RADIOLOGY OF THE ABDOMEN

(LECTURE 1)

Radiology

OBJECTIVES

- To know radiology modalities used in abdomen imaging mainly GI tract.
- To know advantages and disadvantages of each modality.
- To know indications and contraindications of each modality.
- Overview on normal abdomen appearance and common pathologies including:
  - Pneumoperitomium
  - Peptic ulcer
  - Bowell obstruction
  - Inflammatory bowel disease
  - Large bowel masses/malignancies

What radiological modalities are **GOOD** in imaging the abdomen mainly the **GI tract**?

- What radiological modalities are **GOOD** in imaging the abdomen mainly the **STOMACH** and **BOWEL LOOPS**?

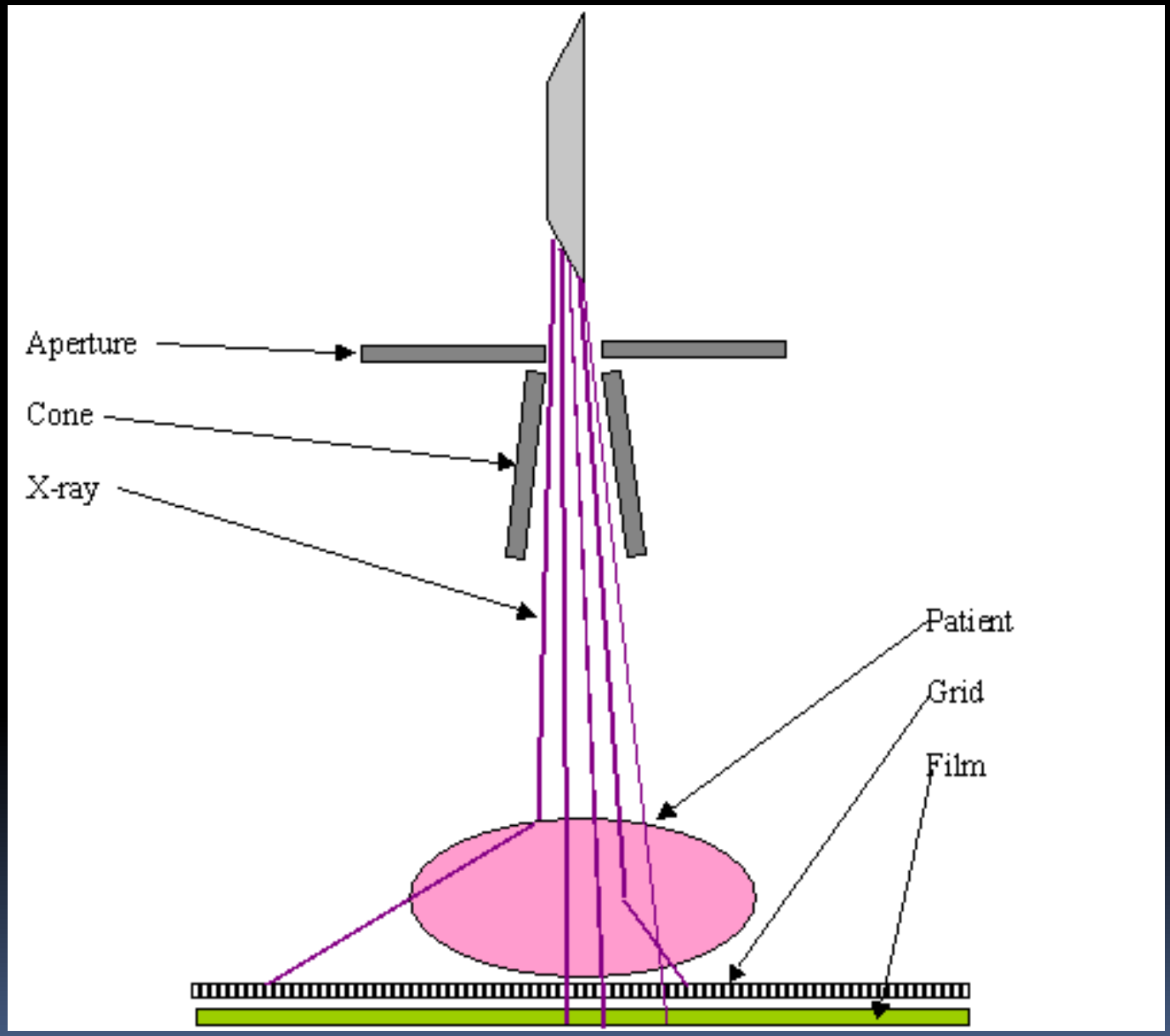
- ✓ **X-ray**
- ✓ **Fluoroscopy**
- ✓ **CT scan**
- ✓ **MRI**

?? **US**

X-Ray

Abdominal x-ray

- X-ray is a form of radiation, that are focused into a beam
- X-ray can pass through most objects including the human body.
- When X-rays strike a piece of photographic film, they make a picture.


Aperture
Cone
X-ray
Patient
Grid
Film

ABDOMINAL X-RAY

White ----- bone and calcification

Grey ------ soft tissue

Black ----- air

ADVANTAGES:

- Widely available
- Cheap
- **Excellent** in diagnosing **free air** in the abdomen
- **Good** in diagnosing **bowel obstruction** & stones/calcifications

DISADVANTAGES:

- Radiation
- Poor soft tissue details

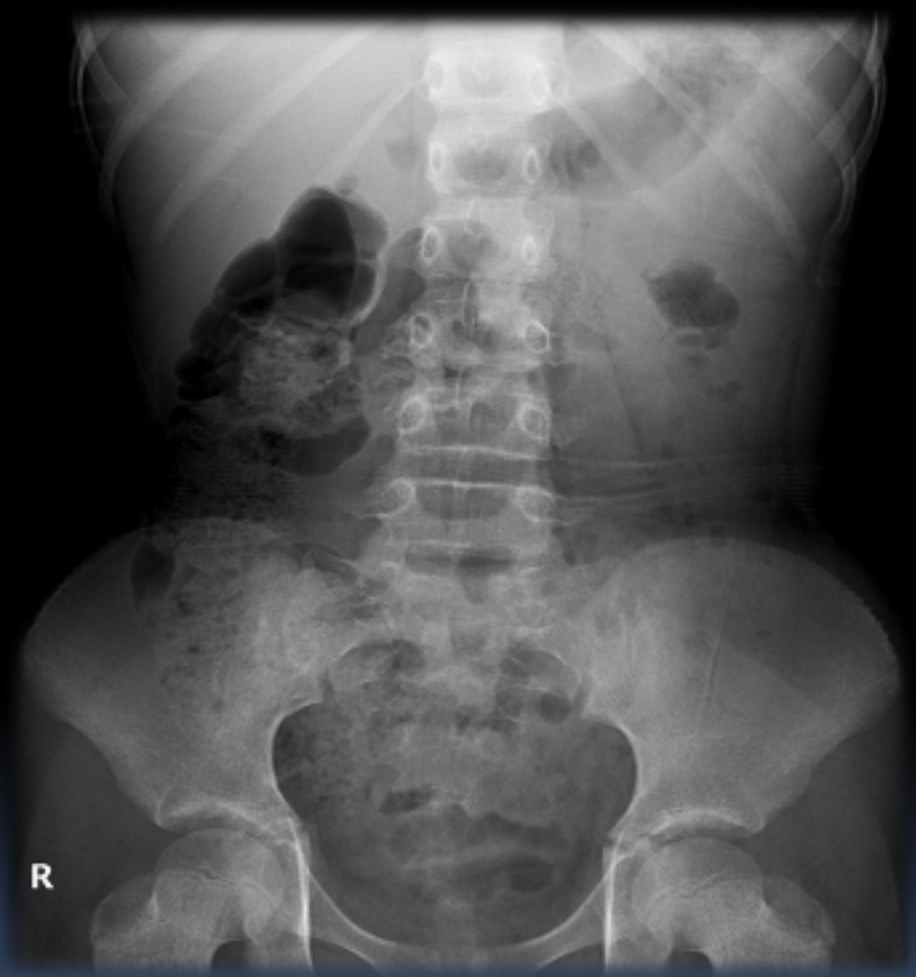
INDICATIONS

- Abdominal pain
- Bowel obstruction
- Stones
- Masses
- Trauma
- Others, foreign body, supportive lines.. Etc

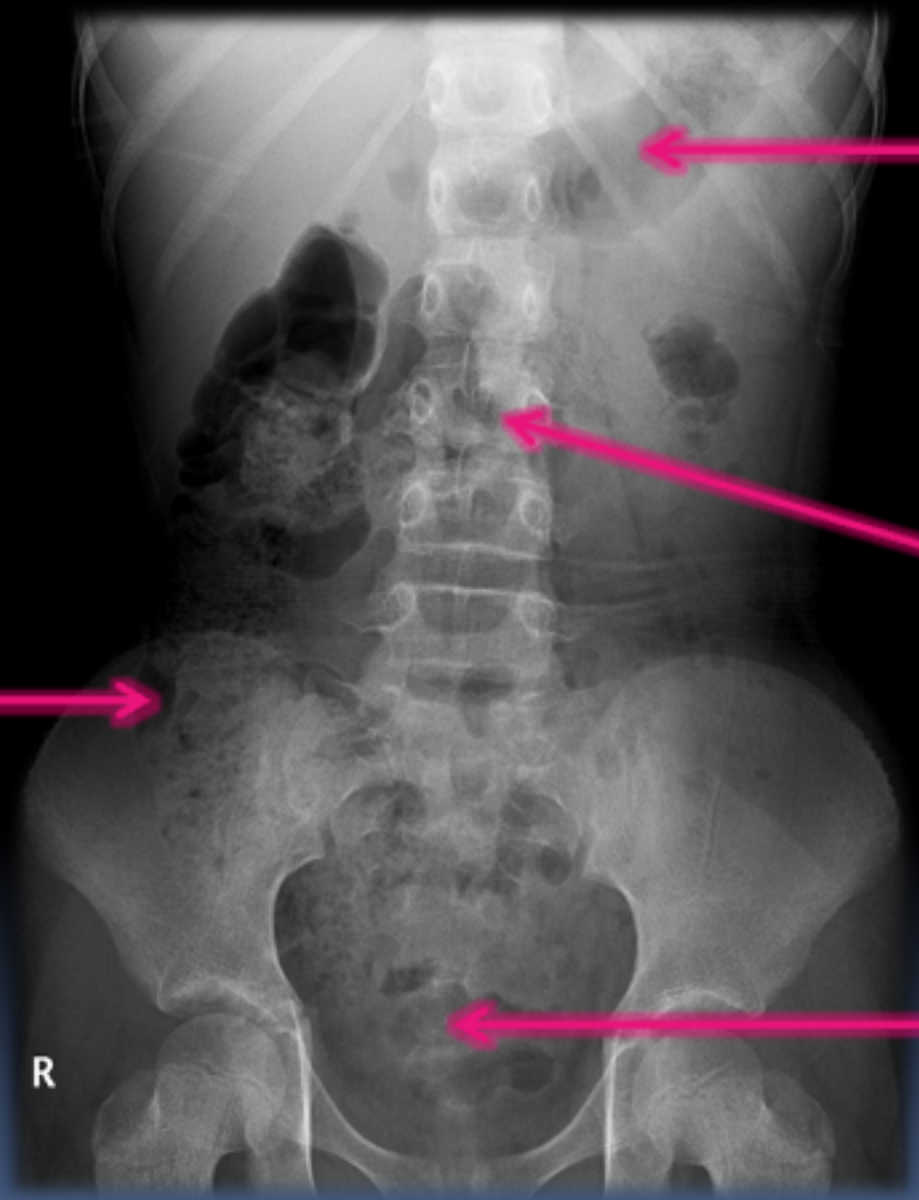
CONTRAINDICATIONS:

