# 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**?

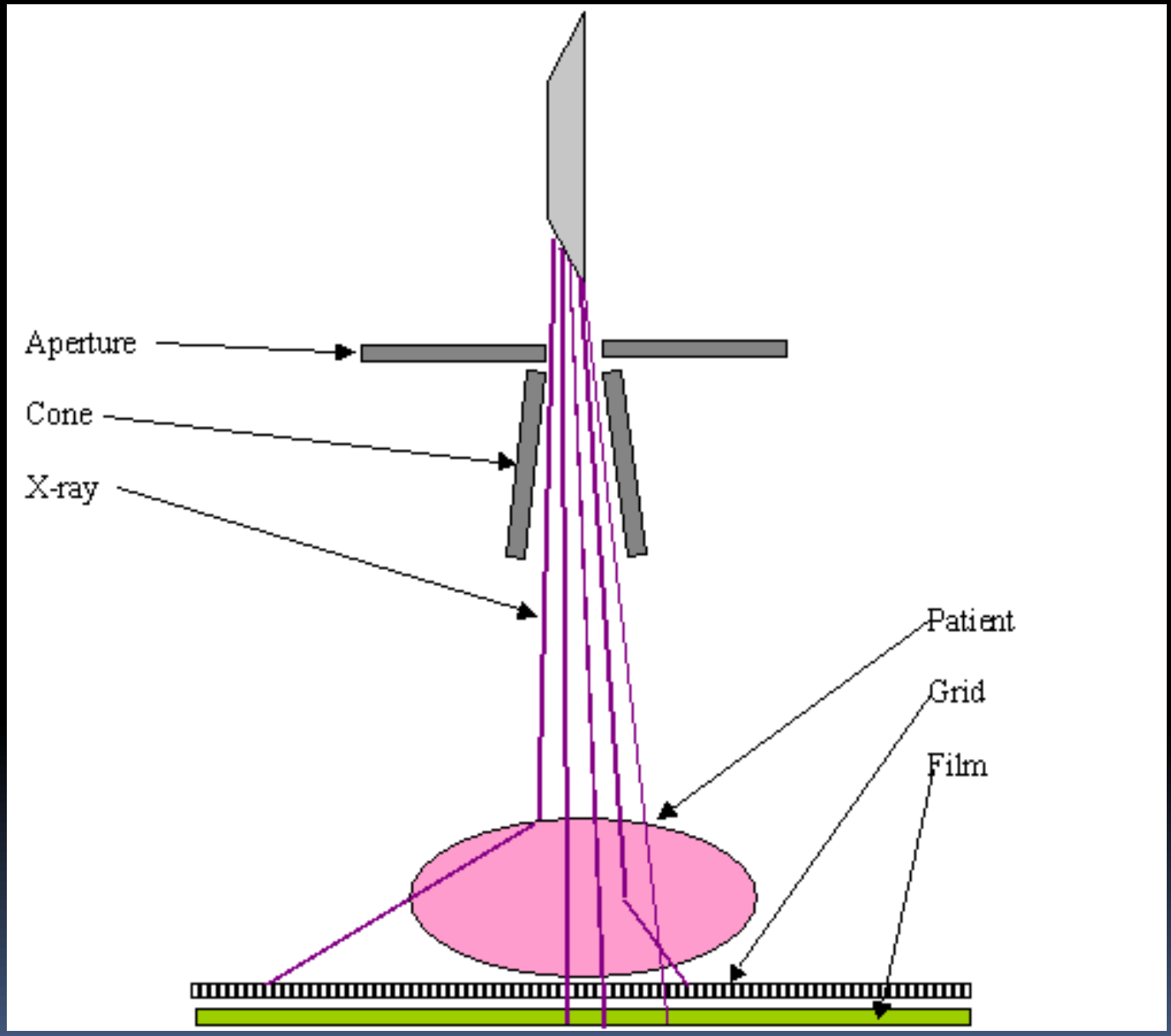
✓ **X-ray**
✓ **Fluoroscopy**
✓ **CT scan**
✓ **MRI**

?? 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

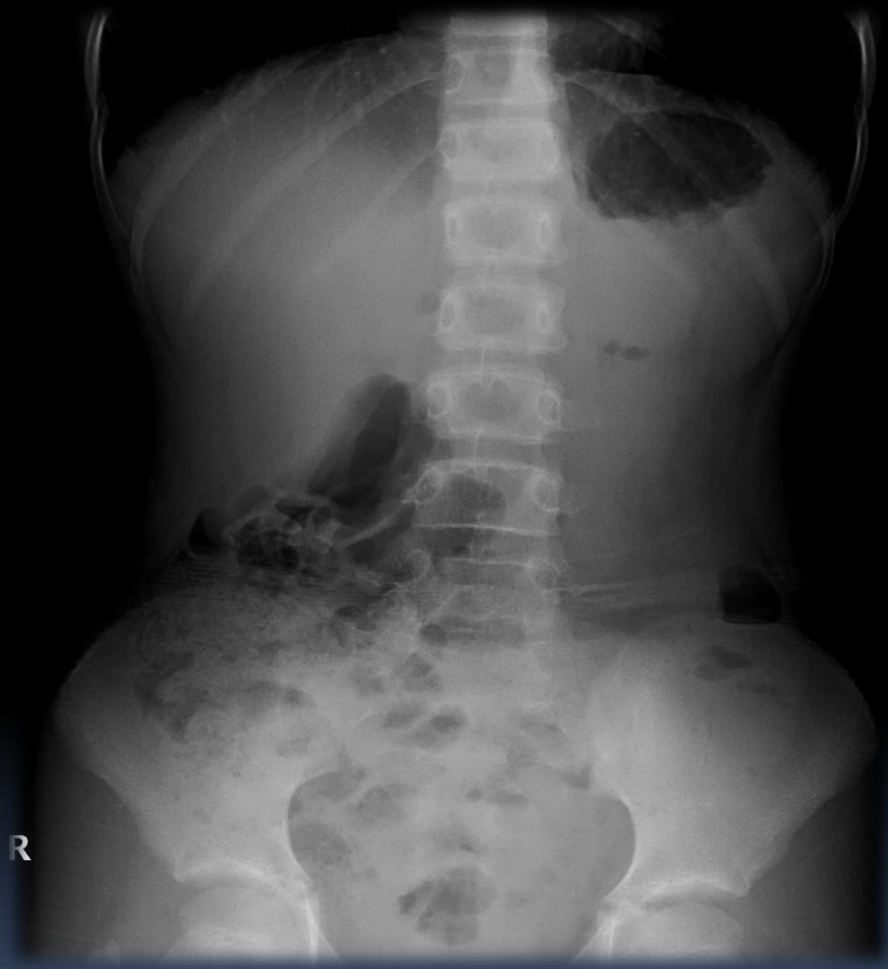
## INDICATIONS

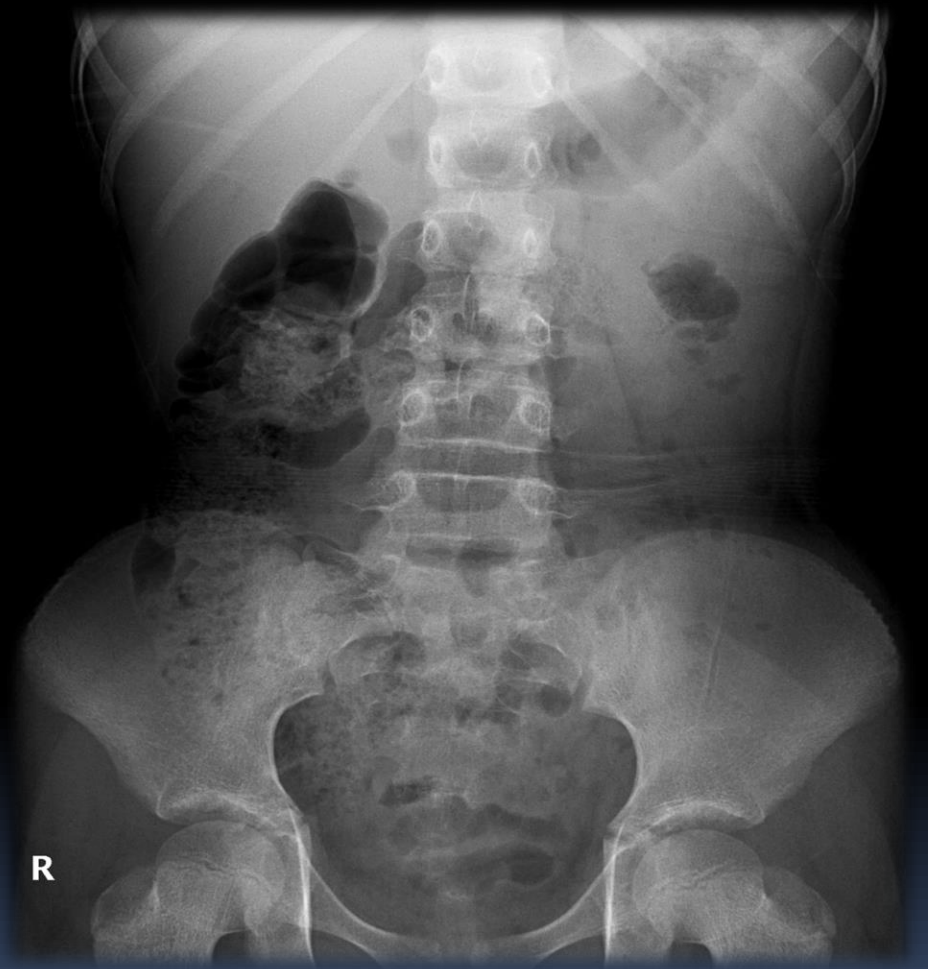
- Abdominal pain
- Bowel obstruction
- Stones
- Masses
- Trauma
- Others, foreign body, supportive lines.. Etc

