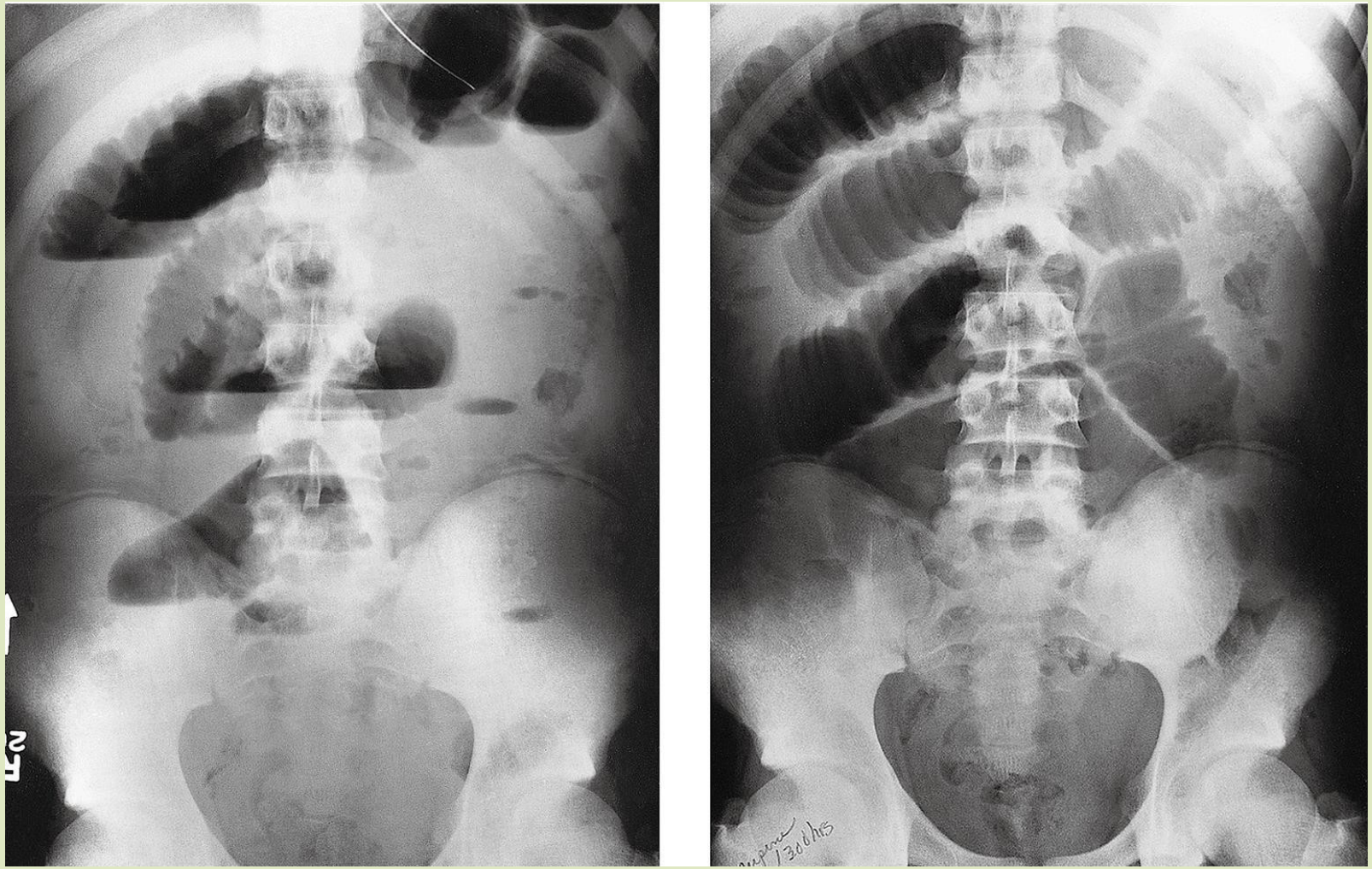
CASE 2



LOCULATED AIR = ABCSCESS! (air-fluid level)