- pregnancy

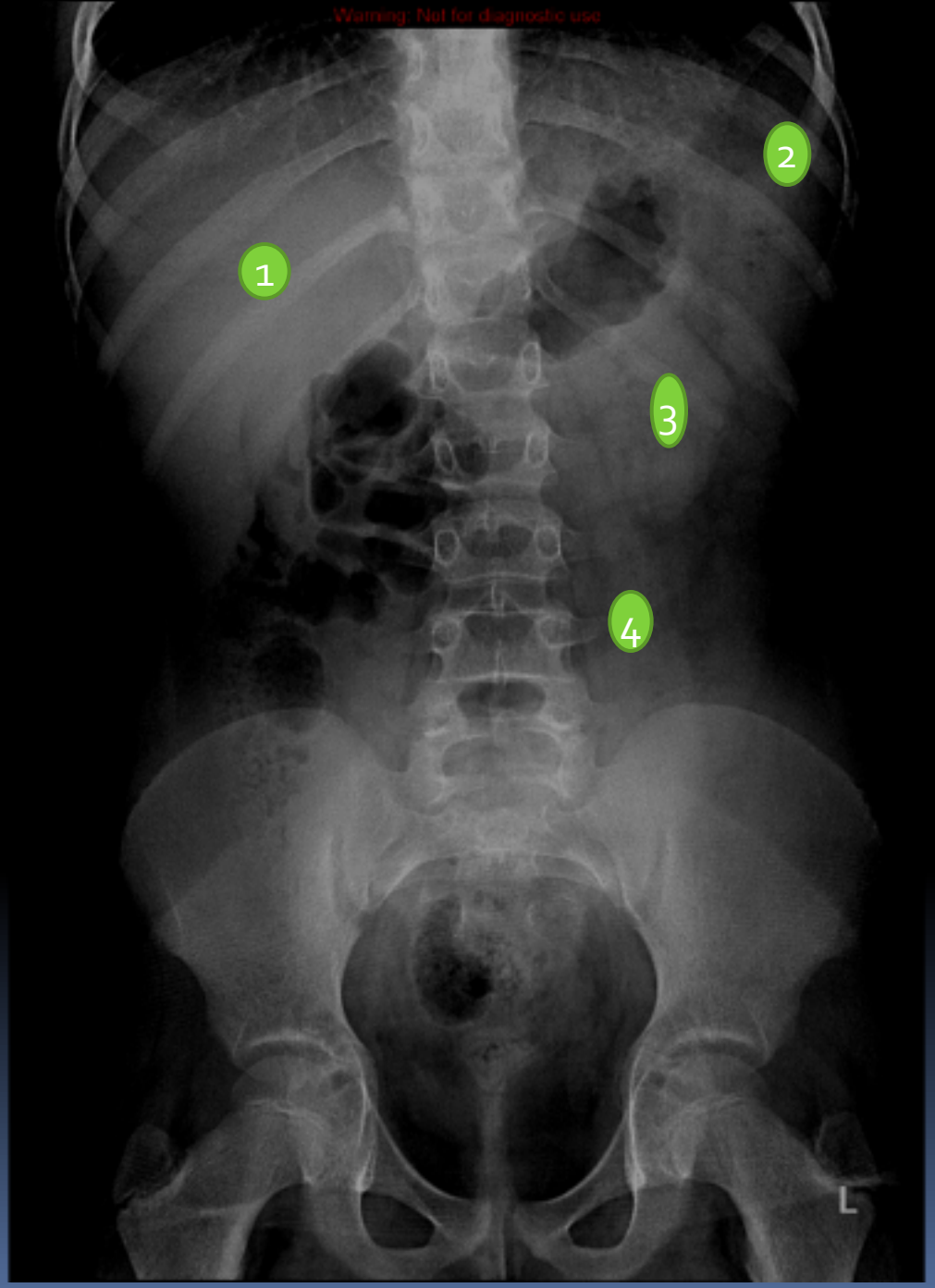
NORMAL ABDOMEN X-RAY



Standing **Supine**


STOMACH
SMALL BOWEL
LARGE BOWEL
RECTUM
R

Soft tissues



Soft tissues

- Liver
- Spleen
- Kidneys
- Psoas muscles

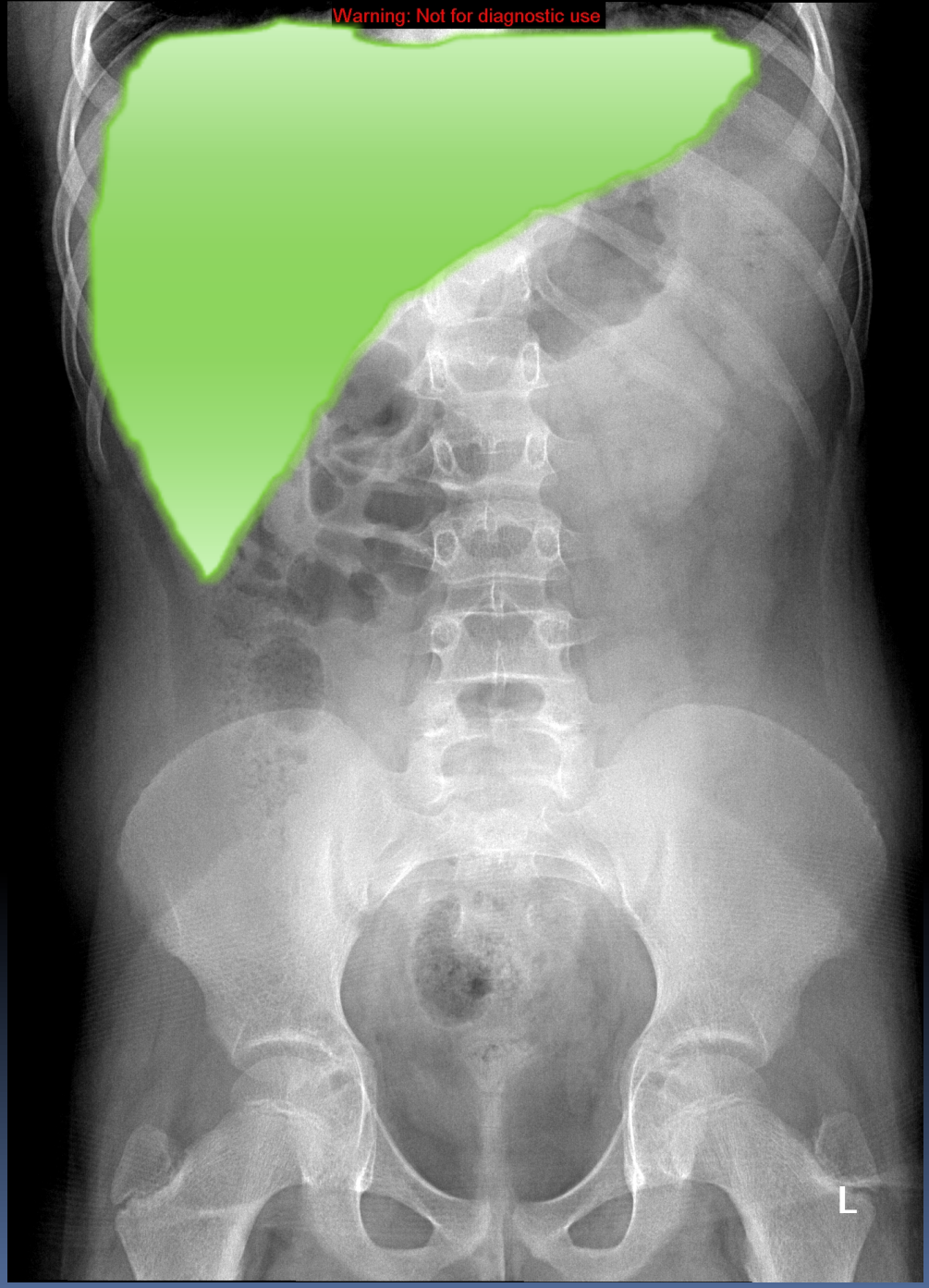
Soft tissues

Liver

Spleen

Kidneys

Psoas muscles

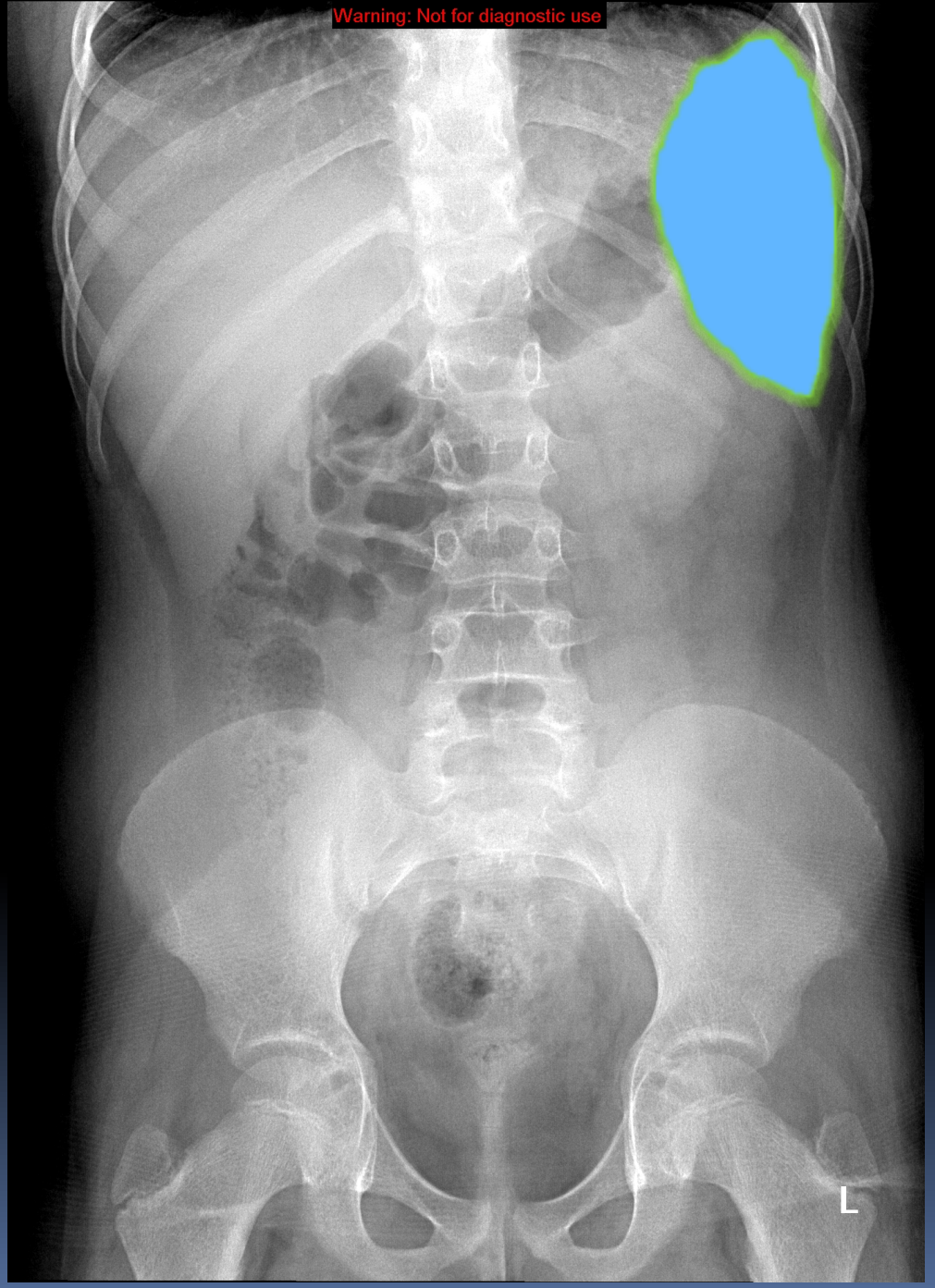


Liver

Spleen

Kidneys

Psoas muscles

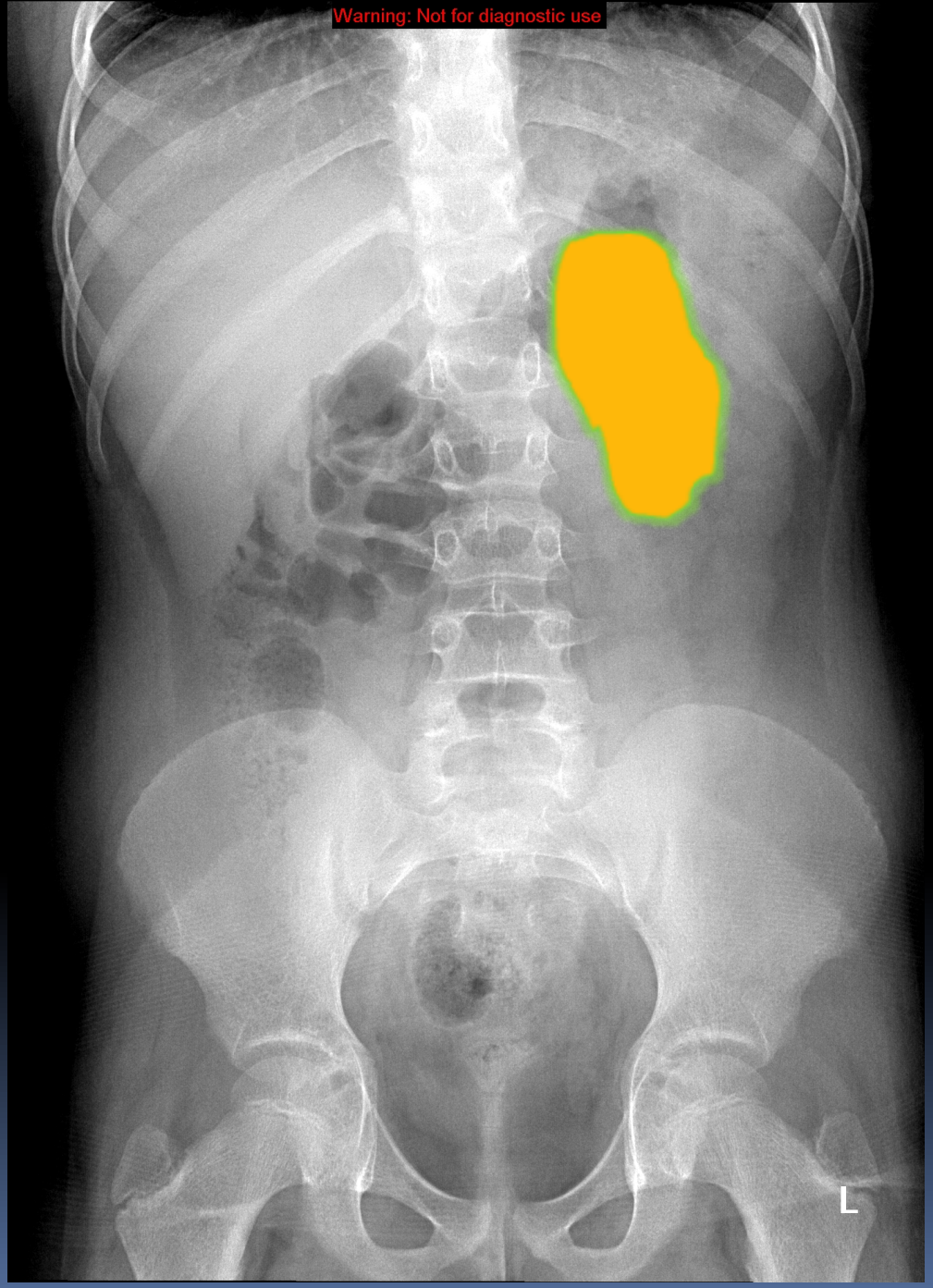


Liver

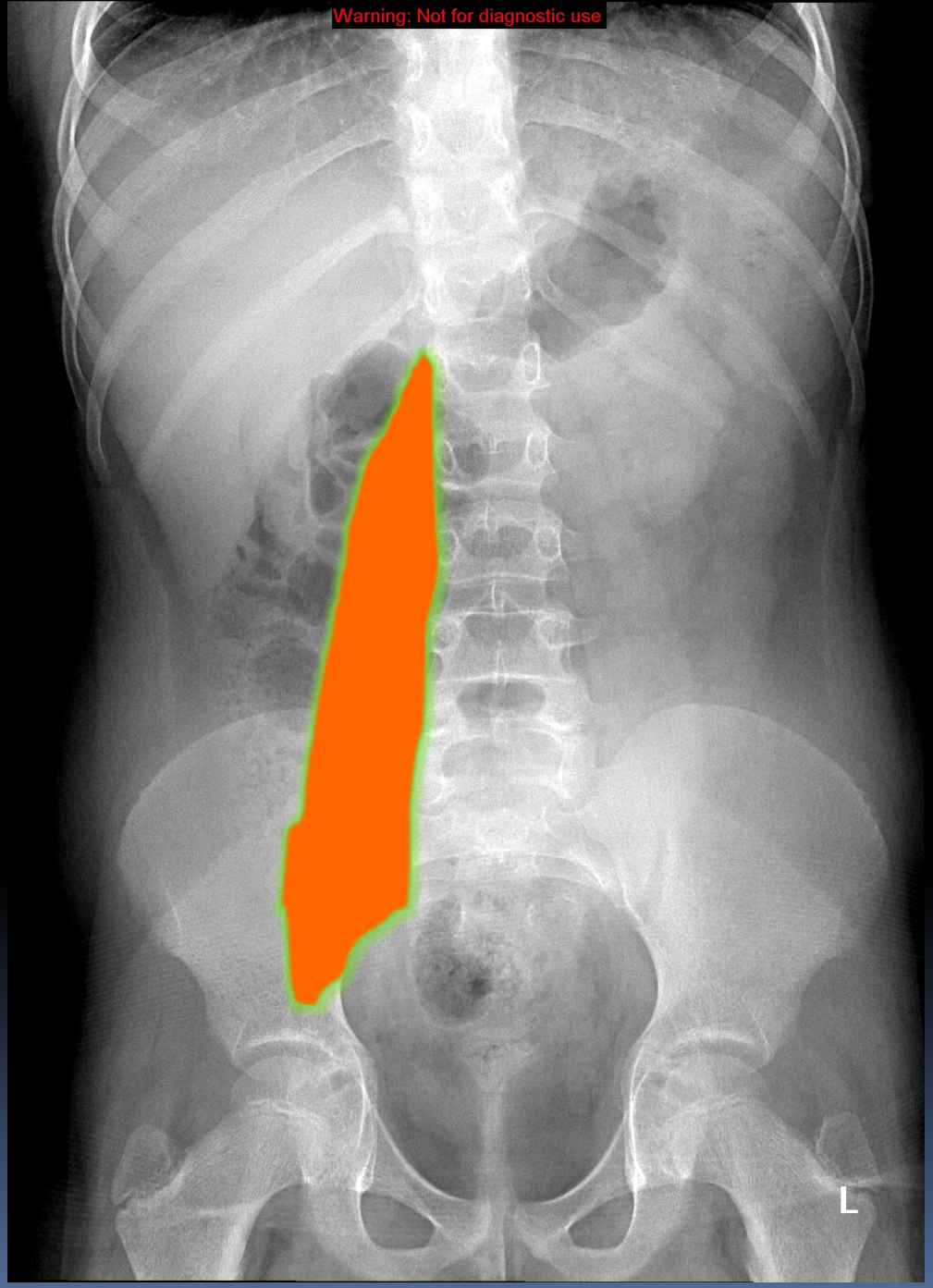
Spleen

Kidney

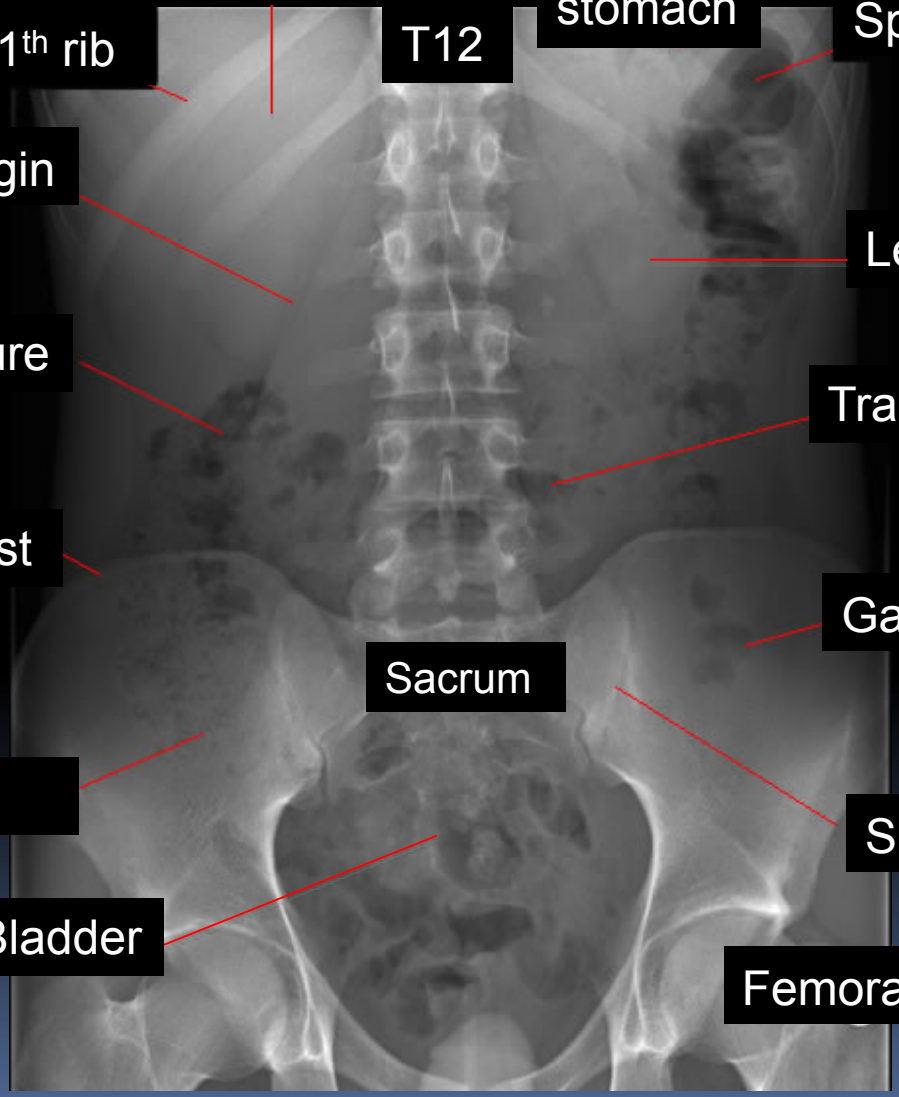