## CONTRAINDICATIONS:

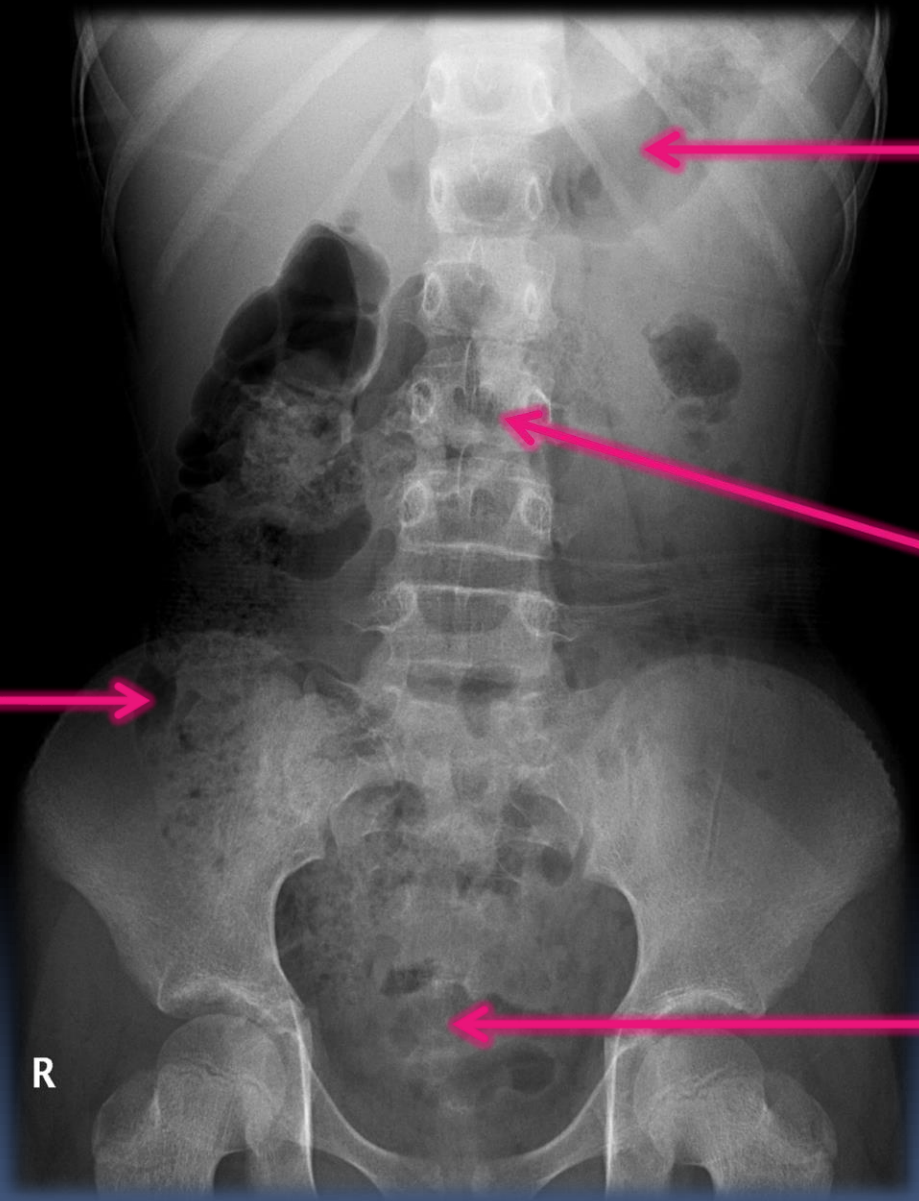
- pregnancy

# NORMAL ABDOMEN X-RAY

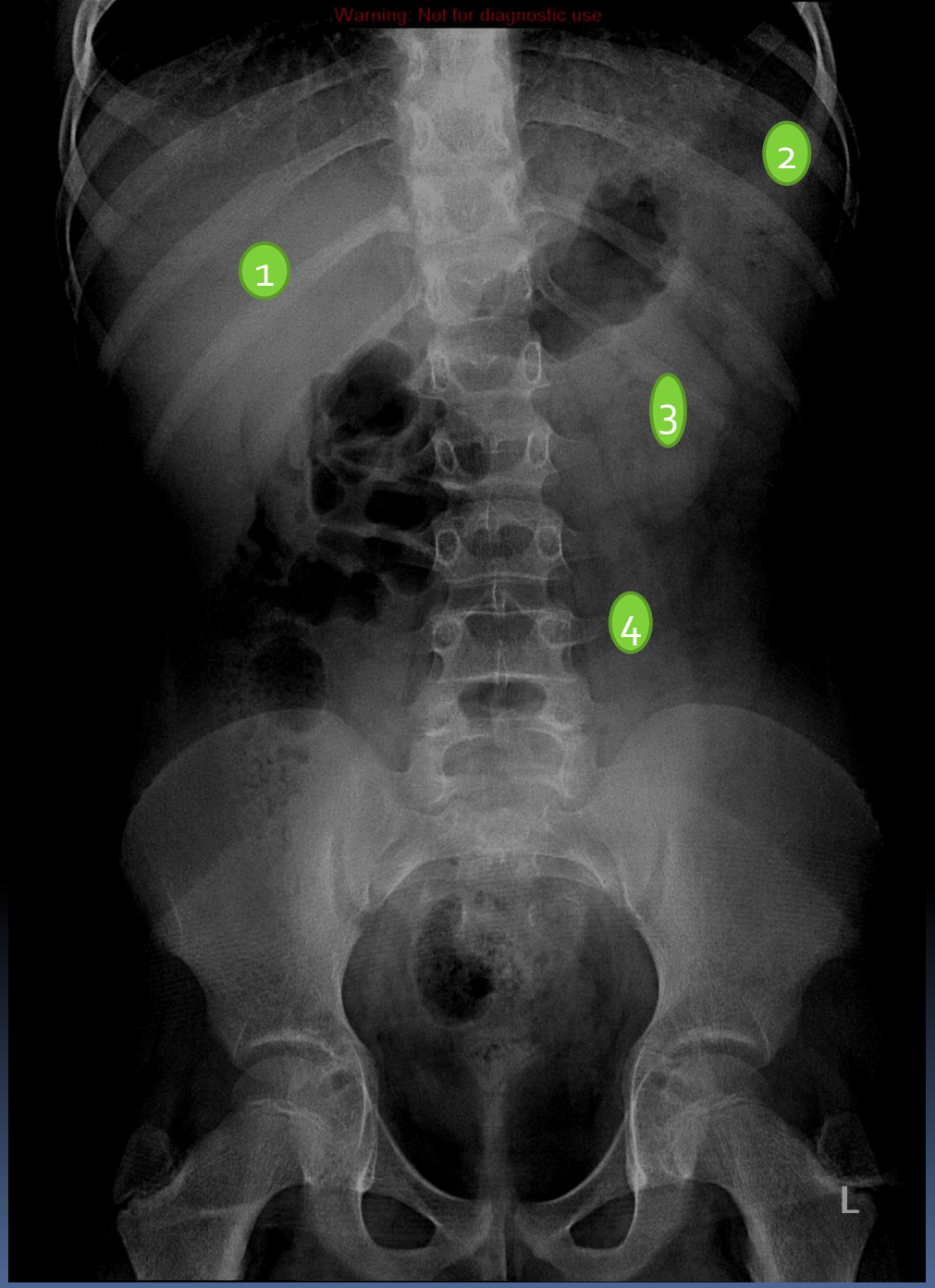



**Standing** **Supine**

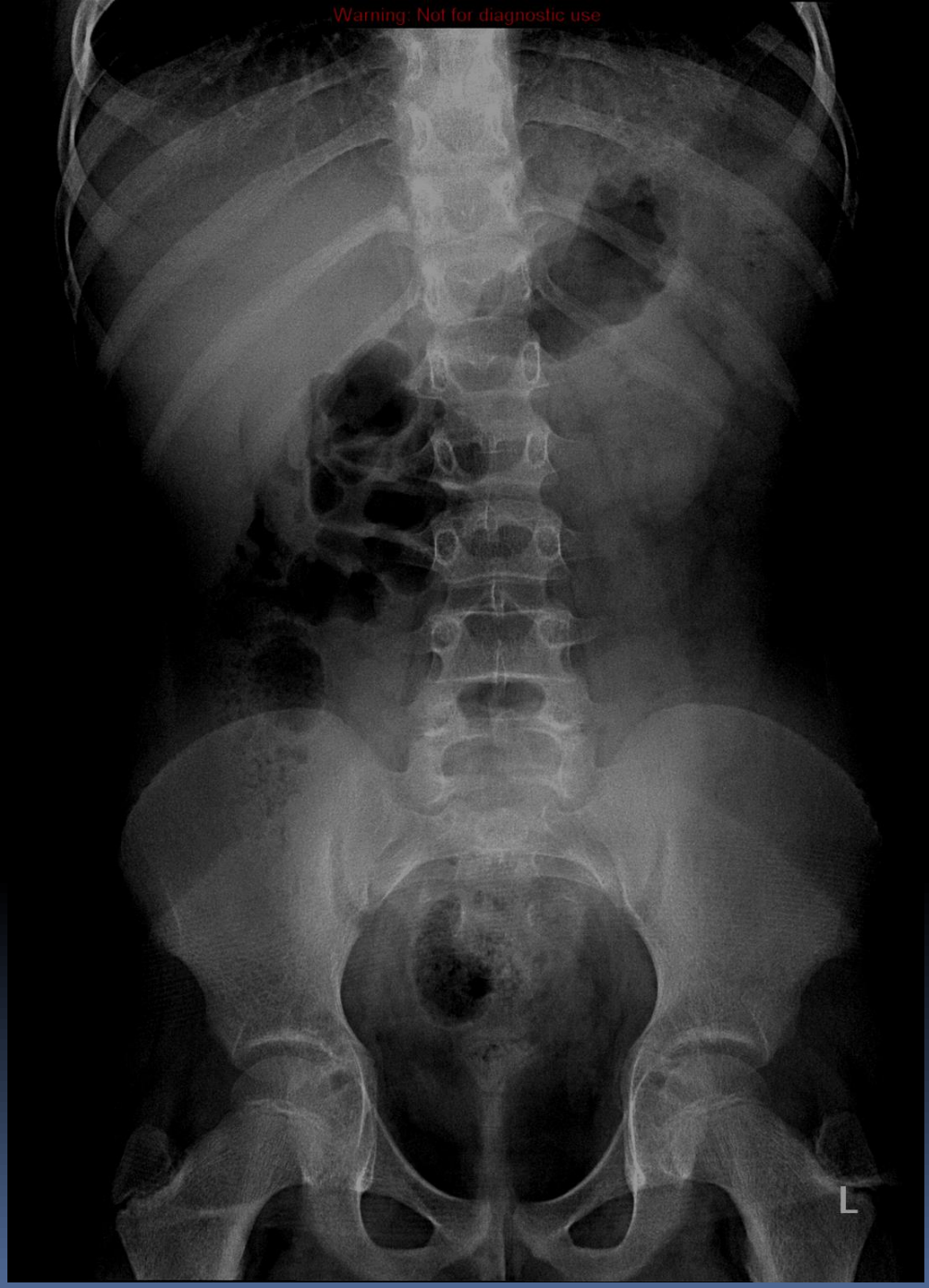

STOMACH
SMALL BOWEL
LARGE BOWEL
RECTUM
R

# Soft tissues



# Soft tissues

- Liver
