

430 Radiology team

Gastrointestinal Radiology

Upper GI +Lower GI

Done by:

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Special Thanks for:

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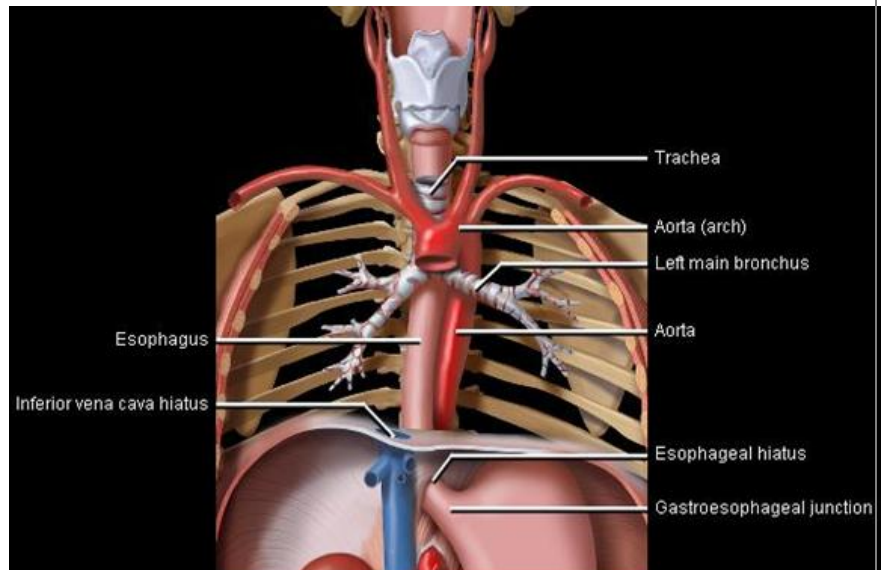
NOTE:

This work includes only what the doctor said in the lecture..

There are some additional notes in the lecture but the doctor does not talk about it so we didn't include them here.

Normal Anatomy:

- The esophagus enters the **thorax at about T₁ level** behind and slightly to the left of the trachea.
- It is usually indented on its **left antero-lateral surface by the arch of the Aorta** and left bronchus.
- The esophagus is closely applied to the Aorta throughout its course, and **may be pushed or pulled by aortic abnormalities, such as aneurysm or ectasia.**
- The esophagus enters the abdomen at **about T₁₀ level** (gastro-esophageal junction), between fibers of the right crus of diaphragm.