Psoas muscles



Liver
Spleen
Kidneys
Psoas muscles



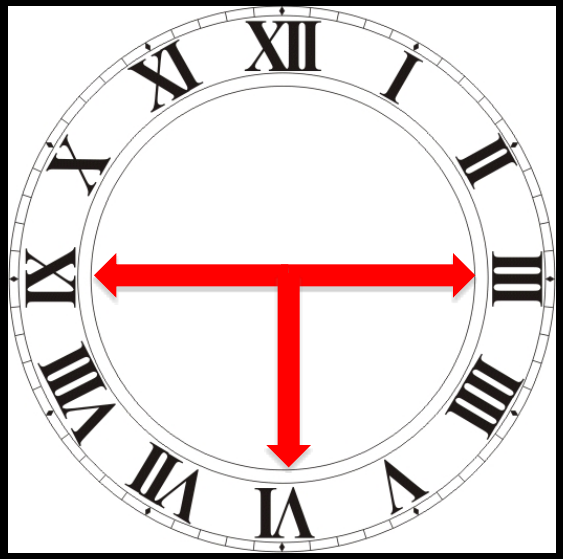
Normal AXR


Liver
Gas in stomach
11th rib
T12
Splenic flexure
Psoas margin
Left kidney
Hepatic flexure
Transverse colon
Iliac crest
Gas in sigmoid
Sacrum
Gas in caecum
SI joint
Bladder
Femoral head

What is normal?

- Stomach
  - Almost always air in stomach
- Small bowel
  - Usually small amount of air in 2 or 3 loops
- Large bowel
  - Almost always air in rectum and sigmoid
  - Varying amount of gas in rest of large bowel