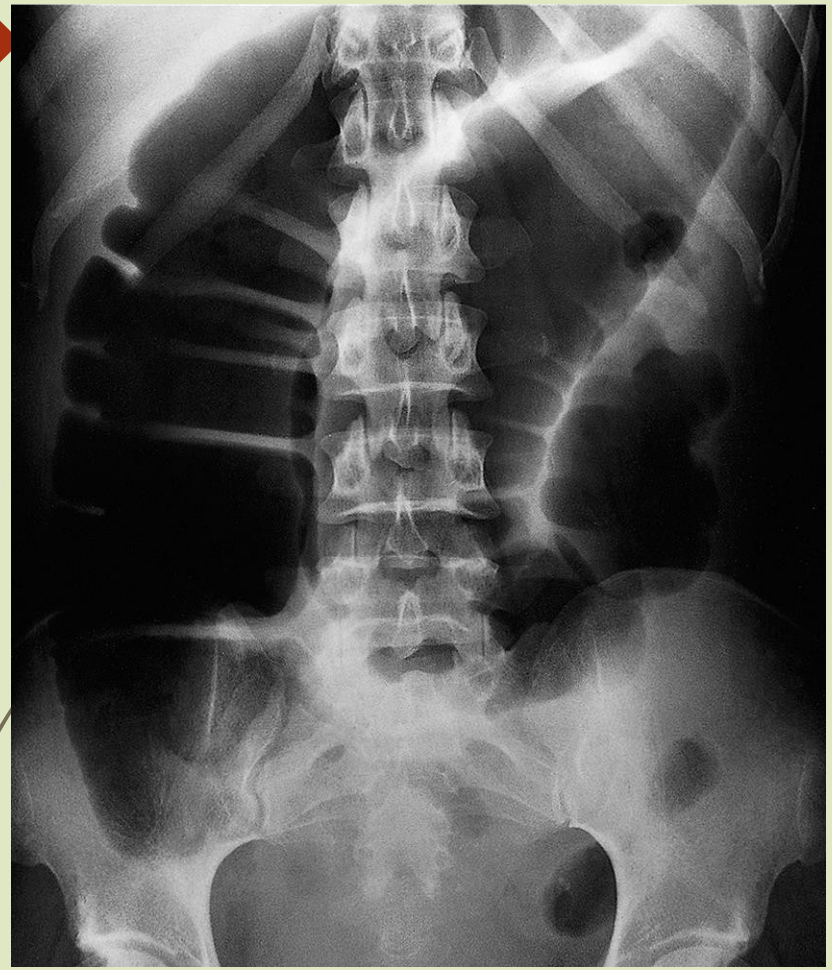
ABNORMAL AIR COLLECTION WITHIN ABDOMEN

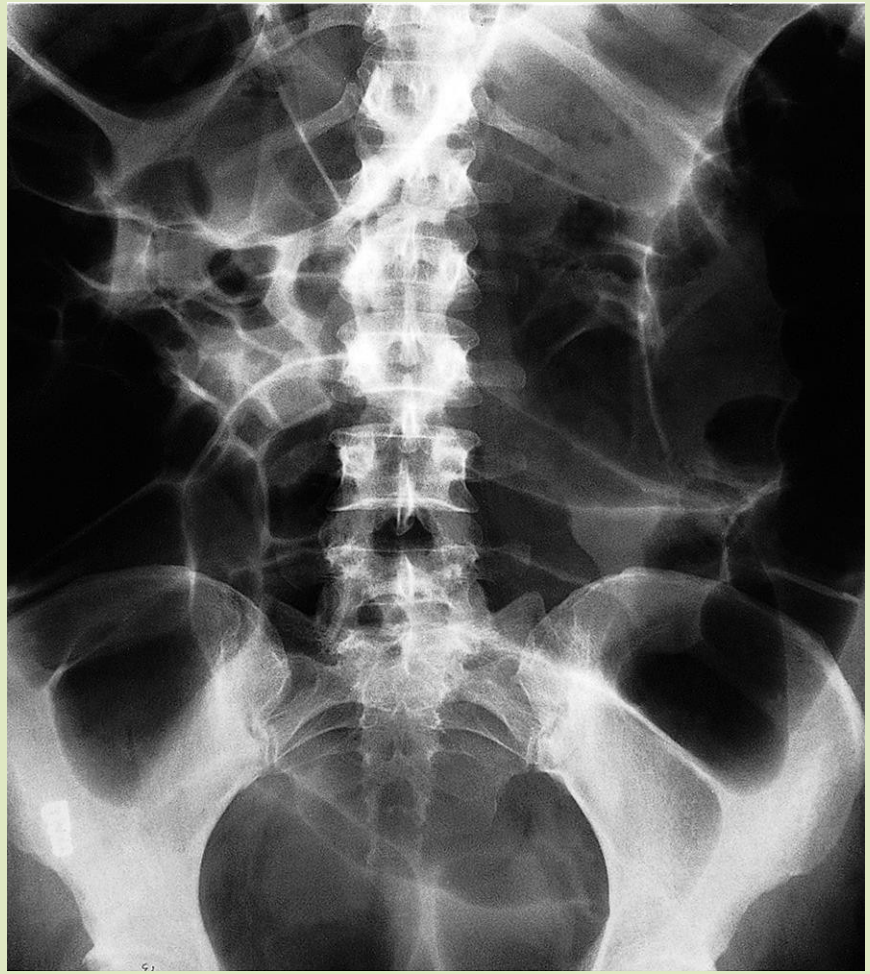
CASE 3