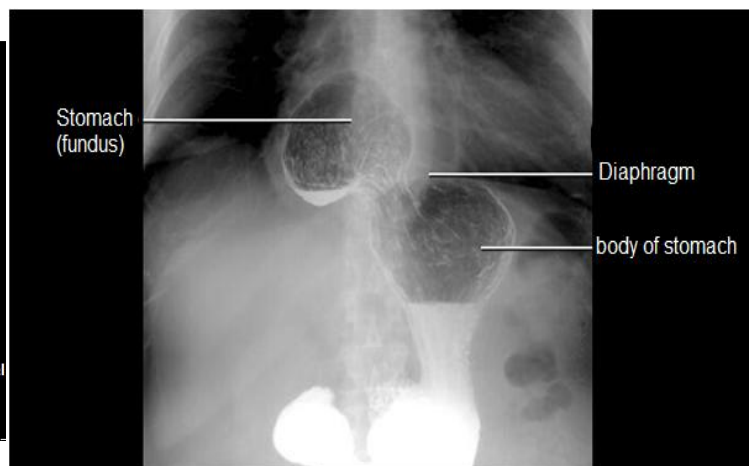
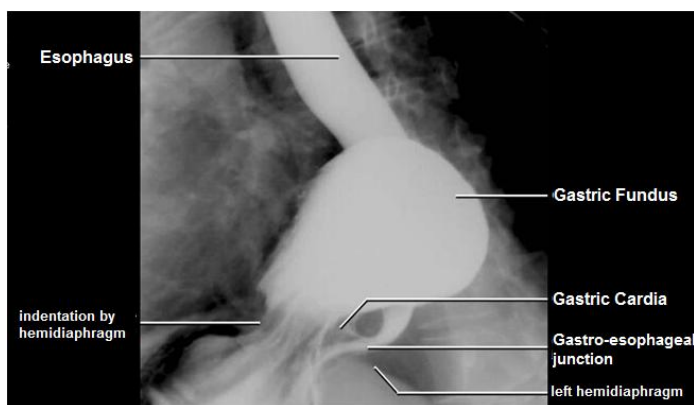
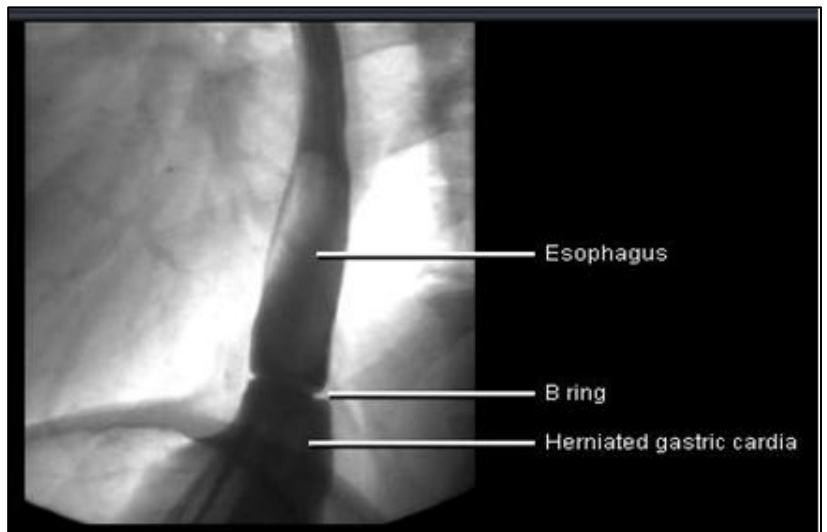


Hiatus hernia:

- Clinical presentation: reflux and burning sensation especially at night.
- Radiological investigation: single or double (air + barium) contrast study.

- Barium esophagarm shows a **web-like (ring like) narrowing** at the gastro-esophageal junction.
- A **typical feature** is the **esophageal B ring**, (which marks the gastro-esophageal junction), **The B ring is well seen due to the hiatus hernia** (as upper border of hiatus hernia) which has **distended the distal esophagus and proximal stomach.**

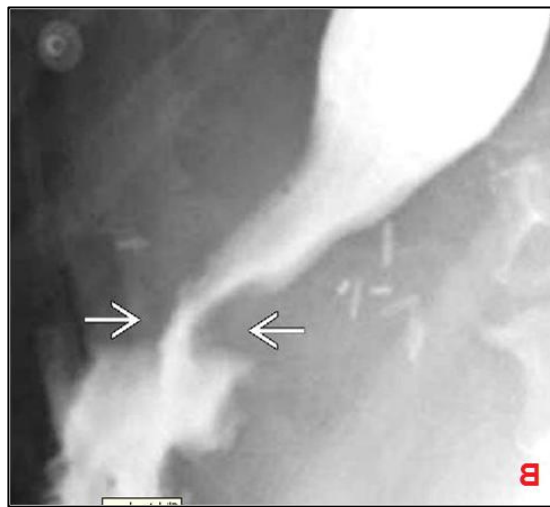
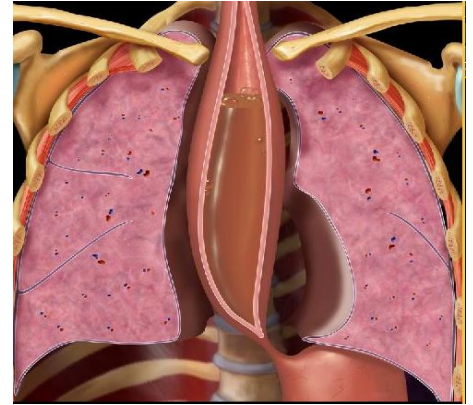
Note that the esophagus is normal.