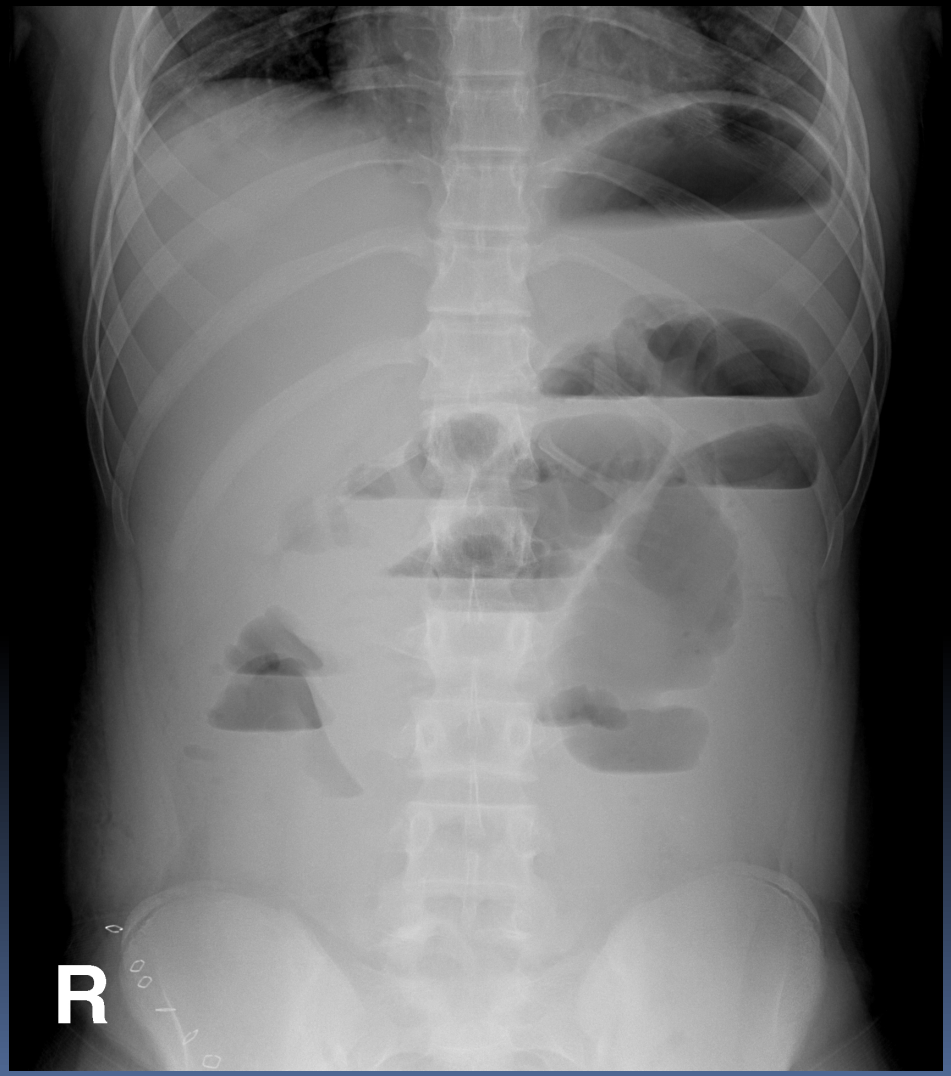
3, 6, 9 RULE



Maximum Normal Diameter of bowel

Small bowel	3cm
Large bowel	6cm
Caecum	9cm

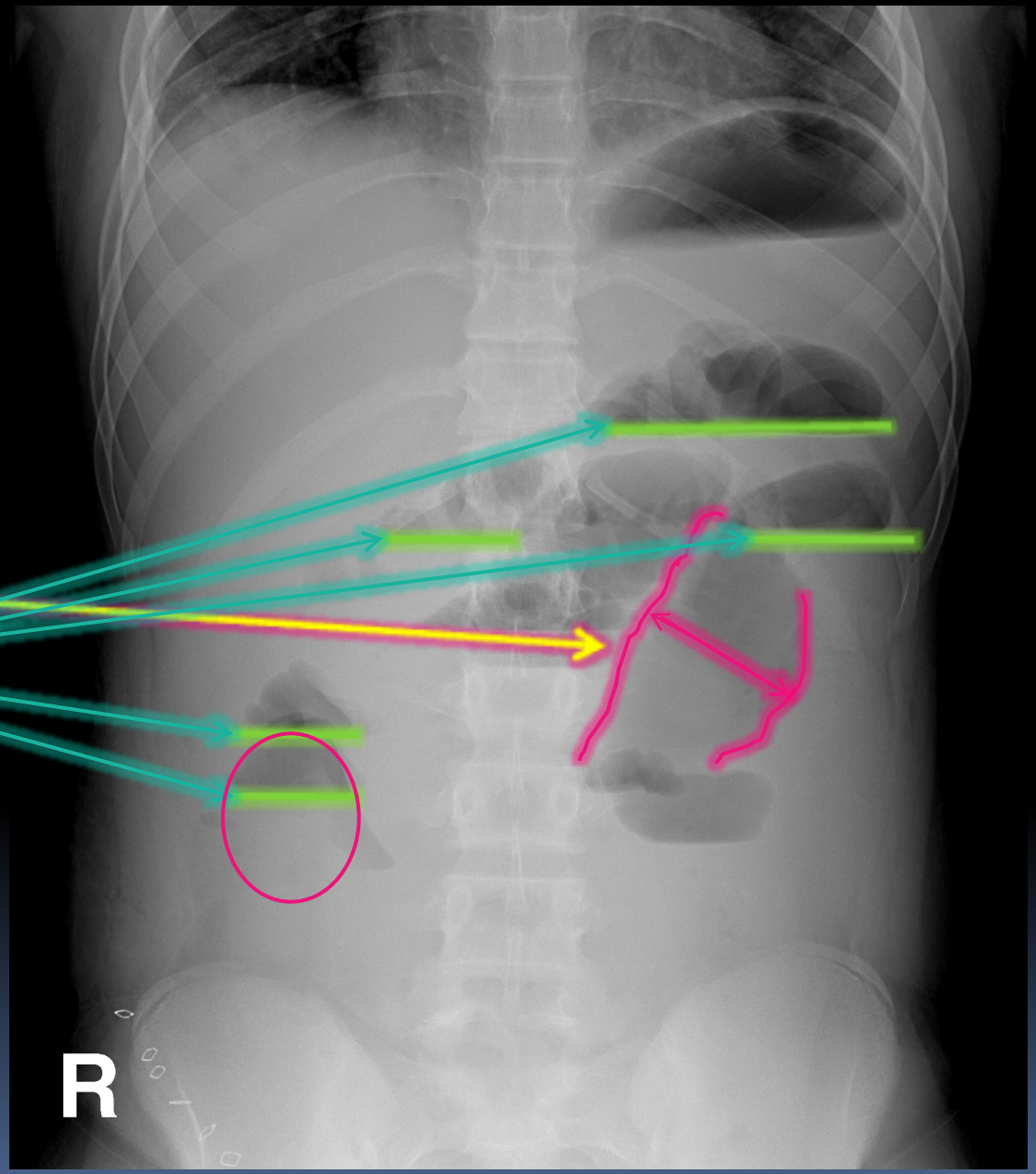
Is this X ray normal or abnormal ? and Why?



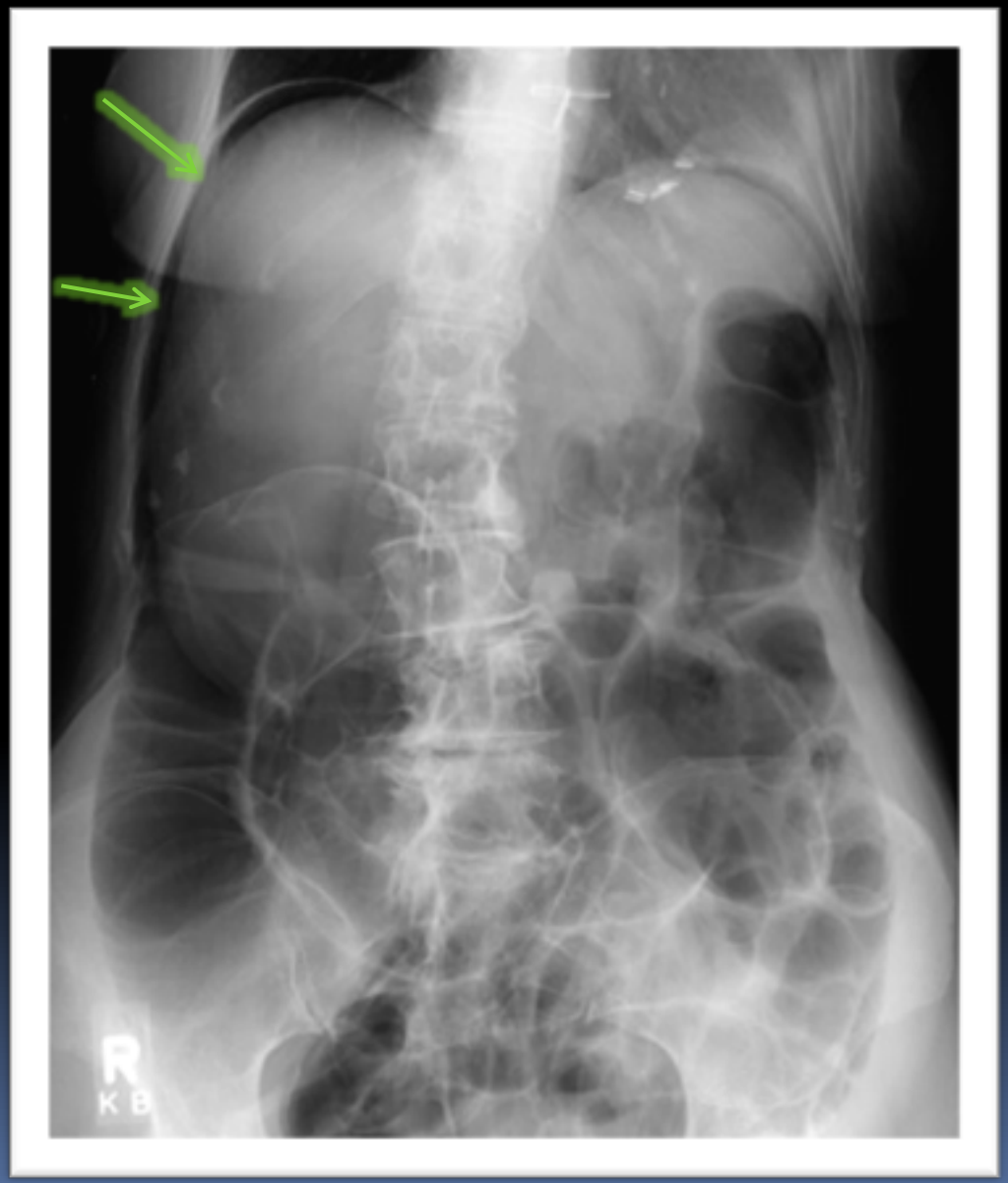
is ABNORMAL

OWEL OBSTRUCTION

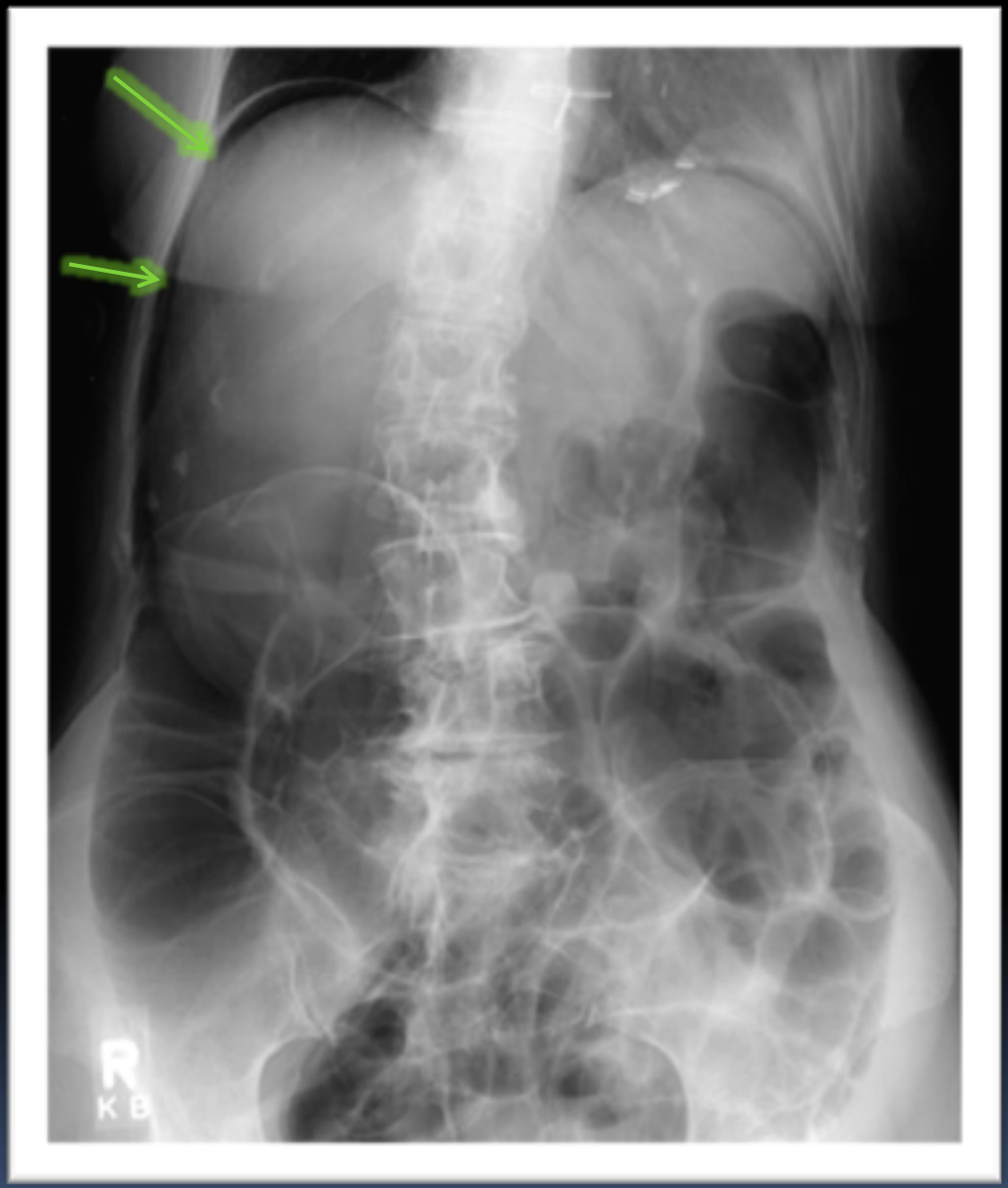
- Dilated bowel loops
- Air fluid levels



Is the air inside or outside the bowel loops?