- Spleen
- Kidneys
- Psoas muscles



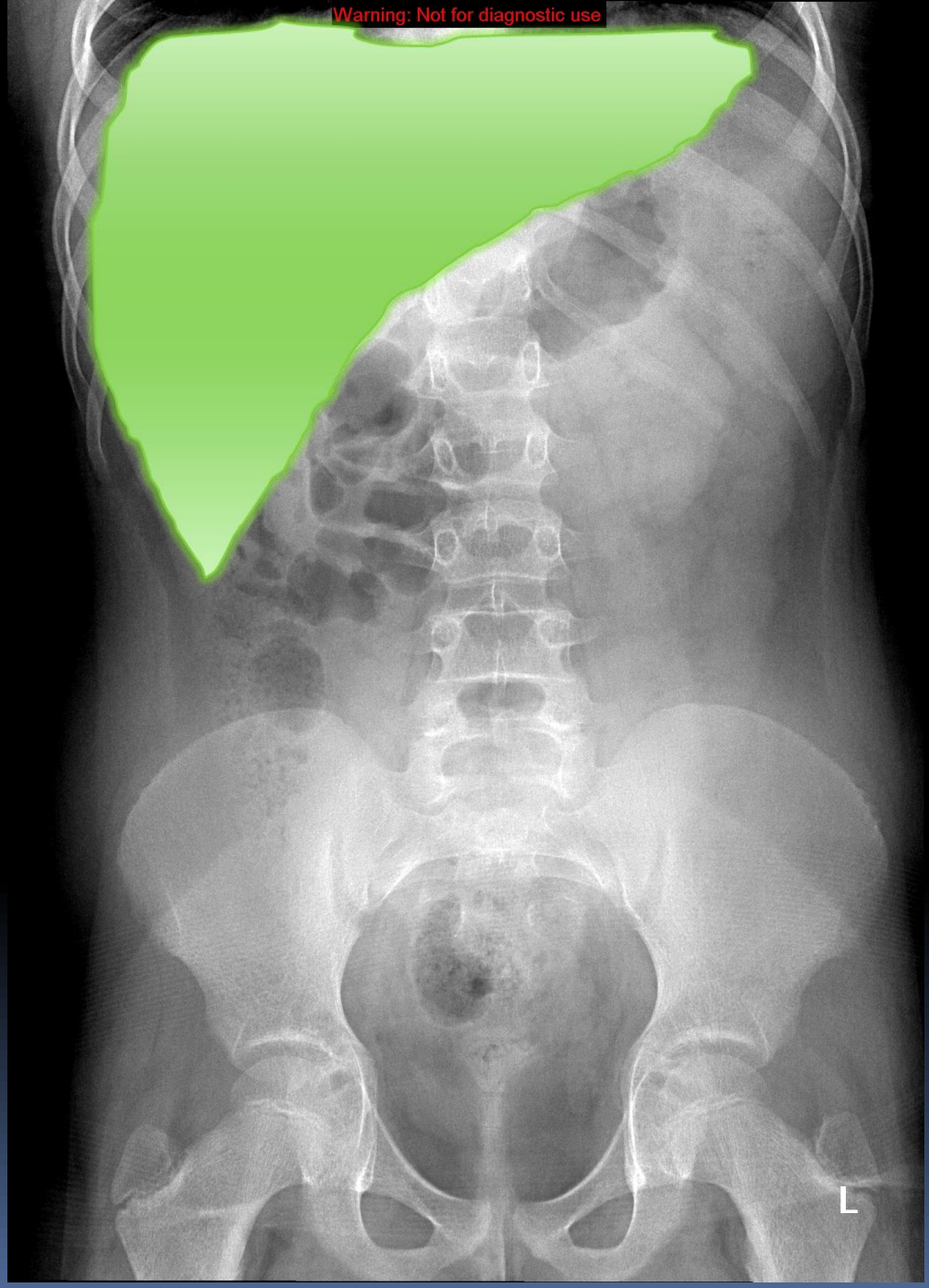
# Soft tissues

***Liver***

Spleen

Kidneys

Psoas muscles

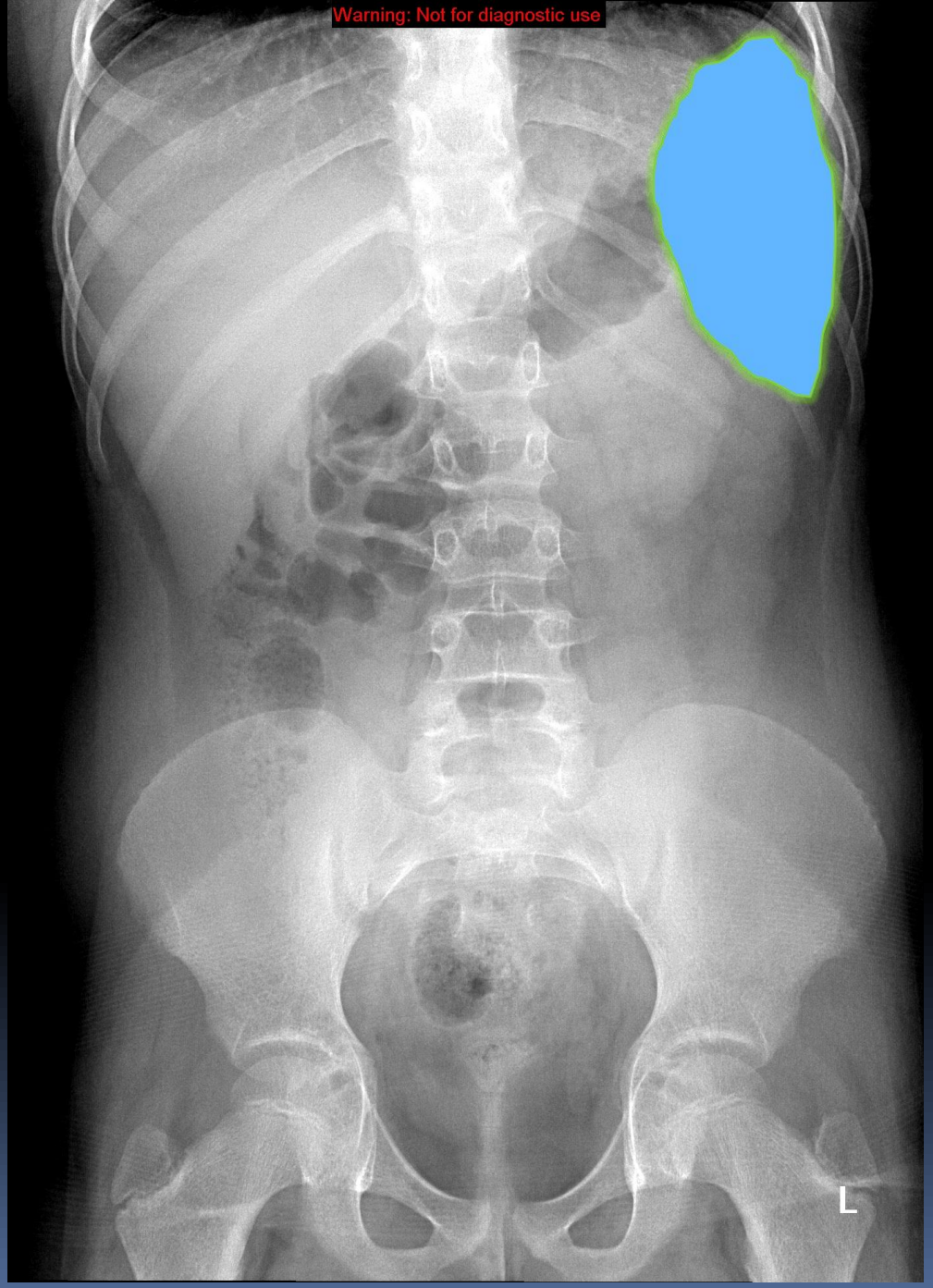


Liver

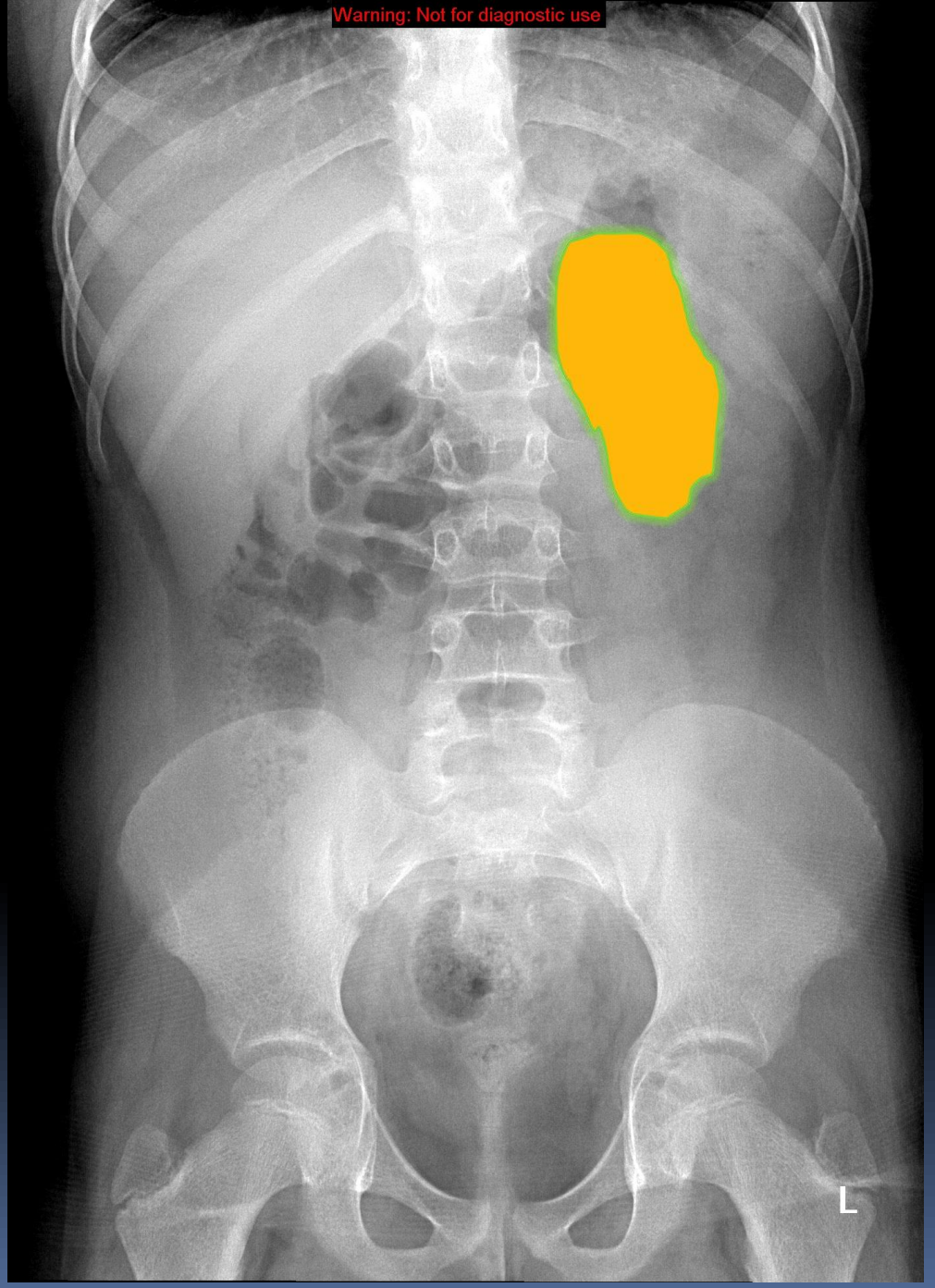
***Spleen***

Kidneys