DILATED SMALL BOWEL LOOPS = SB OBSTRUCTION

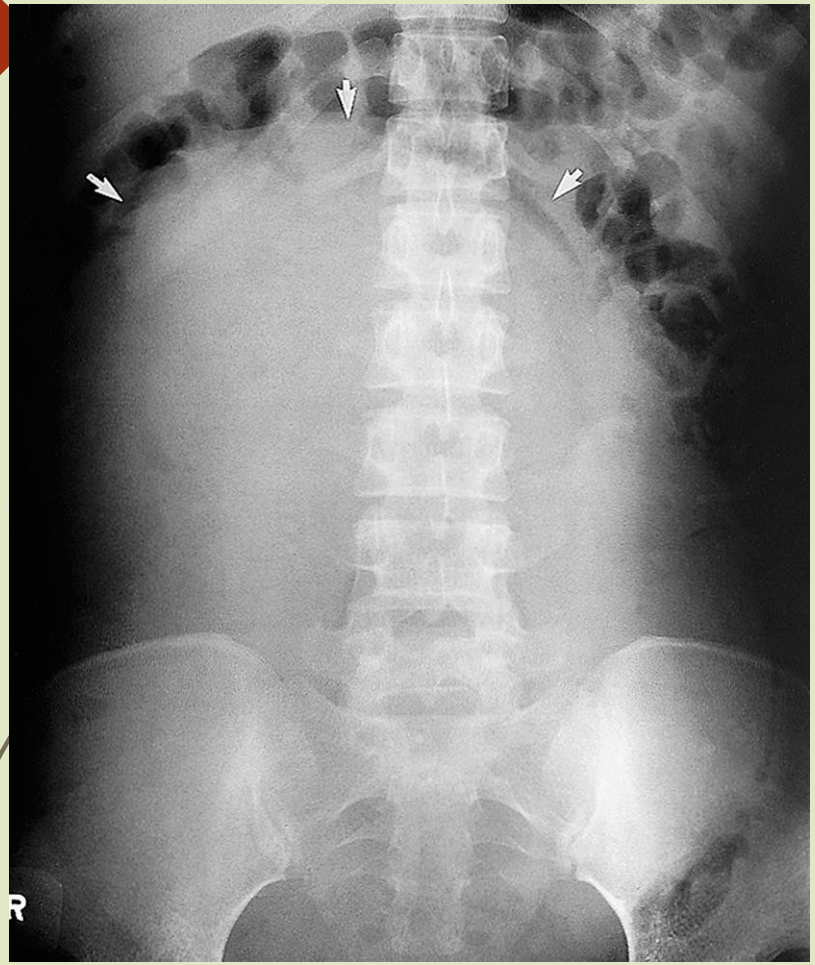
CASE 4

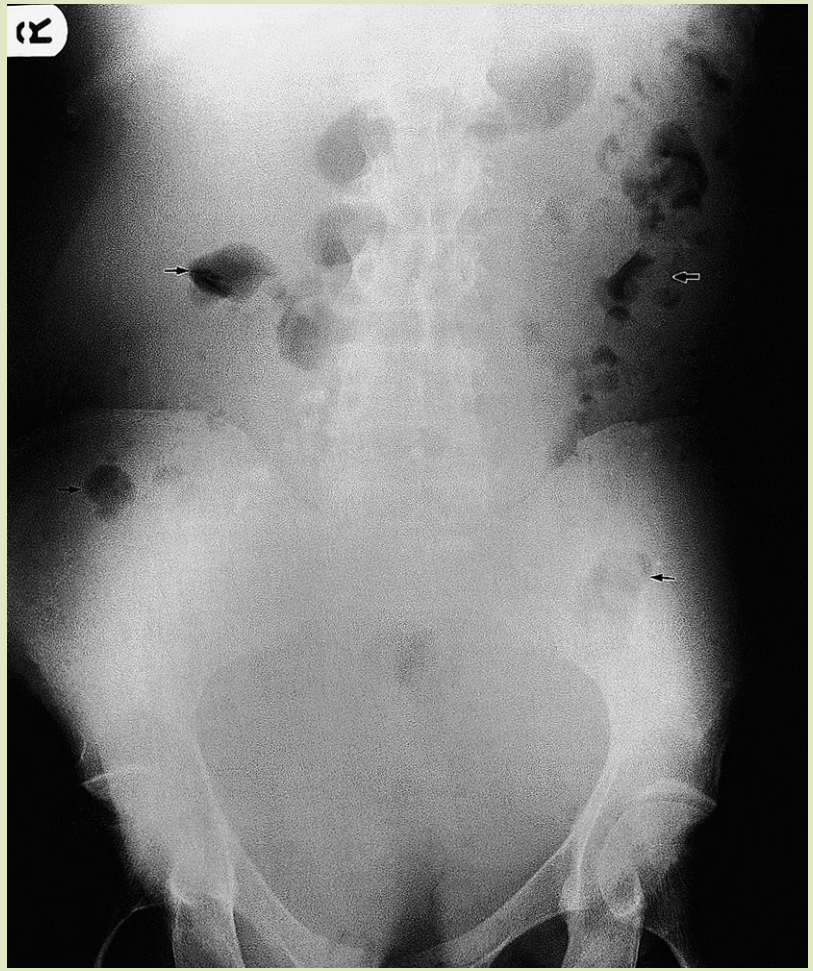