It is outside (pneumoperitonium)



Fluoroscopy

+

X-RAY

ORAL CONTRAST

Barium swallow ----------> Esophagus

Barium meal ----------> Stomach

Barium follow through -----> Small bowel

Barium enema ----------> Large bowel

ADVANTAGES:

- Available
- Relatively cheap
- **Excellent** in evaluation the bowel **lumen and mucosa**

DISADVANTAGES:

- Radiation
- Poor in evaluating extra luminal pathologies

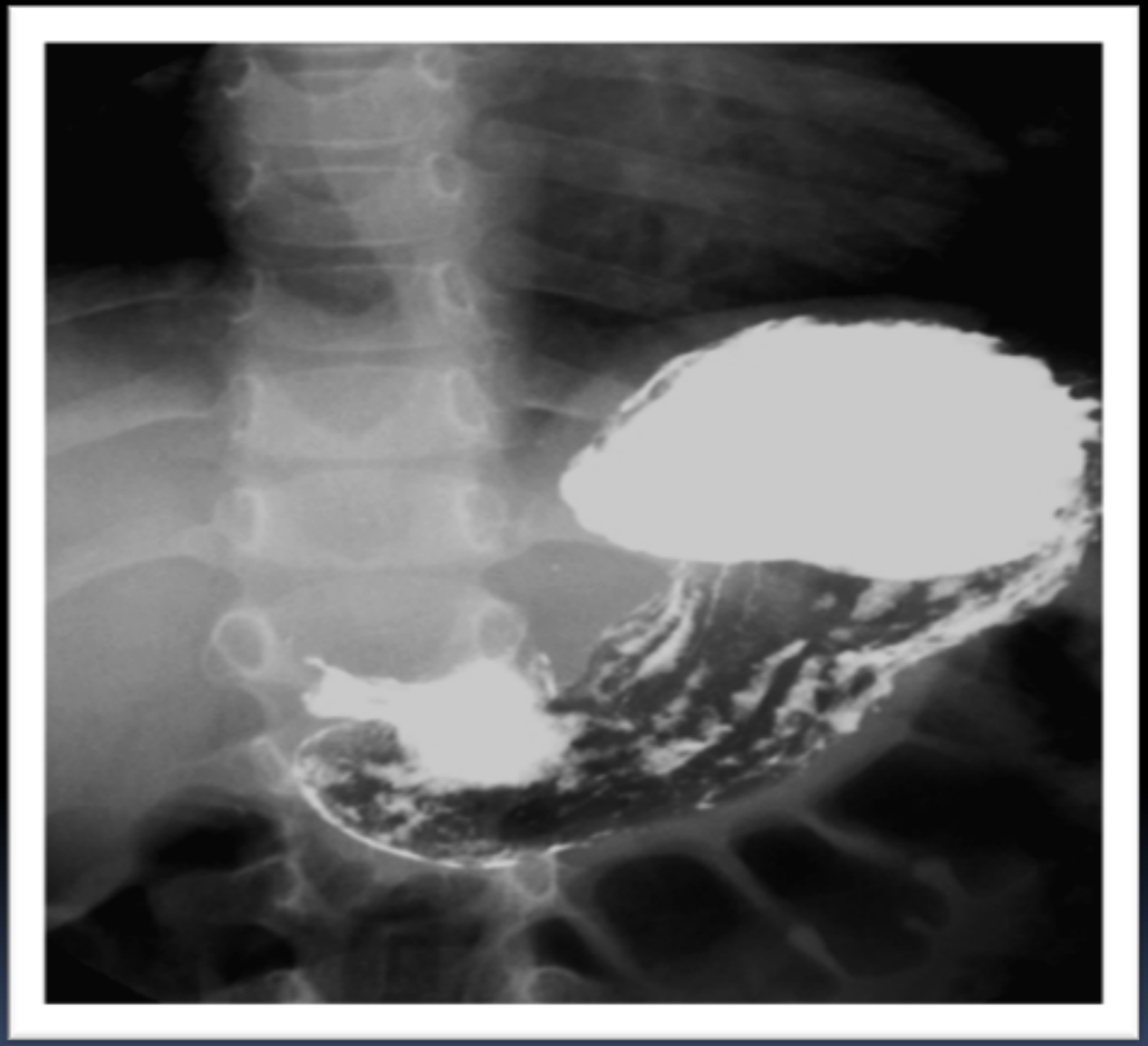
INDICATIONS

- Assessing the mucosal outline
- Abdominal pain
- Gastro esophageal reflux
- Masses
- Inflammatory bowel diseases
- Post surgical, leak

CONTRAINDICATIONS:

- Pregnancy
- Bowel obstruction
- Bowel perforation (with barium type of contrast)

