

MED439
KING SAUD UNIVERSITY

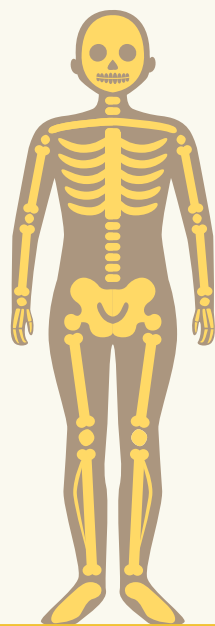
Revised & Approved



Radiology of the abdomen

-GNT BLOCK-

Make sure to read the notes slide as it's very important!!



Color index:

Black: Main text

Red: Important

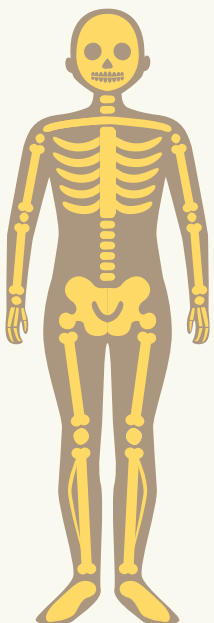
Yellow: Drs notes

Gray: Extra

Objectives

By the end of this lecture you should know:

1. To know radiology modalities used in abdomen imaging mainly GI tract.
2. To know advantages and disadvantages of each modality
3. To know indications and contraindications of each modality
4. Overview on normal abdomen appearance and common pathologies including:
 - a. Pneumoperitoneum
 - b. Peptic ulcer
 - c. Bowel obstruction
 - d. Inflammatory bowel disease
 - e. Large bowel masses/malignancies



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Abdominal X Ray

Good radiological modalities in imaging the Abdomen mainly Stomach and Bowel loops include:

CT scan MRI Fluoroscopy X-rays

Abdominal X Ray

How it works:

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

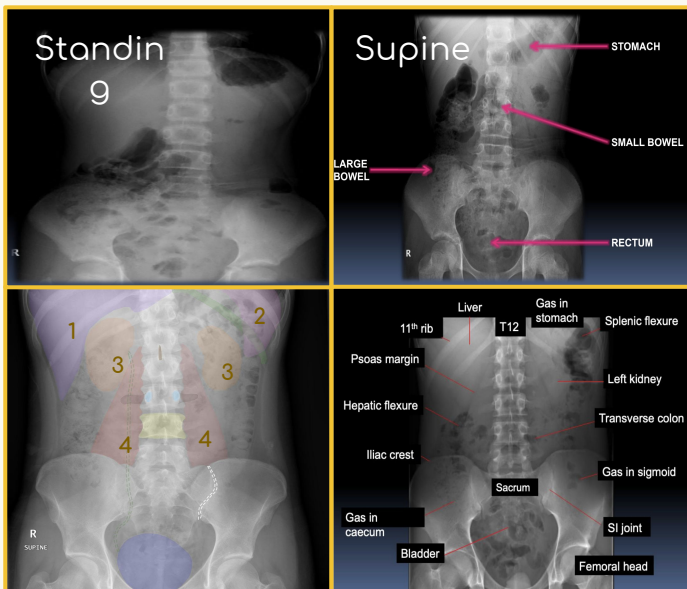
-Interpretation:

White → Bone and calcification

Grey → Soft tissue

Black → Air

-Normal Abdominal X Ray:



-Soft Tissue:

Liver (1) Spleen (2) Kidneys (3) Psoas muscles (4)

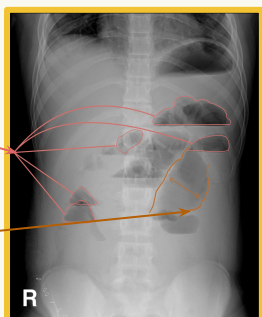
★ (3,6,9 RULE)⁷
Maximum Normal Diameter of bowel

Small bowel — 3 cm
Large bowel — 6 cm
Caecum — 9 cm



Advantages	Disadvantages
<ul style="list-style-type: none"> Widely available Cheap Excellent in diagnosing free air in the abdomen¹ Good in diagnosing bowel obstruction² & stones/calcification 	<ul style="list-style-type: none"> Radiation Poor soft tissue details
Indications	Contraindications
<ul style="list-style-type: none"> Abdominal pain³⁺⁴ Bowel (Intestinal) obstruction⁵ Stones Masses Trauma Others, foreign body, Supportines lines.. etc 	<ul style="list-style-type: none"> Pregnancy
Normal X-ray findings	
<ul style="list-style-type: none"> Stomach: <ul style="list-style-type: none"> There is Almost always air in the stomach Small bowel: <ul style="list-style-type: none"> Usually small amount of air in 2 or 3 loops Large bowel: <ul style="list-style-type: none"> There is almost always air in the rectum and sigmoid⁶ Varying amount of gas in the rest of large of bowel 	