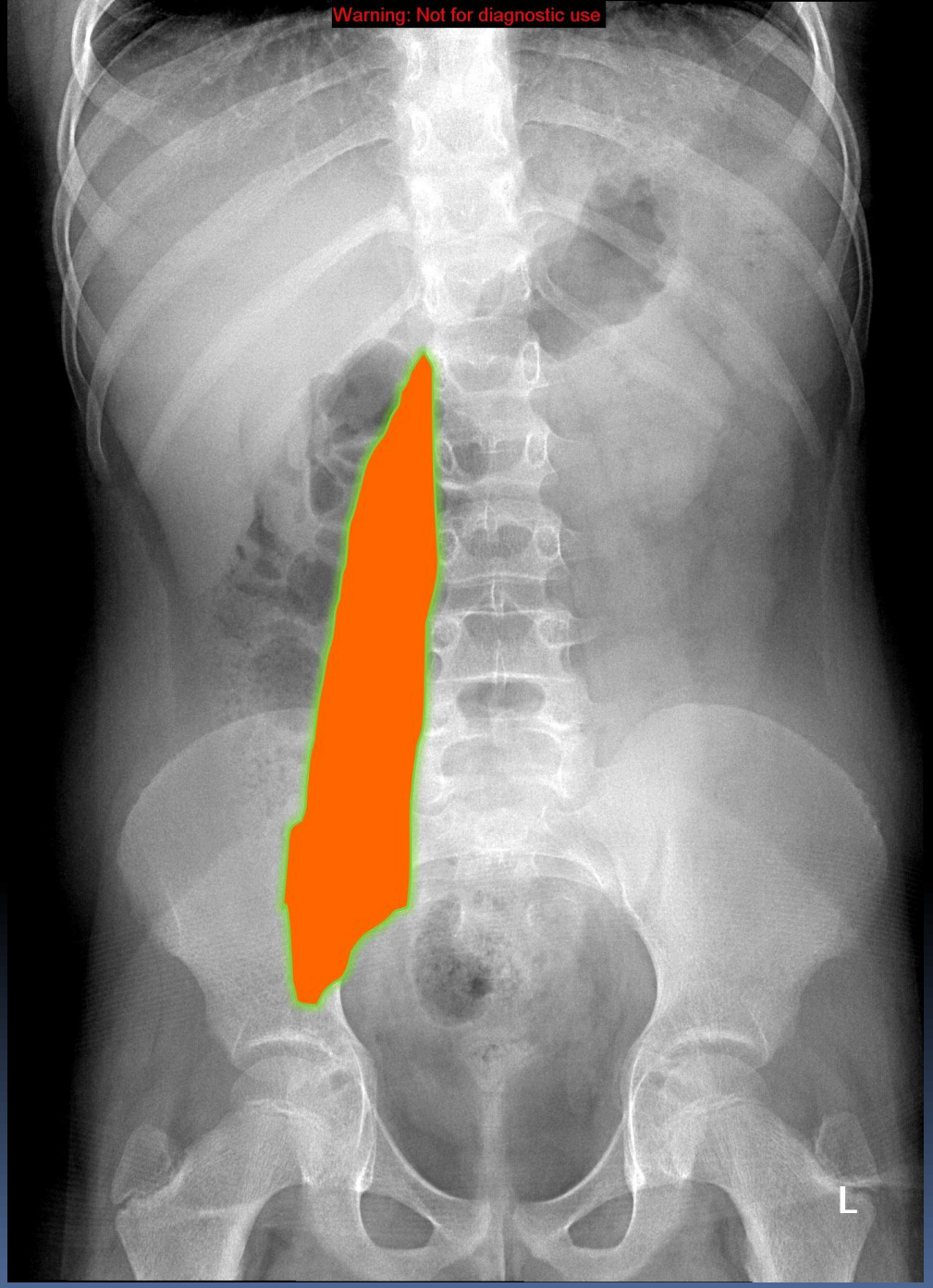
Psoas muscles



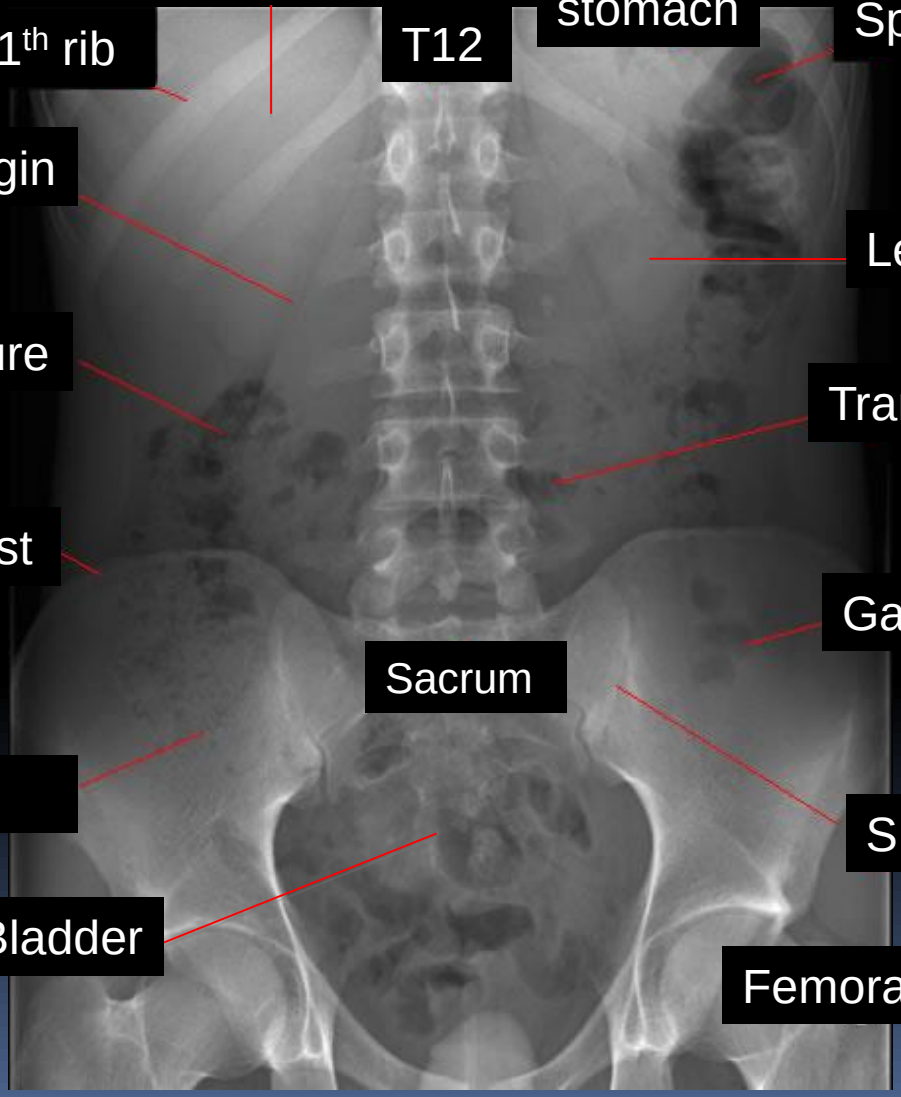
Liver
Spleen
***Kidney***
Psoas muscles



Liver
Spleen
Kidneys
***Psoas muscles***



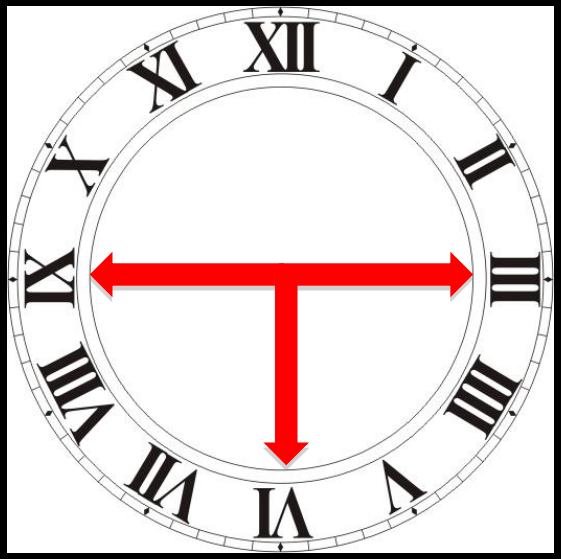
# Normal AXR


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