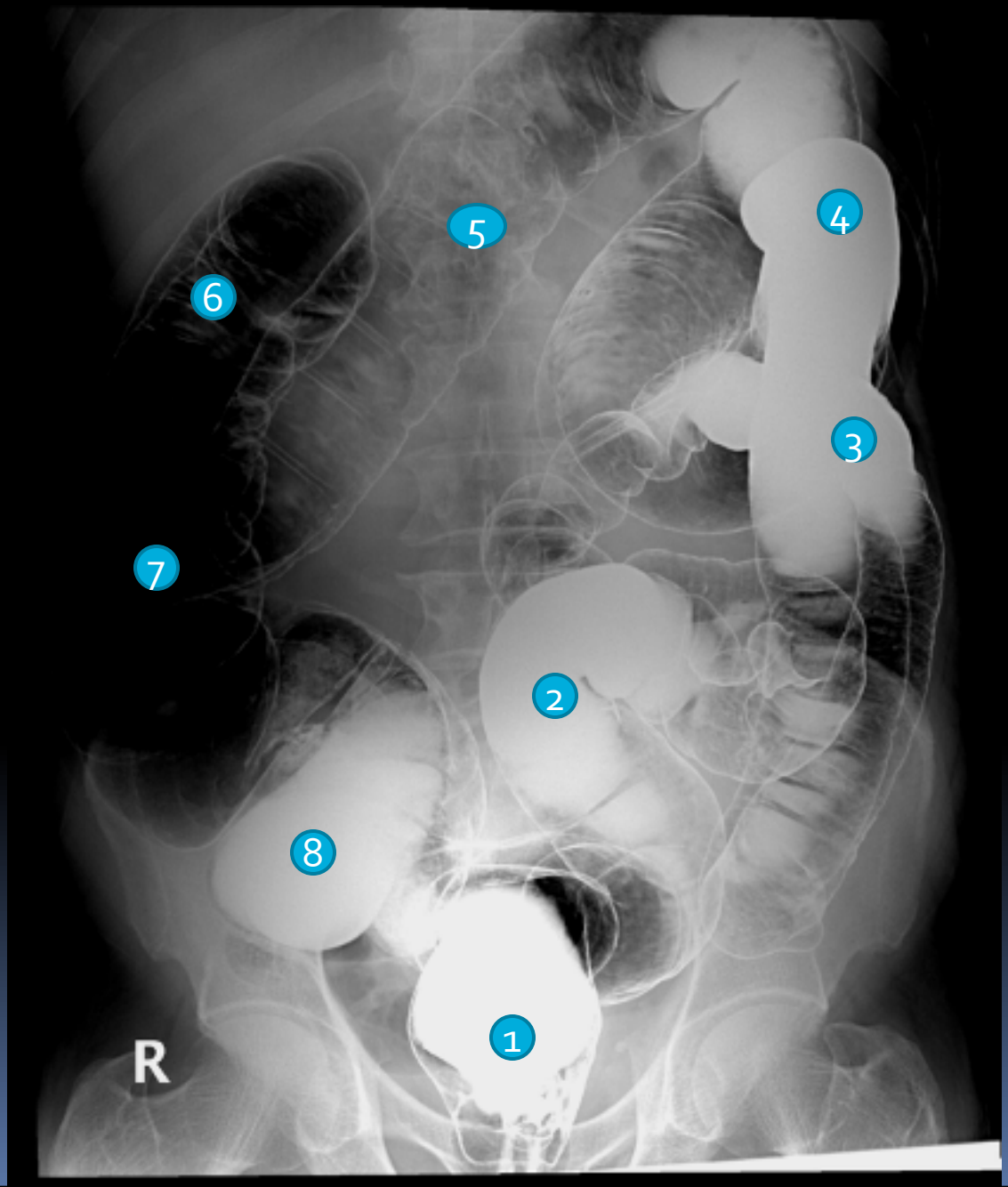
BARIUM SWALLOW



BARIUM MEAL

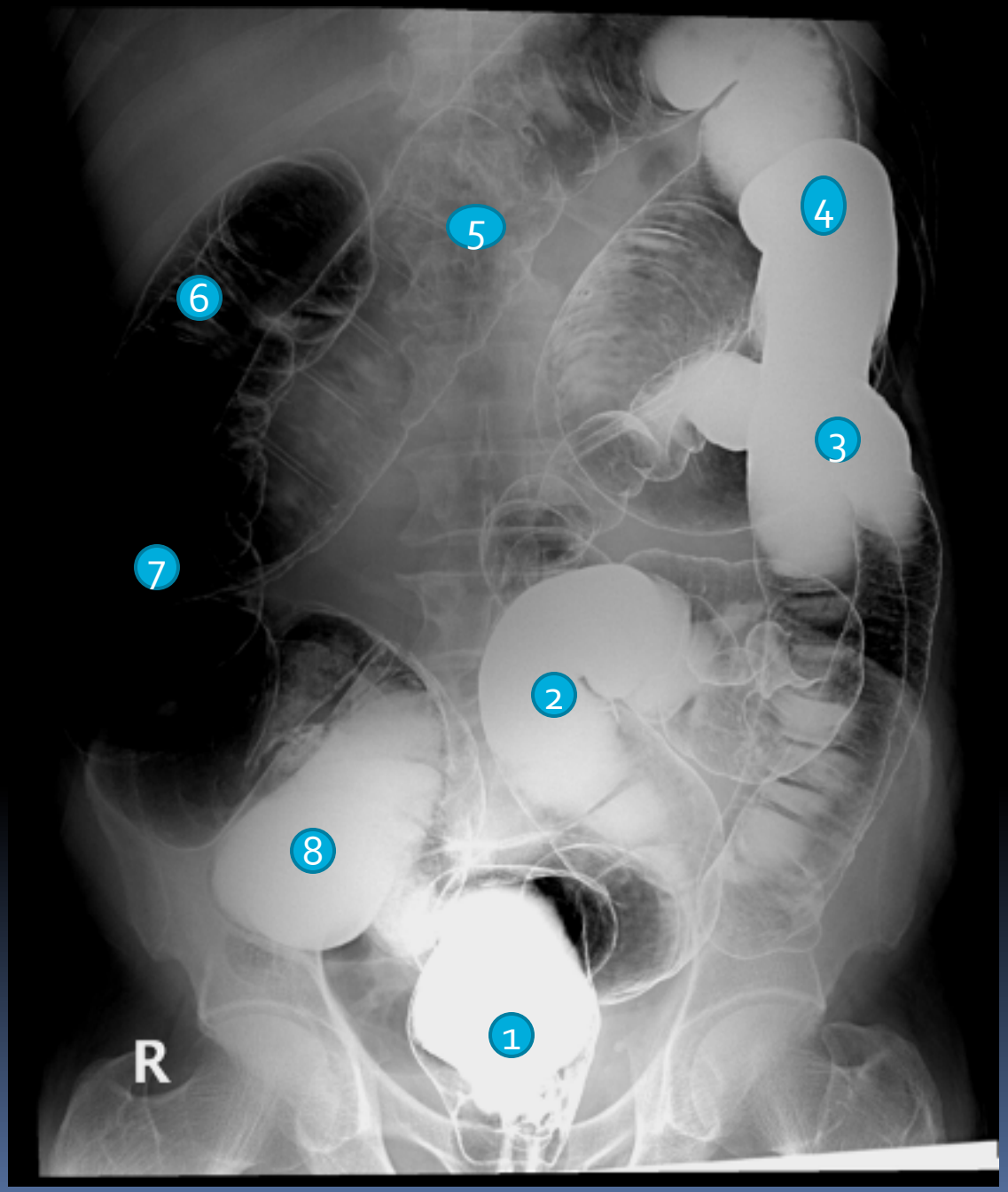
BARIUM FOLLOW THROUGH

BARIUM ENEMA

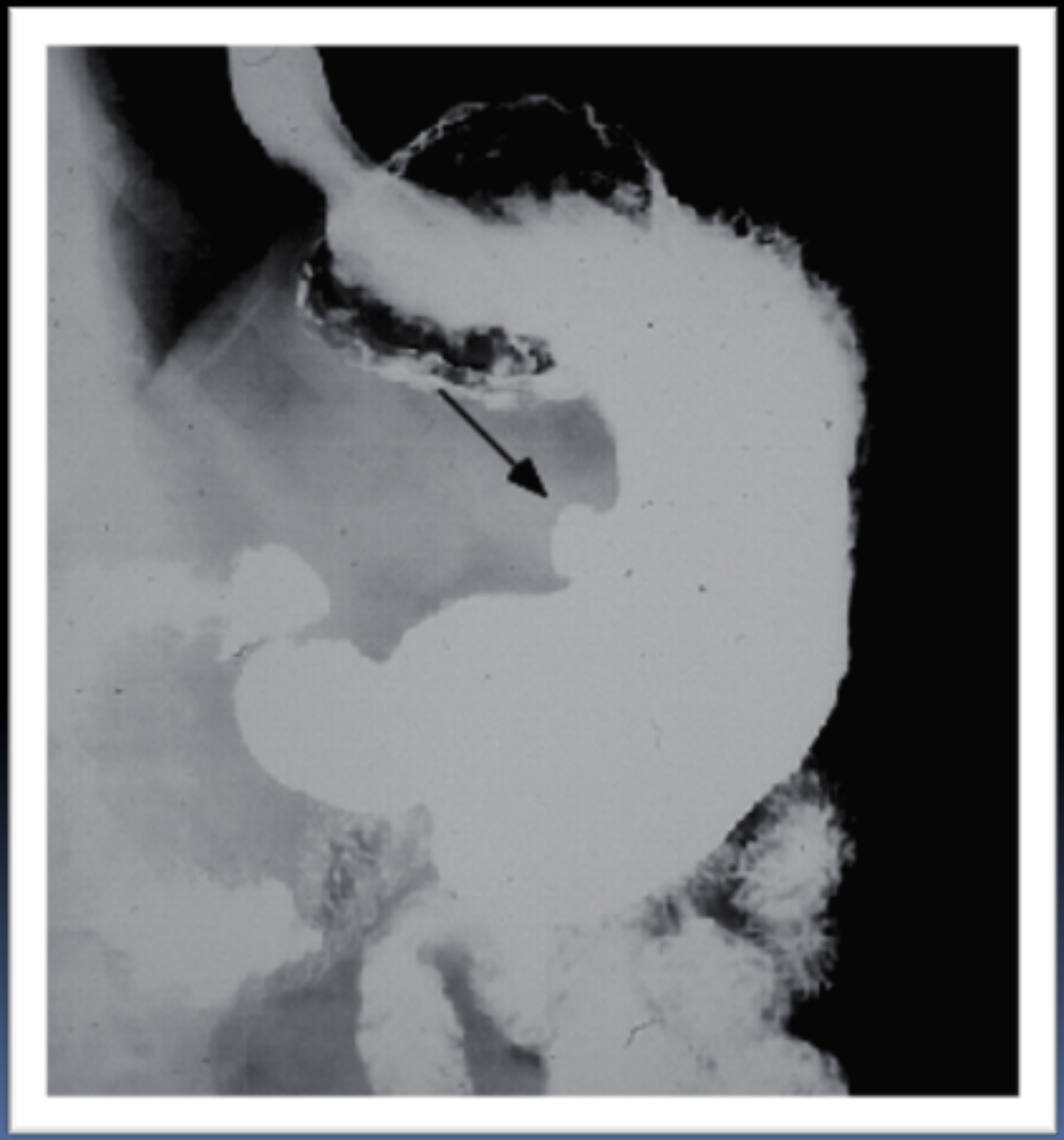


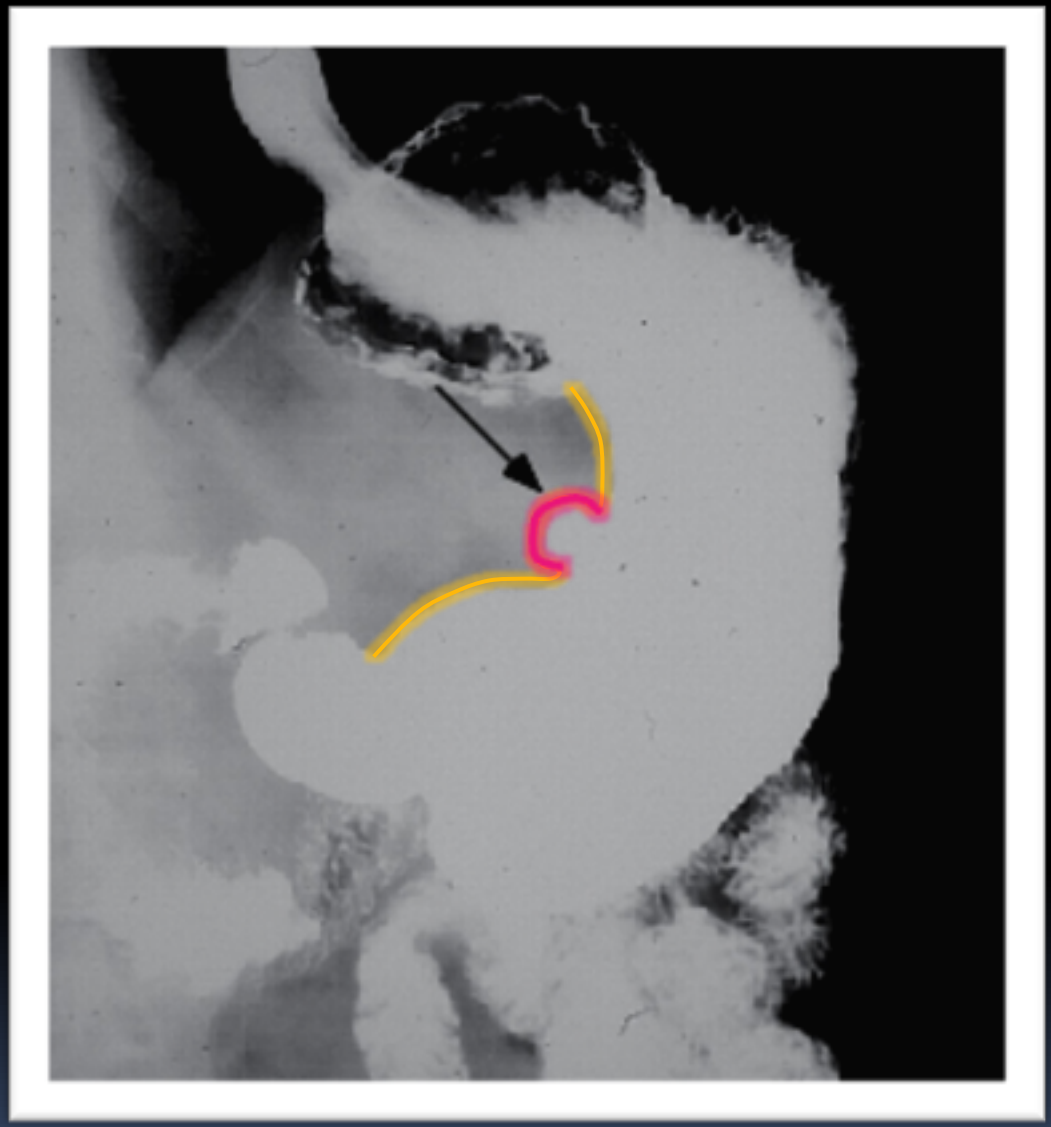
What type of this study?

1. Rectum
2. Sigmoid colon
3. Descending colon
4. Splenic flexure
5. Transverse colon
6. Hepatic flexure
7. Ascending colon
8. cecum



What is abnormal here?





Peptic ulcer disease

What is abnormal in this barium enema?

Colon mass/malignancy ***(Apple core appearance)***

CT scan

❖ ADVANTAGES:

- Available
- Short scan time
- Much more soft tissue and bone details
- **Excellent** in diagnosing **extra-luminal lesions**
- **Excellent** in diagnosing the **cause** **of bowel obstruction**

❖ DISADVANTAGES:

- Radiation
- Some times need intra venous contrast (renal disease)
- Relatively expensive

INDICATIONS

- Abdominal pain
- To look for bowel obstruction cause
- To diagnose intra-abdominal masses
- Trauma

CONTRAINDICATIONS:

- Pregnancy
- No IV contrast in renal failure
- Unstable patients (severe trauma/ICU)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Where is this mass ? Inside or outside the bowel loops?

It is **OUTSIDE** the bowel and causing mass effect.