★ -Abnormal Abdominal X Ray:



Diagnosis: Bowel obstruction

Sign "Findings":

- Dilated bowel loops
- Air fluid levels

Next step: CT scan to know the cause of the obstruction

(Bowel obstruction)



Air outside the bowel loops

Diagnosis: pneumoperitoneum

Sign "findings":

- Air in the diaphragm
- Free air "air outside the bowel loops"

Next step: CT to know the cause of the perforation

(Pneumoperitoneum "bowel perforation")

- Fluoroscopy (X Ray + contrast)



X -RAY

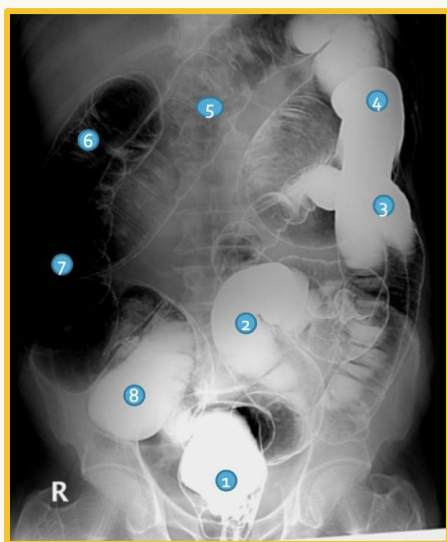


Oral Contrast

★ -Types:

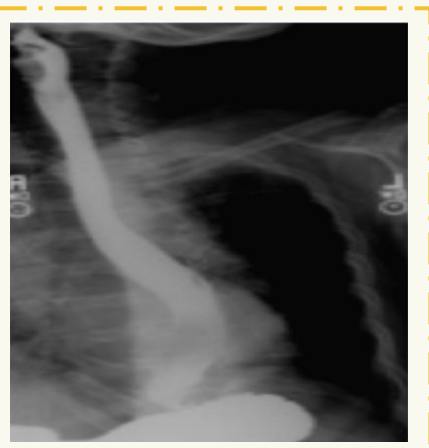
- Barium swallow → Esophagus mucosa
- Barium meal → Stomach mucosa
- Barium follow through → Small bowel mucosa
- Barium enema → Large bowel mucosa

-BARIUM ENEMA

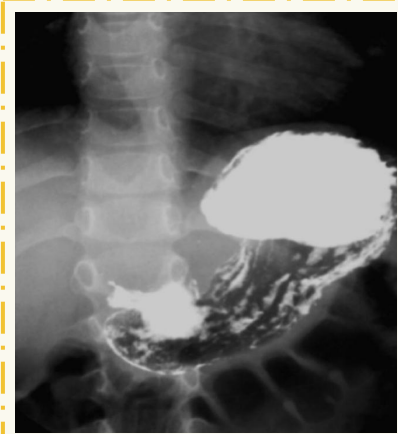


- 1.Rectum
- 2.Sigmoid colon
- 3.Descending colon
- 4.Splenic flexure
- 5.Transverse Colon
- 6.Hepatic flexure
- 7.Ascending colon
- 8.Cecum

Advantages	Disadvantages
<ul style="list-style-type: none"> Available. Relatively cheap. Excellent in evaluation the bowel <u>lumen</u> and <u>mucosa</u>. 	<ul style="list-style-type: none"> Radiation. Poor in evaluating extra luminal pathologies.
Indications	Contraindications
<ul style="list-style-type: none"> Assessing the <u>mucosal</u> outline. Abdominal pain. Gastro- esophageal reflux. Masses. Inflammatory bowel diseases. Post surgical, leak. 	<ul style="list-style-type: none"> Pregnancy. Bowel obstruction. Bowel perforation (with barium type of contrast).⁹