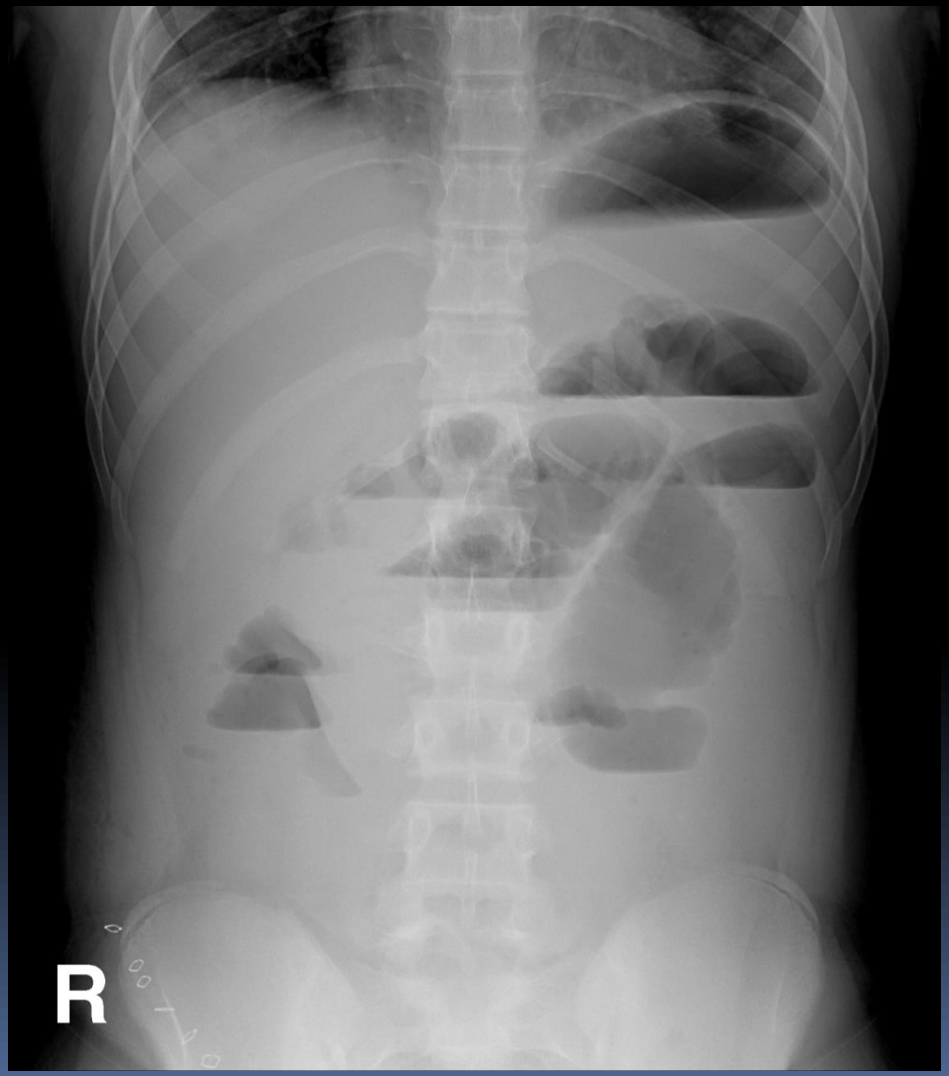
# 3, 6, 9 RULE



**Maximum Normal Diameter of bowel**

| | |
|---|---|
| Small bowel | 3cm |
| Large bowel | 6cm |
| Caecum | 9cm |

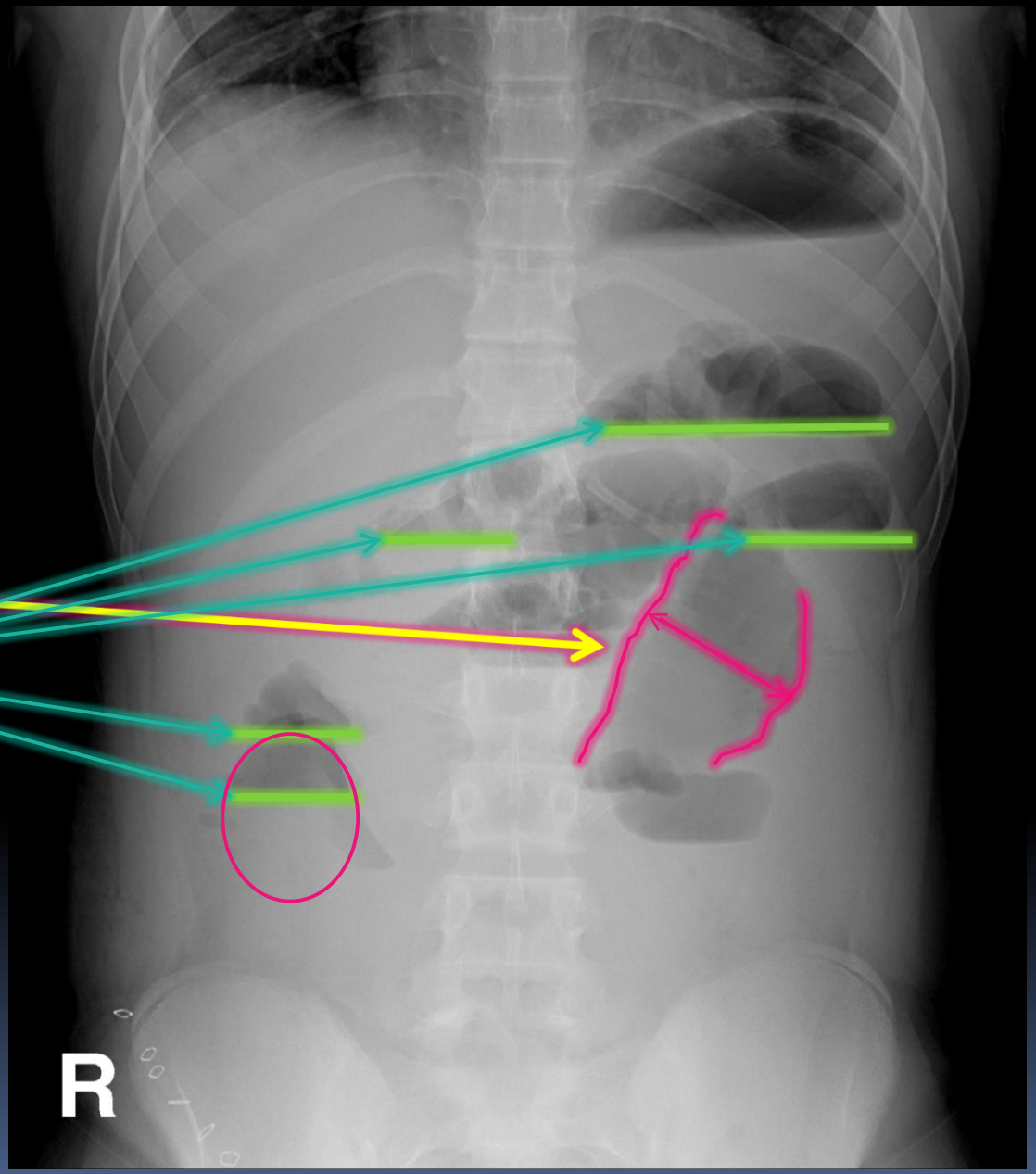
# Is this X ray normal or abnormal ? and Why?