MRI

ADVANTAGES:

- Relatively safe in pregnancy (no radiation)
- Give much more soft tissue details
- Excellent in diagnosing abdominal solid organ lesion: liver, spleen, kidneys

DISADVANTAGES:

- Expensive
- Long scanning time
- Sensitive to motion

INDICATIONS

- Abdominal **solid** **organ masses**
- Inflammatory bowel disease

CONTRAINDICATIONS:

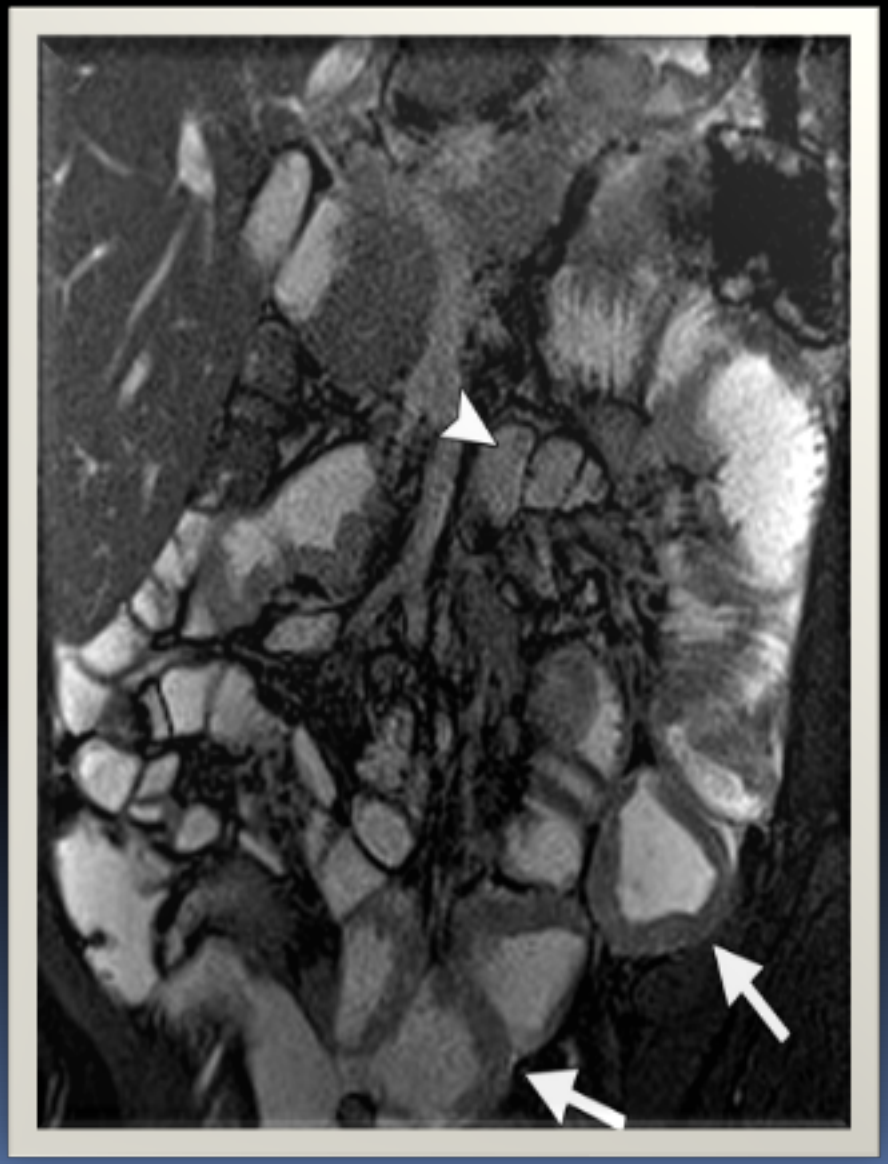
- uncooperative patients
- Early pregnancy (relative contraindication)
- No IV contrast renal failure (relative contraindication)

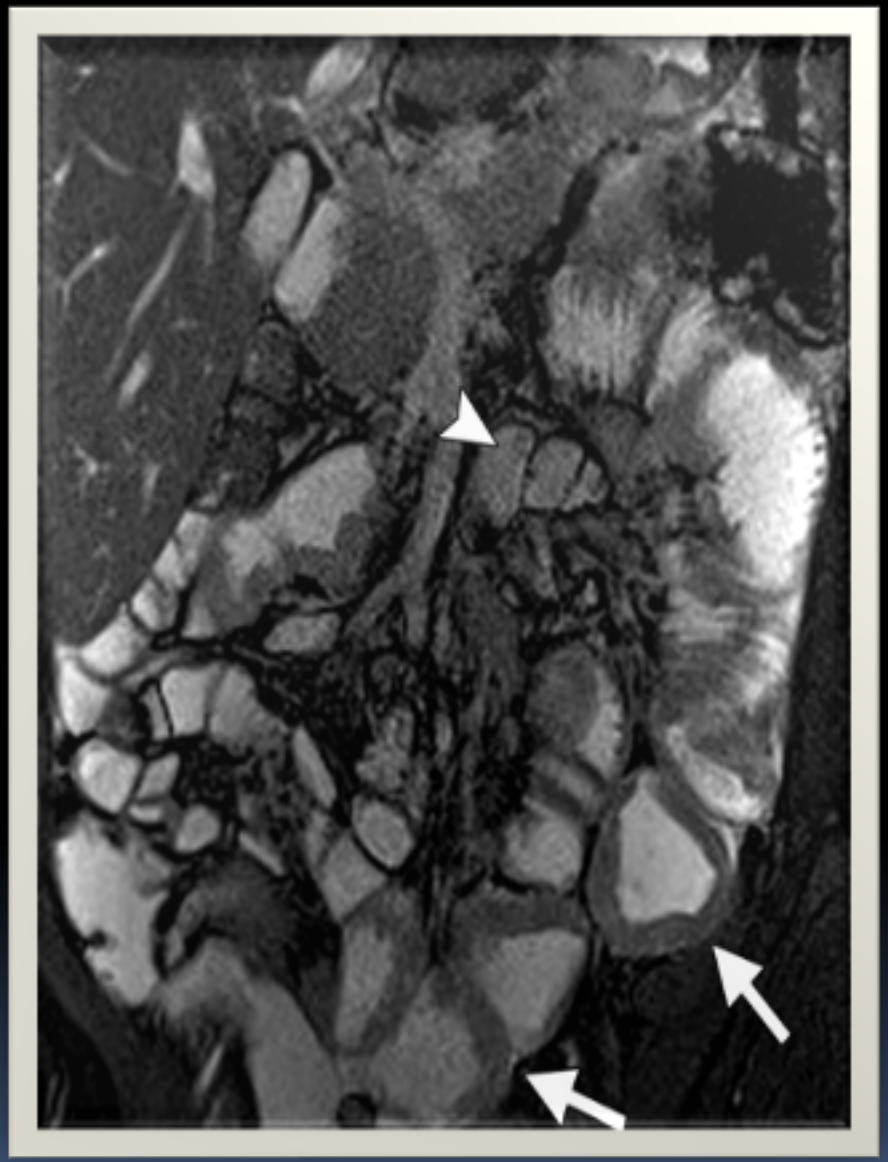

(b)

CT scan

MRI

Can you identify what is abnormal ?

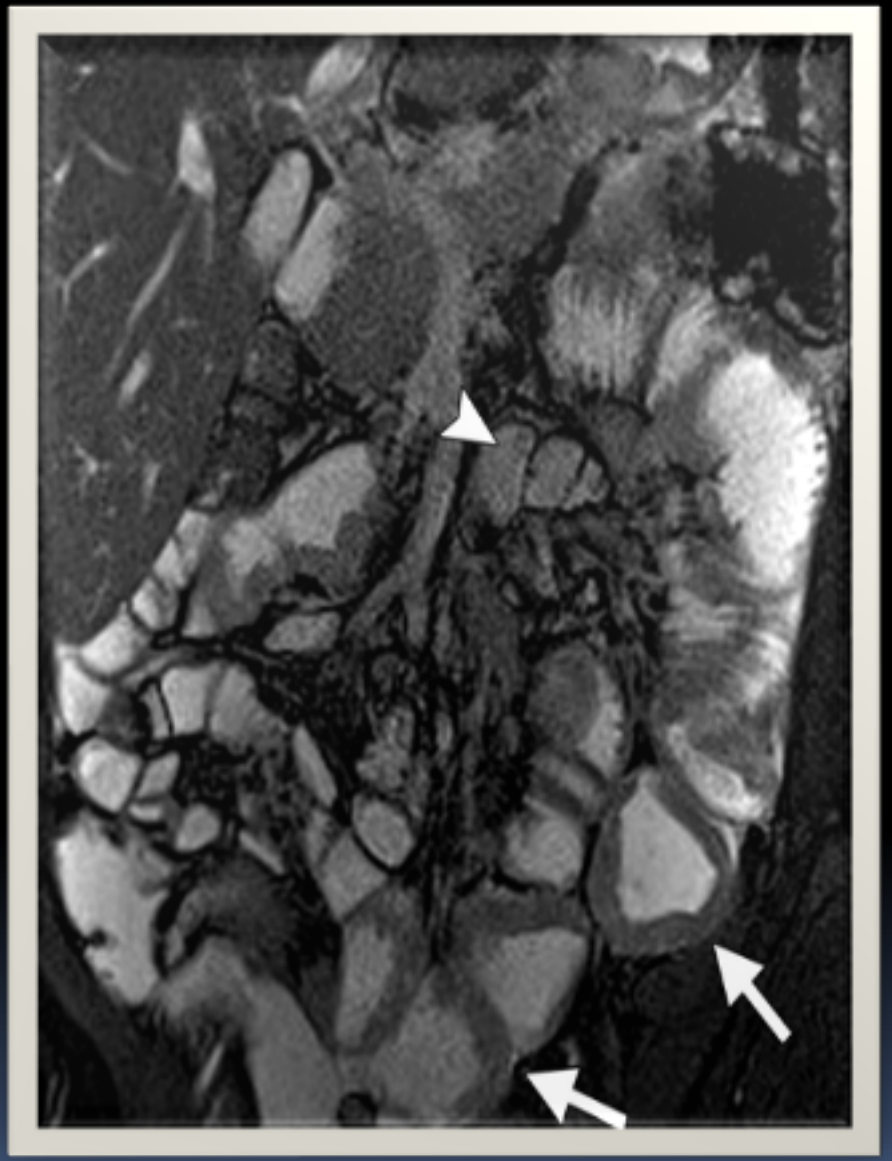





(b)

Inflammatory bowel disease

- Bowel wall thickening



THANK YOU