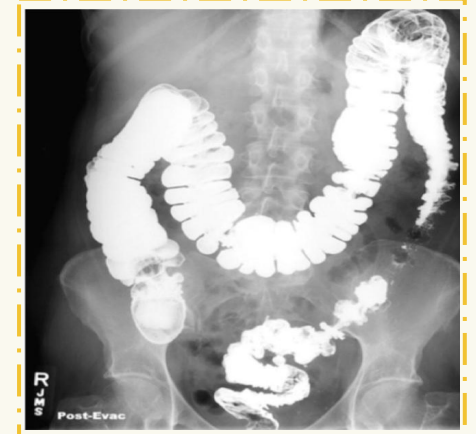
BARIUM SWALLOW



BARIUM MEAL

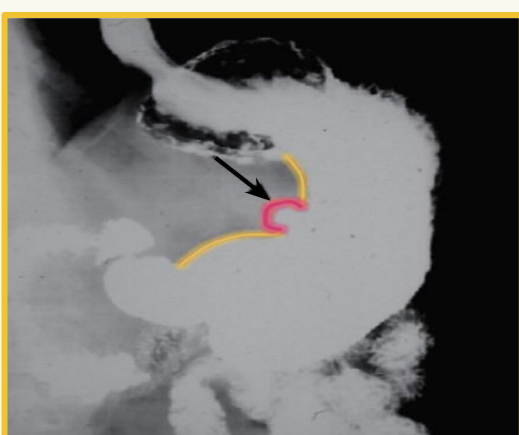


BARIUM FOLLOW THROUGH



BARIUM ENEMA

-Abnormality:



Peptic ulcer disease due to outpushing



(Colon mass/malignancy)

Apple core appearance

Diagnosis: Colon mass

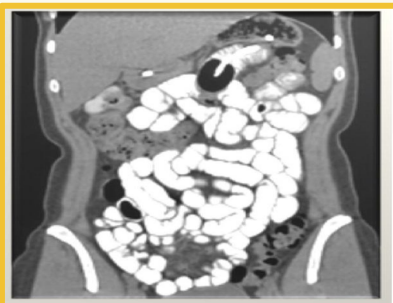
Sign "findings" : Apple core appearance

Next step: CT scan

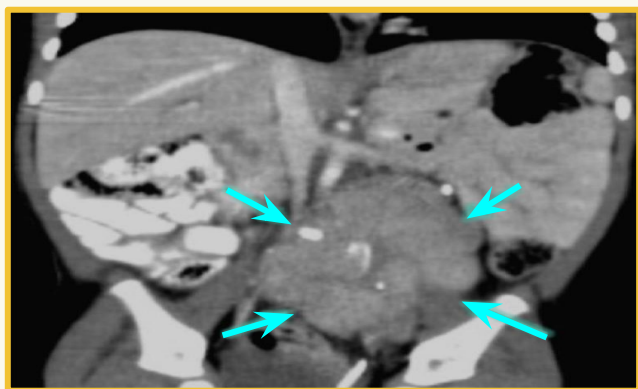
barium enema

• CT scan

-Normal



Abnormality

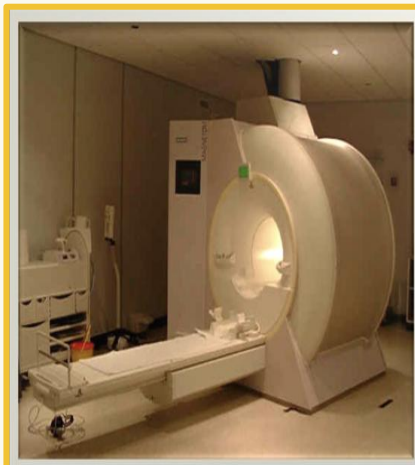


Mass **outside** the bowel, causing mass effect

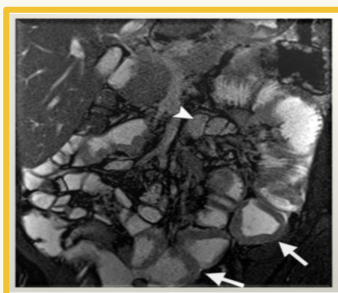
Advantages	Disadvantages
<ul style="list-style-type: none"> • Available. • Short scan time. • Much more soft tissue and bone details. • Excellent in diagnosing extra-luminal lesions. • Excellent in diagnosing the <u>Cause</u> of bowel obstruction by water gastropathy 	<ul style="list-style-type: none"> • Radiation. • Sometimes need intravenous contrast (renal disease). • Relatively expensive.
Indications	Contraindications
<ul style="list-style-type: none"> • To look for bowel obstruction <u>cause</u>. • To diagnose intra-abdominal masses. • Abdominal pain. • Trauma. 	<ul style="list-style-type: none"> • Pregnancy. • No IV contrast in renal failure. • Unstable patients (severe trauma/ICU).