DILATED LARGE BOWEL LOOPS = LB OBSTRUCTION

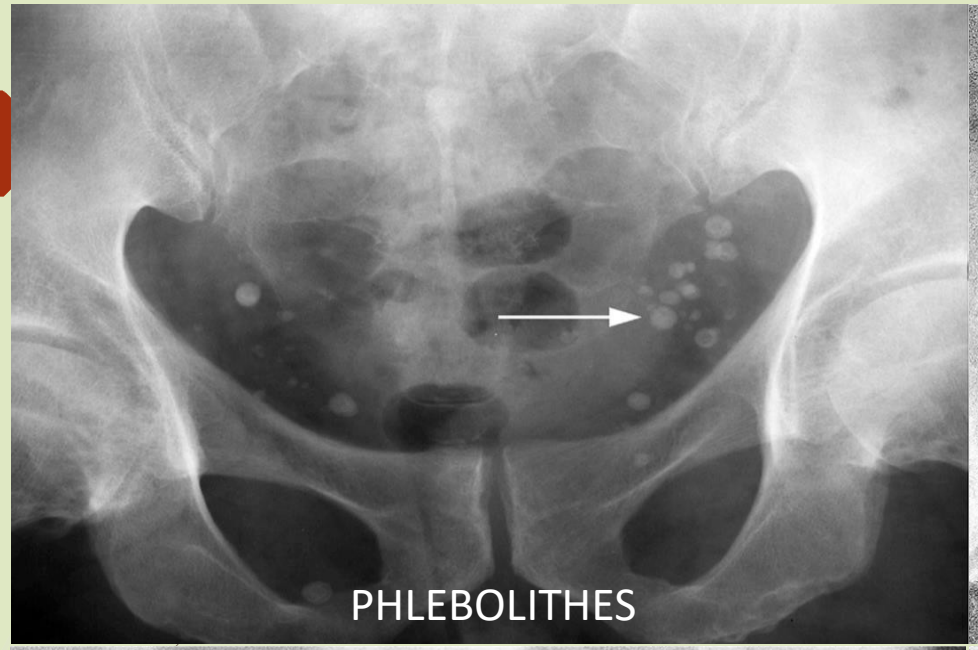
CASE 5



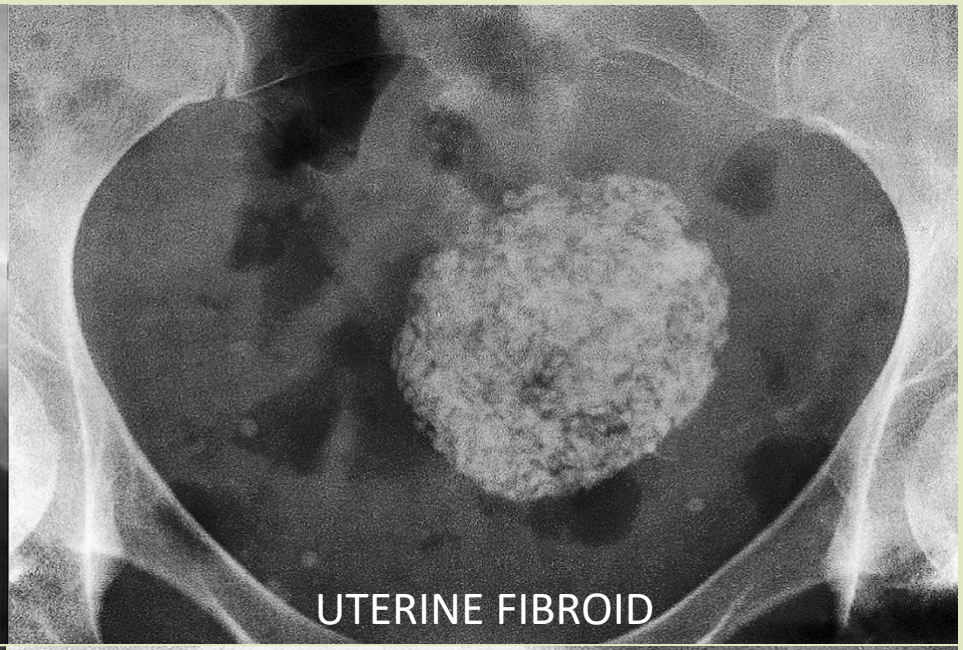