# is ABNORMAL

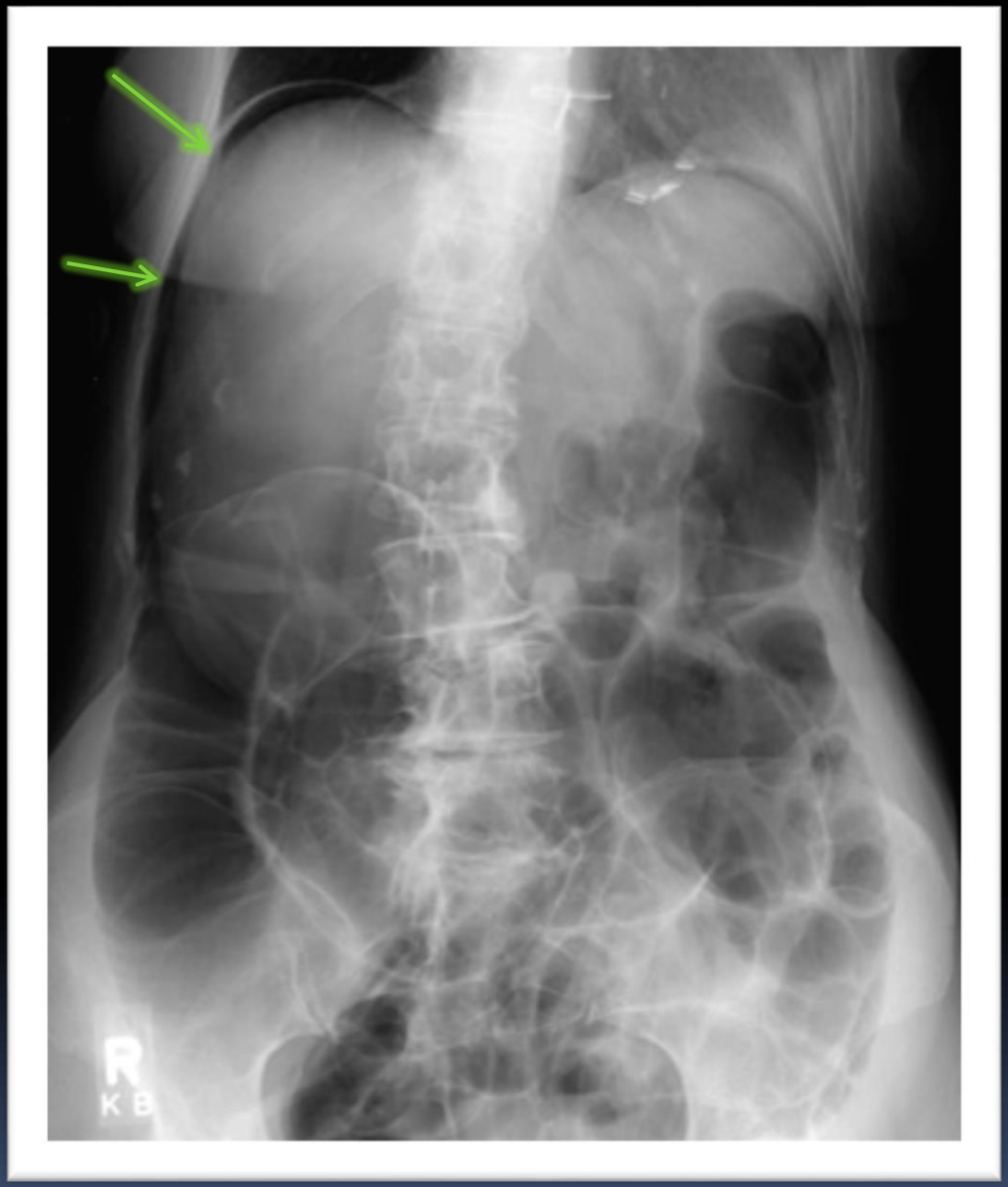
**OWEL OBSTRUCTION**

- 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

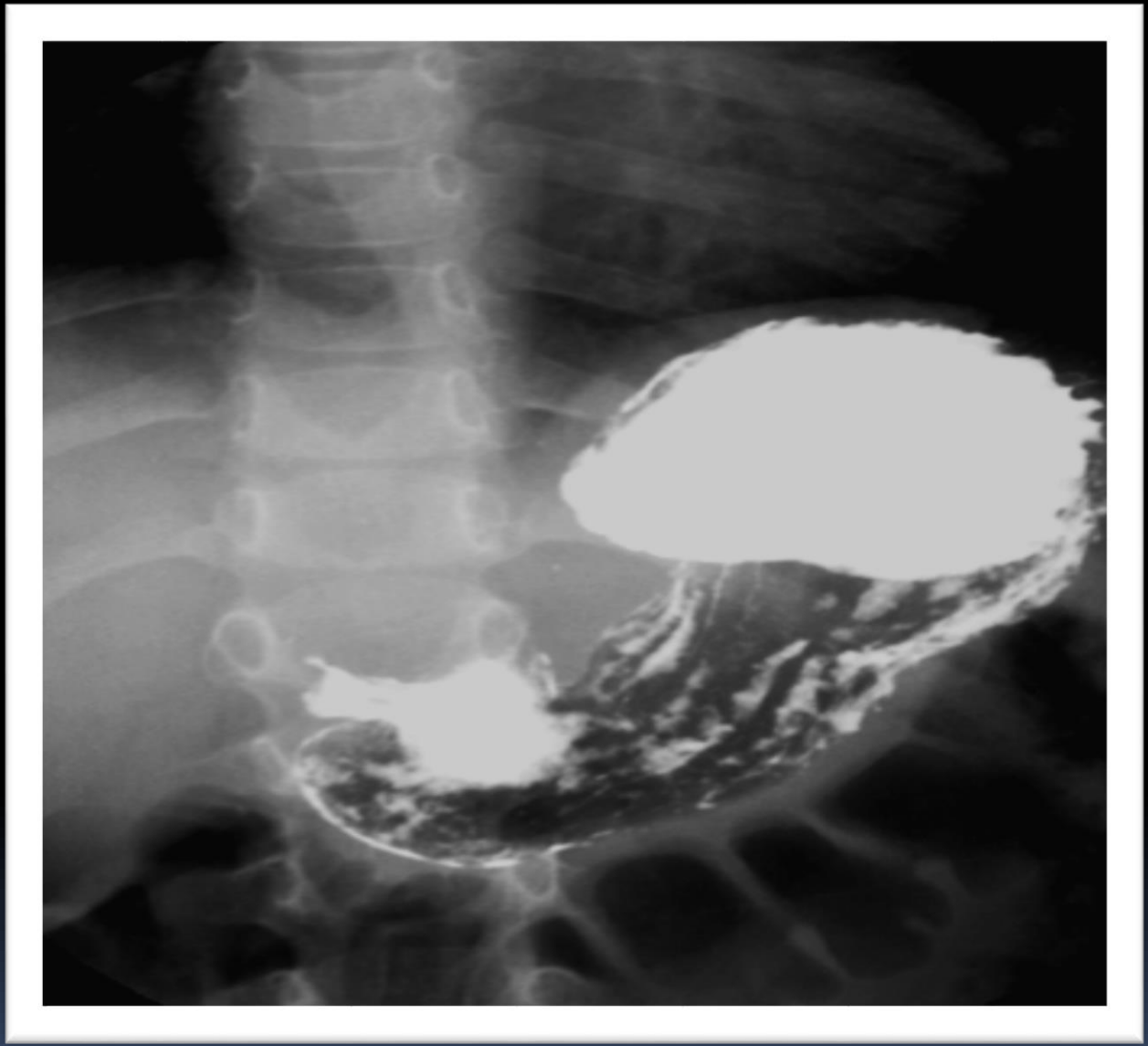
## ❖ INDICATIONS

- 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)