• MRI

-Normal



★ Abnormality



Diagnosis: Inflammatory bowel disease

Sign "findings": Bowel wall thickening

(Inflammatory bowel disease)

Bowel wall thickening

Advantages	Disadvantages
<ul style="list-style-type: none"> • Relatively safe in pregnancy (no radiation) in 2nd and 3rd trimester. • Give much more soft tissue details. • Excellent in diagnosing abdominal solid organ lesion: liver, spleen, kidneys. 	<ul style="list-style-type: none"> • Expensive. • Long scanning time. • Sensitive to motion.
Indications	Contraindications
<ul style="list-style-type: none"> • Abdominal solid organ masses. • Inflammatory bowel disease. 	<ul style="list-style-type: none"> • uncooperative patients • Early pregnancy like 1st trimester (relative contraindication). • No IV contrast renal failure (relative contraindication).



Notes (Important!)

Female doctor: in the exam we will give you the sign and ask you the diagnosis or give you the diagnosis and ask you what's the sign in x-ray or asking what's next modality should we use after doing X-ray for a patient having bowel obstruction or perforation.

1. When the bowel is perforated, the air will go out of the abdomen so we can detect this **free air** by X-ray.
2. Bowel obstruction can be caused by cancer in the bowel "inside mass" or mass from outside like lymphoma and an X-ray is a good modality for diagnosis.
3. Abdominal pain could be caused by obstruction.
4. If any patient presented to the emergency with abdominal pain the first thing you have to do is abdominal X-ray "initial test not diagnostic".
5. Intestinal obstruction has a unique sign in X-ray which is **multiple air fluid levels**.
6. If we don't see air in the rectum, this is a secondary sign that indicates there's a possible bowel obstruction.
7. 3,6,9 Rule is very important in bowel obstructions, e.g. If it's more than 3 cm in small intestine that indicates there's intestinal obstruction ... etc.
8. Barium is contraindicated in perforation but the water soluble contrast can be used in case of perforation and obstruction.

MCQs

1-A 62 year old man presented to the emergency with severe abdominal pain and he couldn't pass stool for 4 days, they suspect a bowel obstruction which ONE of the following may appear as a sign in his X- ray findings

- | | | | |
|--------------------------|--------------------------|------------------------------|--------------------------------|
| A) Apple core appearance | B) Bowel wall thickening | C) Multiple air fluid levels | D) Air outside the bowel loops |
|--------------------------|--------------------------|------------------------------|--------------------------------|

2- What is your next step? (related to Q1)

- | | | | |
|----------------|----------|------------|--------|
| A) Fluoroscopy | B) X-ray | C) CT scan | D) MRI |
|----------------|----------|------------|--------|

3- Which of the following is the best diagnostic procedure to evaluate the lumen and mucosa of the esophagus?

- | | | | |
|----------------|-------------------|--------------------------|-----------------|
| A) Barium meal | B) Barium swallow | C) Barium follow through | D) Barium enema |
|----------------|-------------------|--------------------------|-----------------|

4-A 50 year old women presented to GIT clinic with intermittent per rectum bleeding. Barium enema revealed irregular narrowed descending colon with apple core appearance. What is the modality that should be used for diagnosis?

- | | | | |
|----------------|----------|------------|--------|
| A) Fluoroscopy | B) X-ray | C) CT scan | D) MRI |
|----------------|----------|------------|--------|

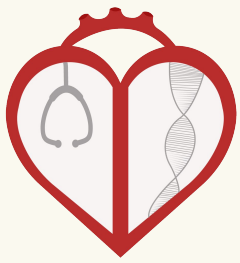
5-What's the best modality to evaluate the cause of the bowel obstruction?

- | | | | |
|----------------|----------|------------|--------|
| A) Fluoroscopy | B) X-ray | C) CT scan | D) MRI |
|----------------|----------|------------|--------|

6- A 30 old woman presented to the emergency with abdominal pain, they suspect Inflammatory bowel disease which one of the following may appear as a sign in her MRI findings

- | | | | |
|------------------------------|--------------------------|--------------------------|--------------------------------|
| A) multiple air fluid levels | B) Apple core appearance | C) Bowel wall thickening | D) Air outside the bowel loops |
|------------------------------|--------------------------|--------------------------|--------------------------------|

Answers: 1-C, 2-C, 3-B, 4- A, 5- C, 6- C



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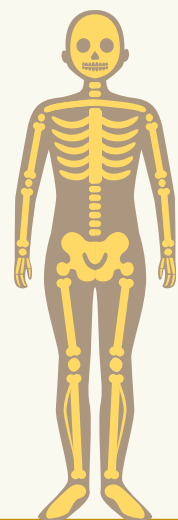
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