DISPLACED BOWEL LOOPS = SOFT TISSUE MASS LESION

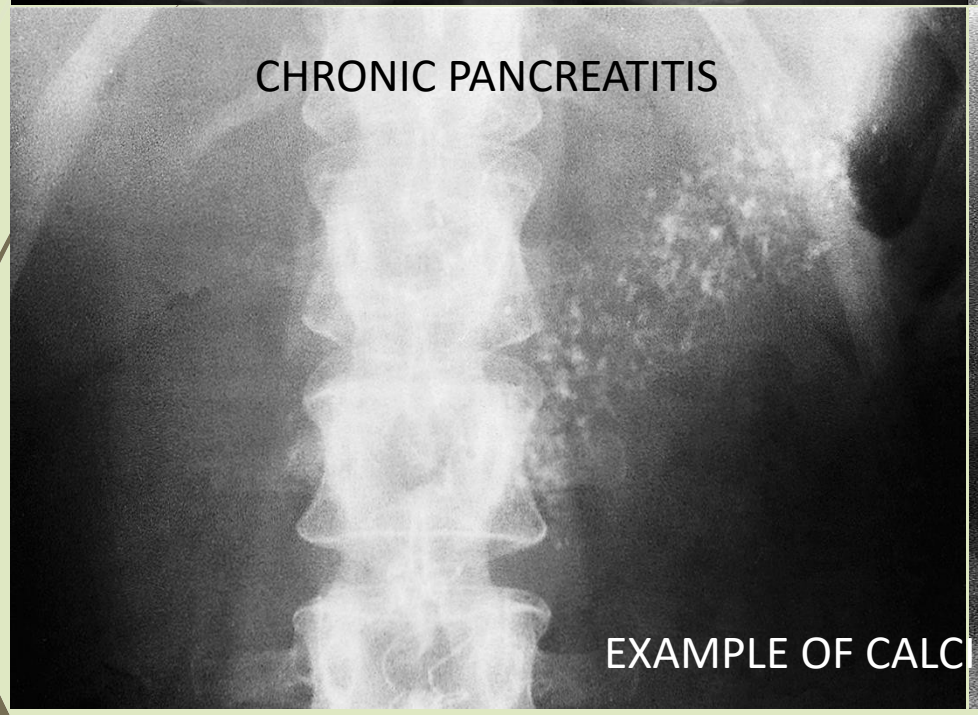
CASE 6



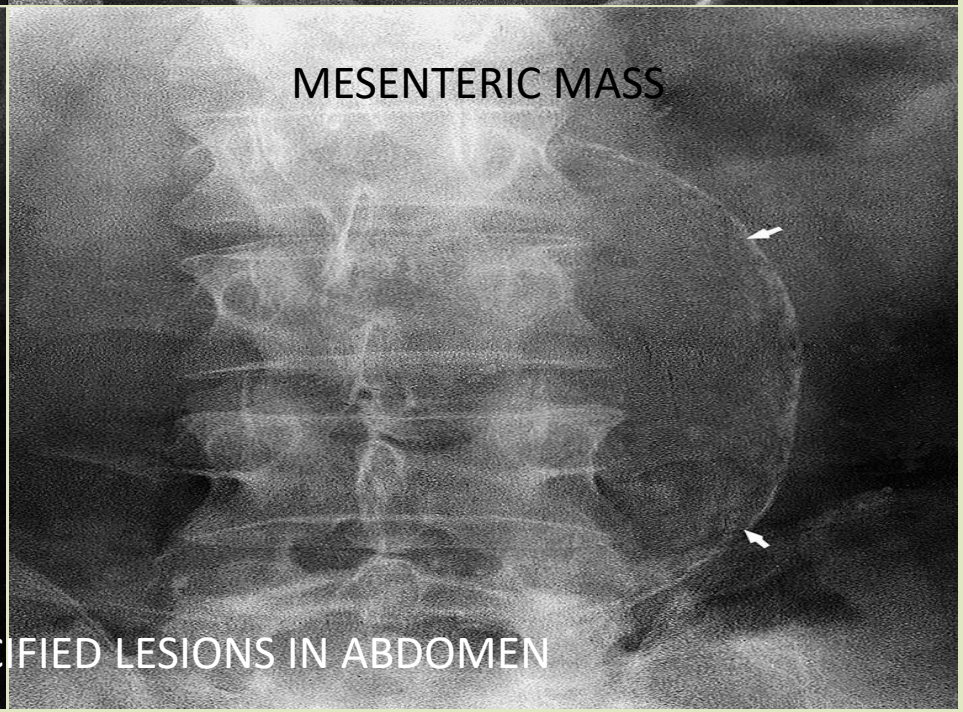
PHLEBOLITHES



UTERINE FIBROID



CHRONIC PANCREATITIS



MESENTERIC MASS

EXAMPLE OF CALCIFIED LESIONS IN ABDOMEN

THE END

THANK YOU