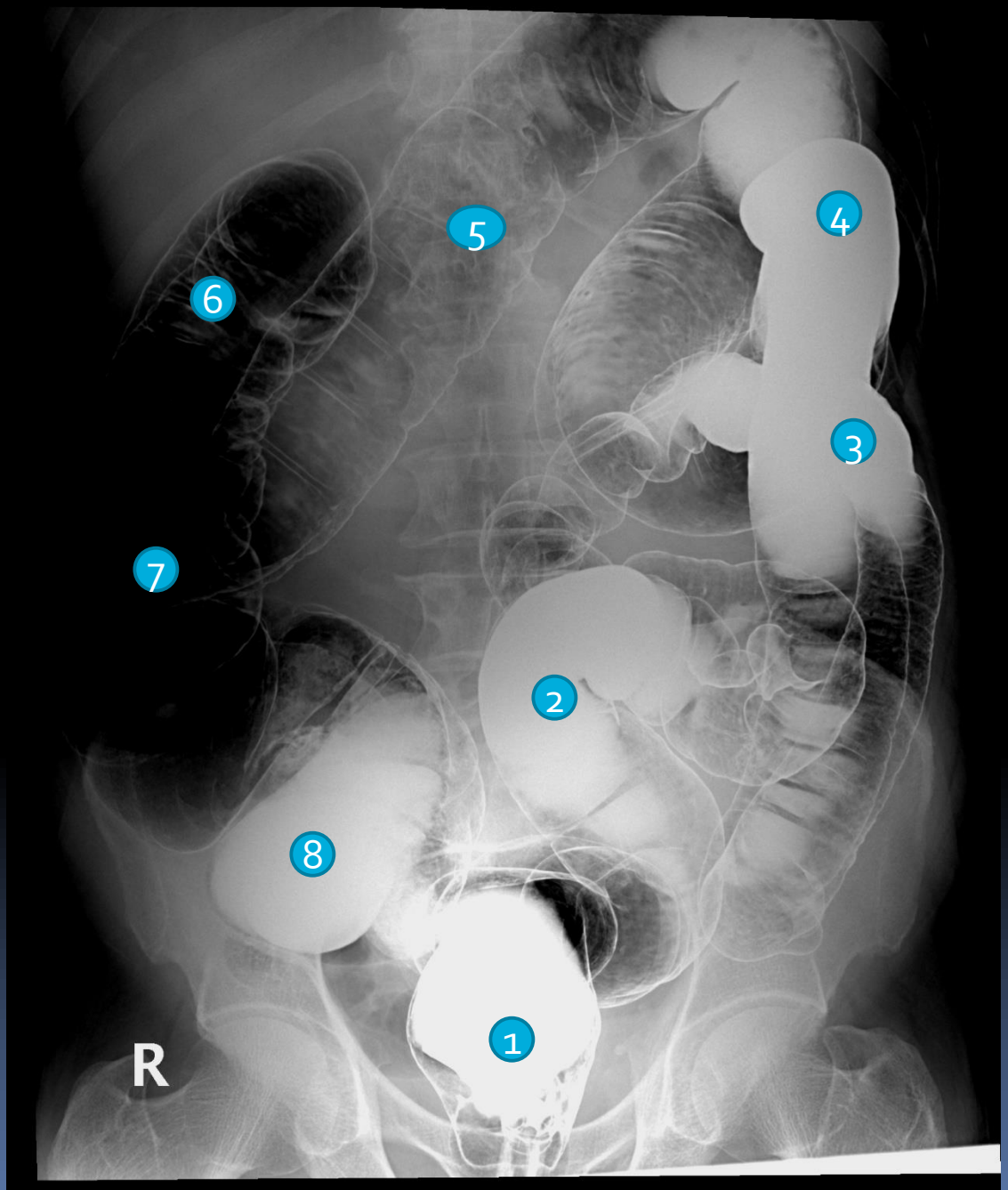
# BARIUM SWALLOW



# BARIUM MEAL

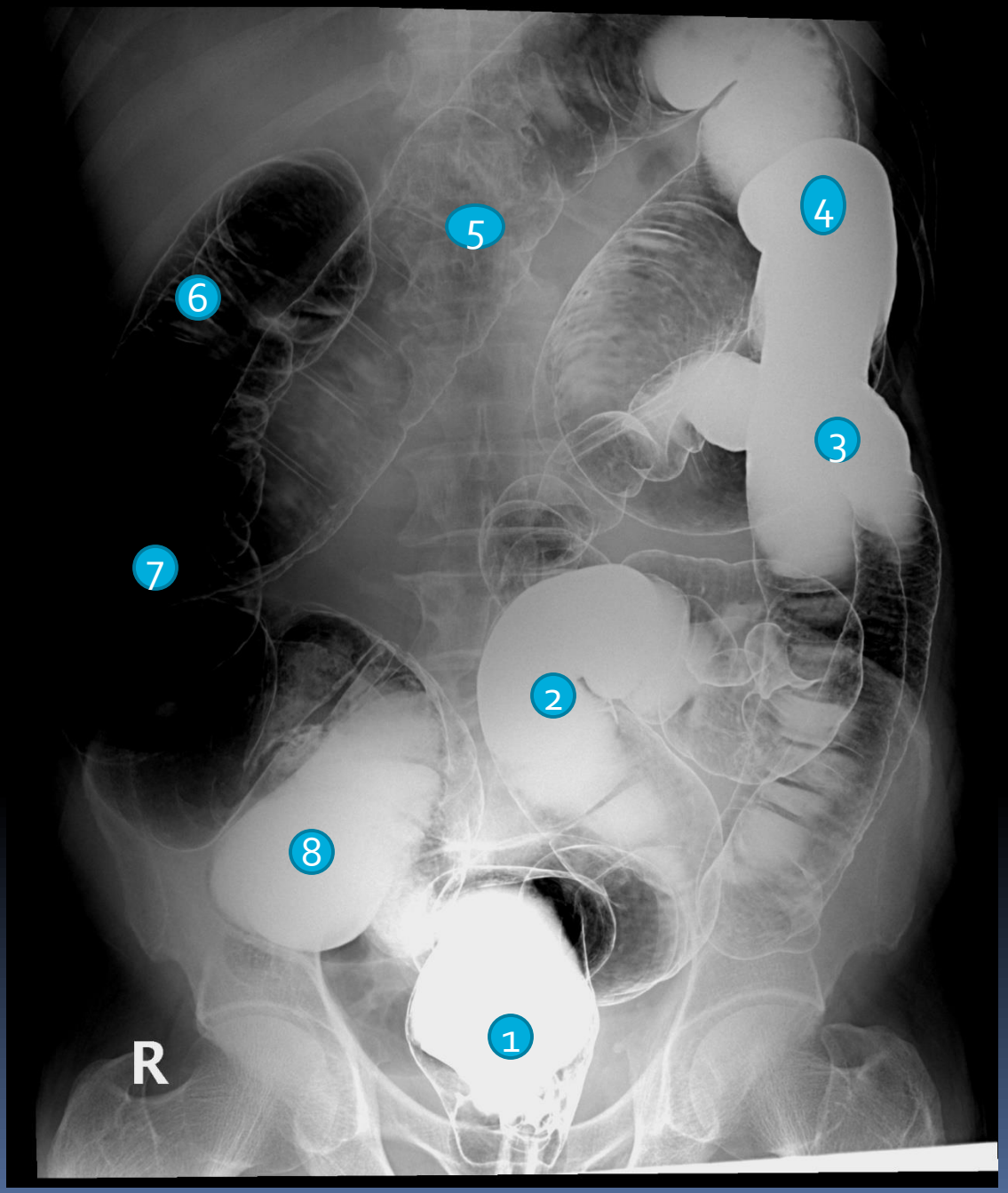

# BARIUM FOLLOW THROUGH


# BARIUM ENEMA

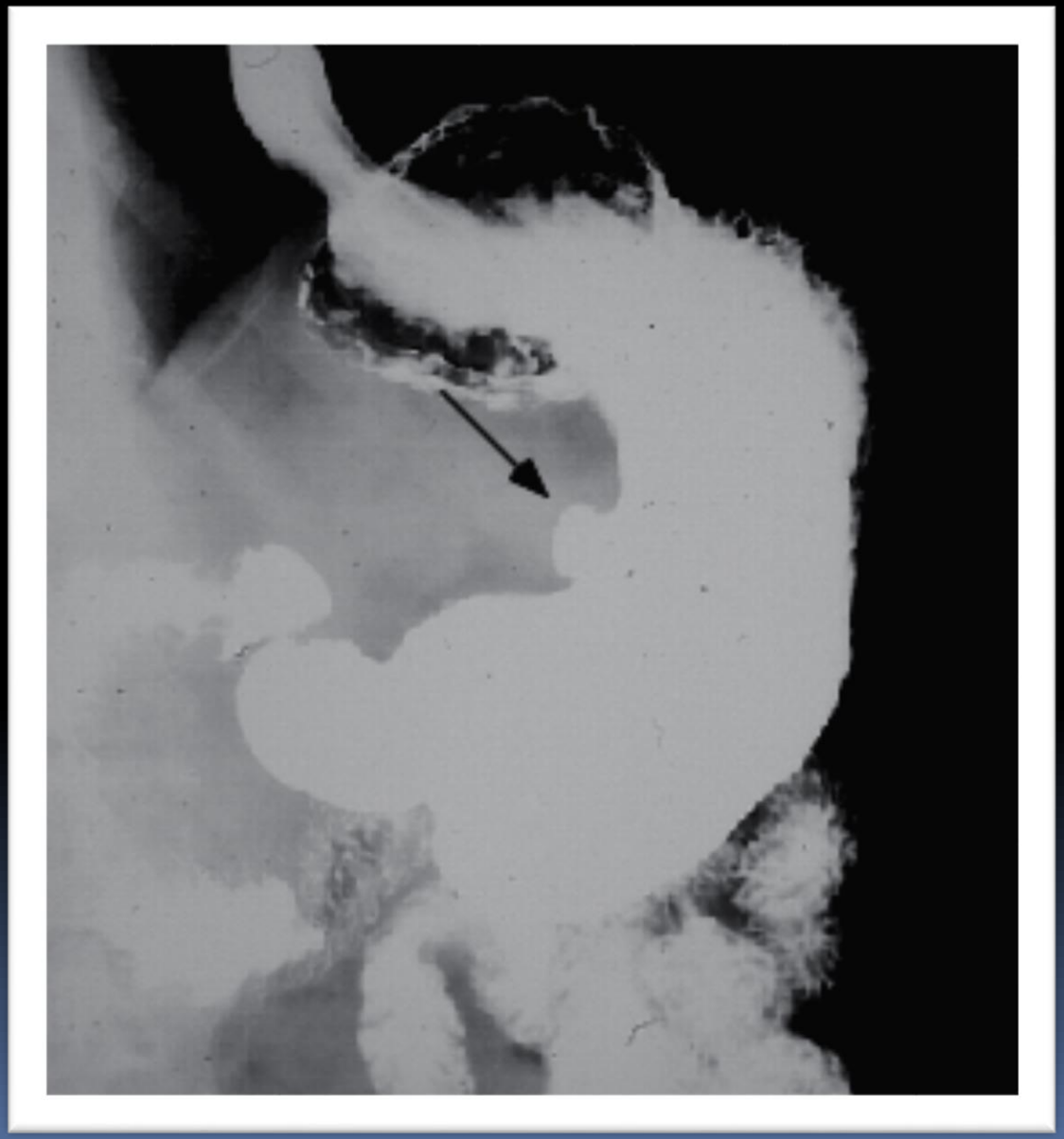


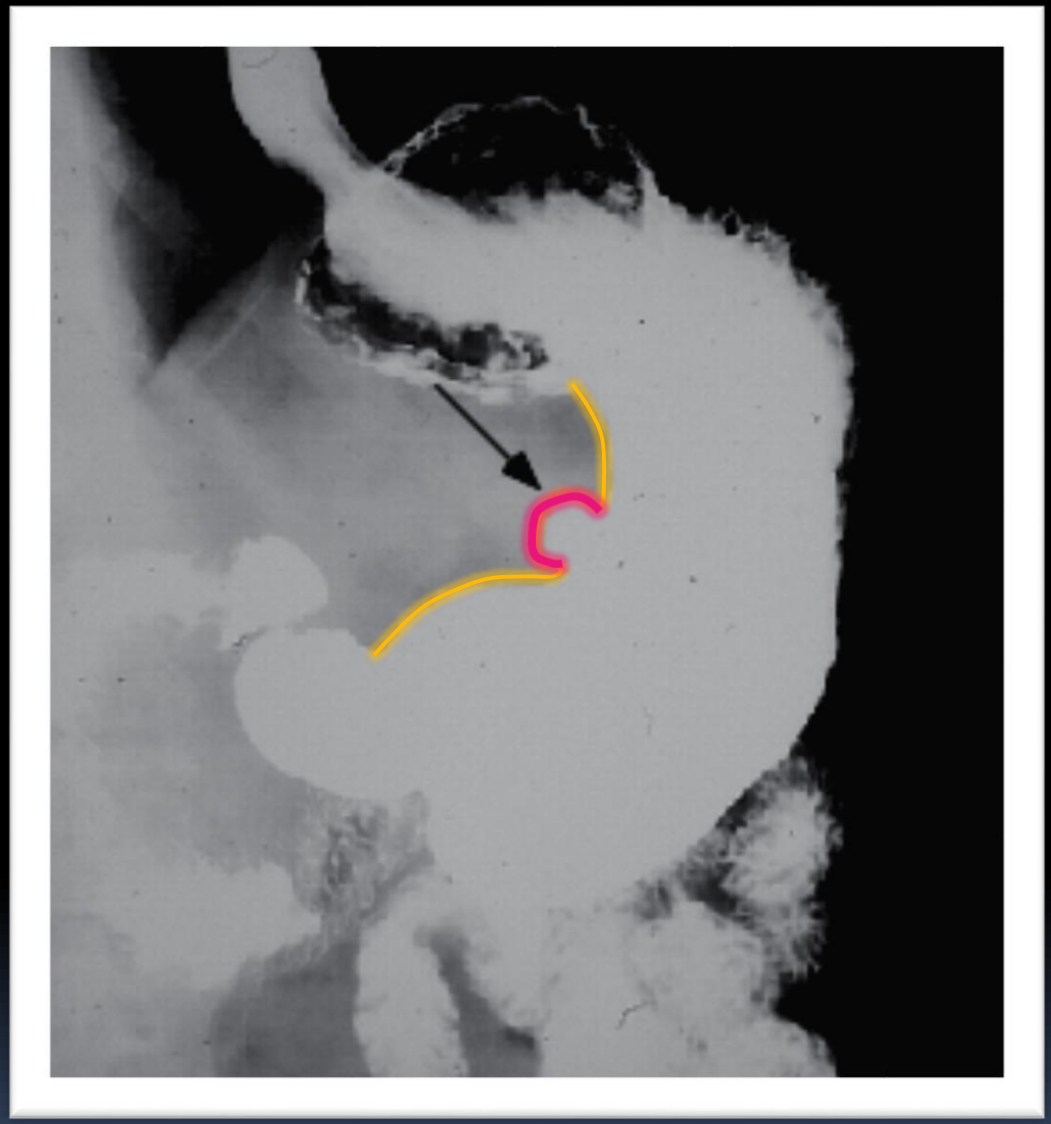

What type of this study?

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?



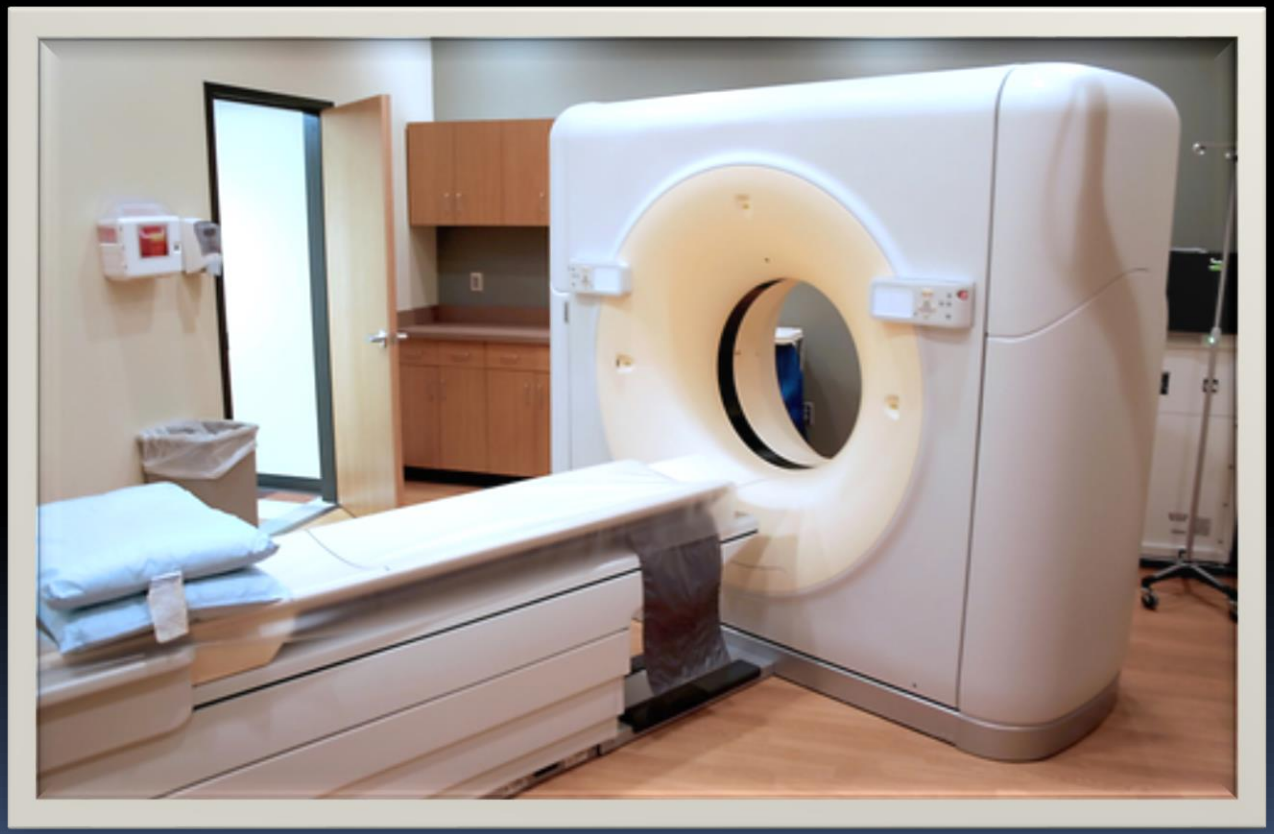


# Peptic ulcer disease

# 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:

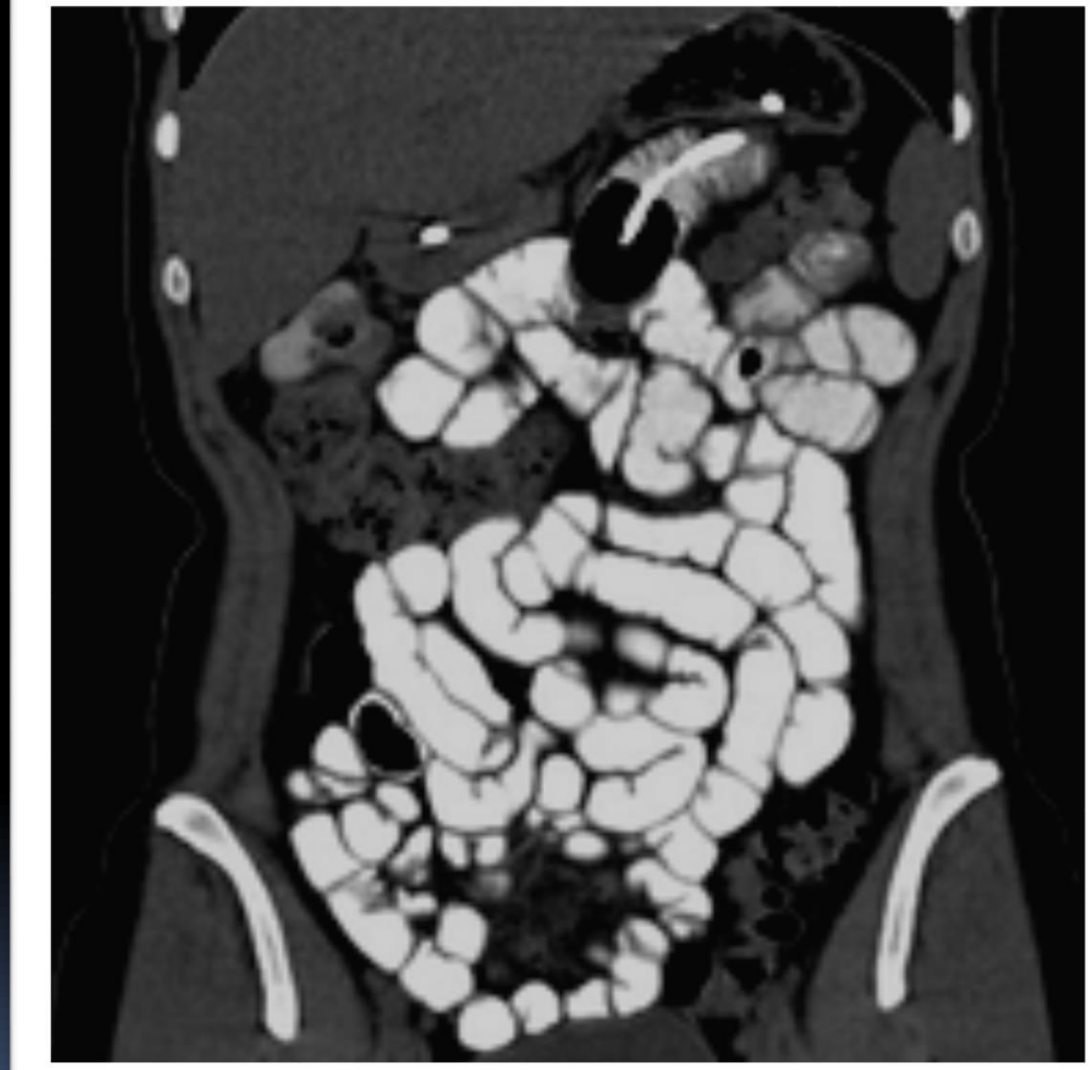
- Radiation
- Some times need intra venous contrast (renal disease)
- Relatively expensive

## 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:

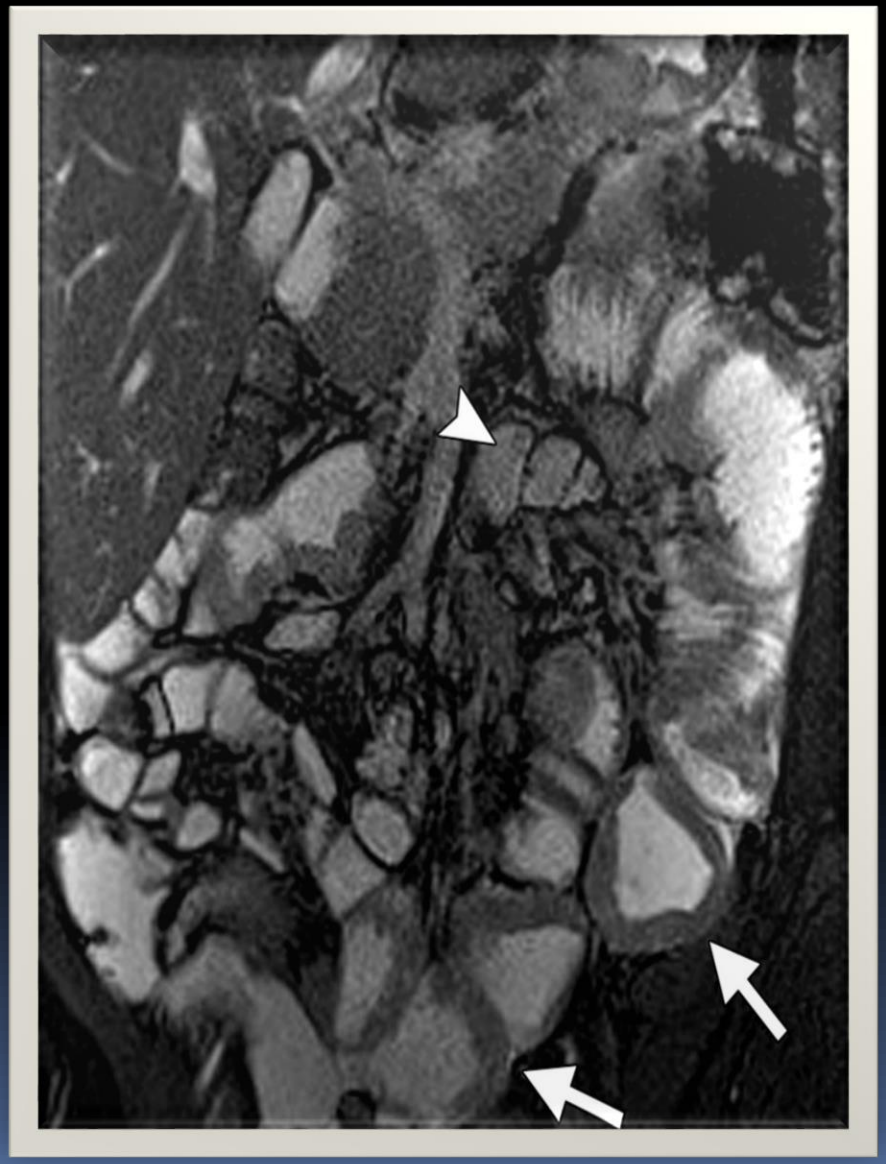
- uncooperative patients
- Early pregnancy (relative contraindication)
- No IV contrast renal failure (relative contraindication)


(b)

CT scan


MRI

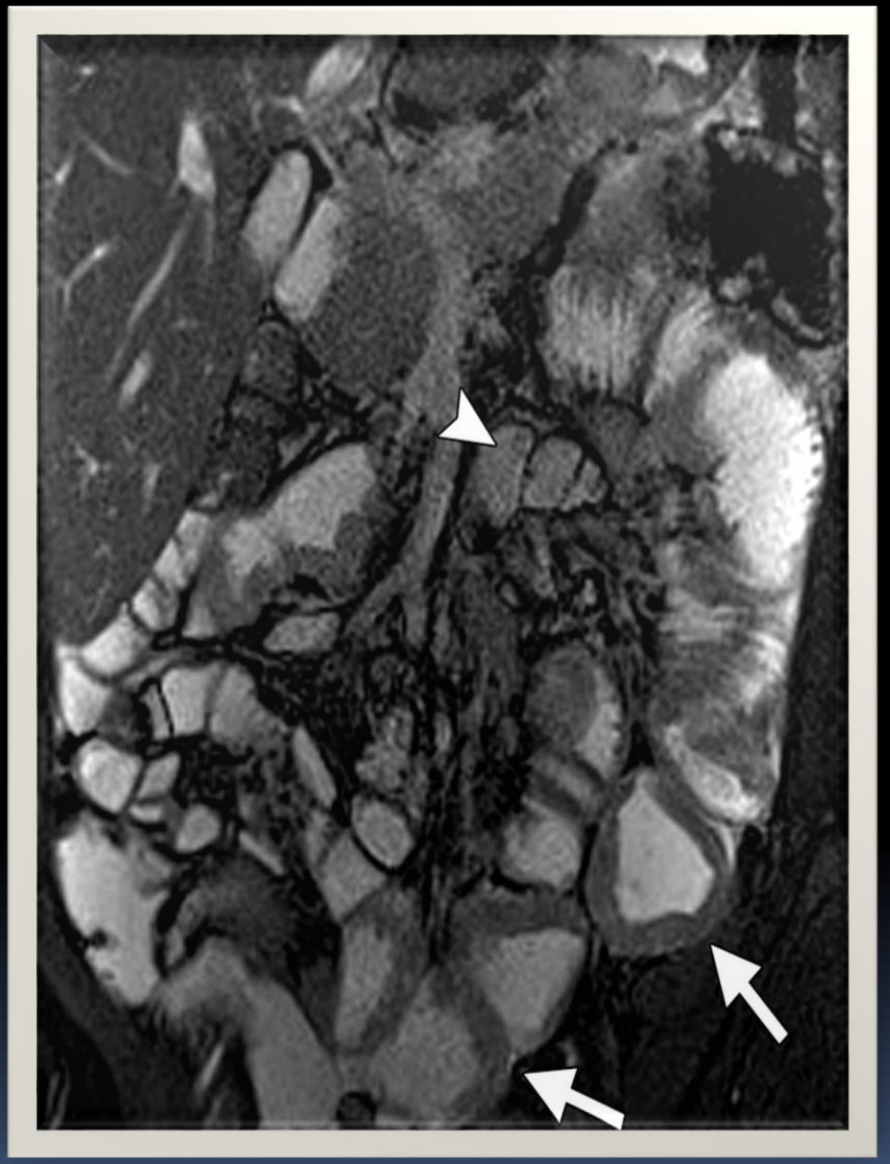
# Can you identify what is abnormal ?




(b)

## Inflammatory bowel disease

- Bowel wall thickening



# THANK YOU