A single contrast (barium) study –pic in the left- and double contrast –pic in the right- showed that there is a plugging of the stomach fundus above the diaphragm → hiatus hernia.

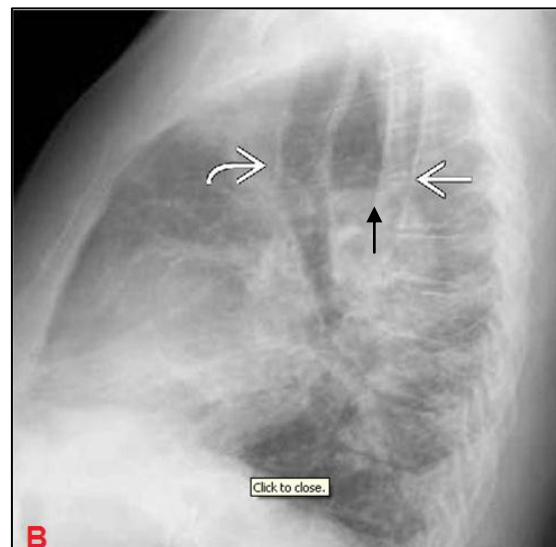
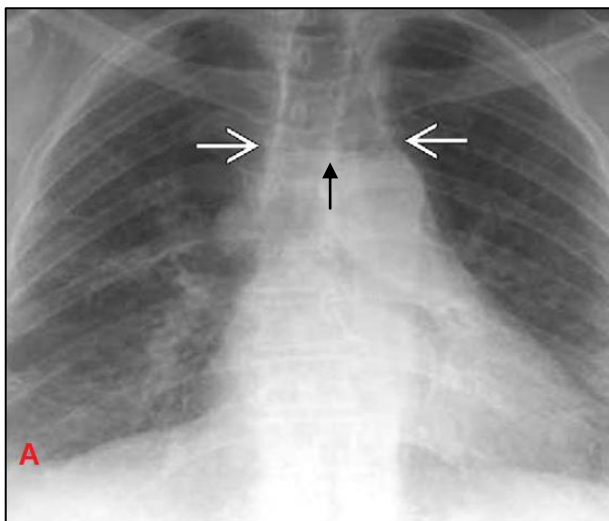
Achalasia:

- Imaging modality: single contrast (barium swallowing) X-ray.
- Imaging diagnostic clue: "Bird-beak" deformity, dilated esophagus (diameter >4cm) with smooth, symmetric, tapered narrowing (Length of narrowed segment < 3.5 cm) at esophagogastric region (esophageal end).
- Top Differential Diagnoses:
 - Esophageal scleroderma.
 - Chagas disease
 - Esophageal carcinoma. (you have to exclude tumor)
 - Esophagitis with stricture.
 - Complications Aspiration pneumonitis.
 - Superimposed infection (e.g., *Candida esophagitis*).
- Risk of carcinoma increased by 10x Clinical Issues.
- Treatment: Heller myotomy (partial thickness incision of LES) Partial (Toupet) fundoplication often incorporated into myotomy procedure
- Terminology: Cardiospasm, primary motility disorder and **esophageal smooth muscle disorder**



On barium swallowing study it shows:

- 1- A narrowing at the end of esophagus (**Bird-beak** sign) or (Rat tail sign).
- 2- Extremely dilated esophagus.
- 3- On A → there is food particles which disturbed the barium filling → collection of these particles are caused by narrowing in the lower esophageal spincter (LES).



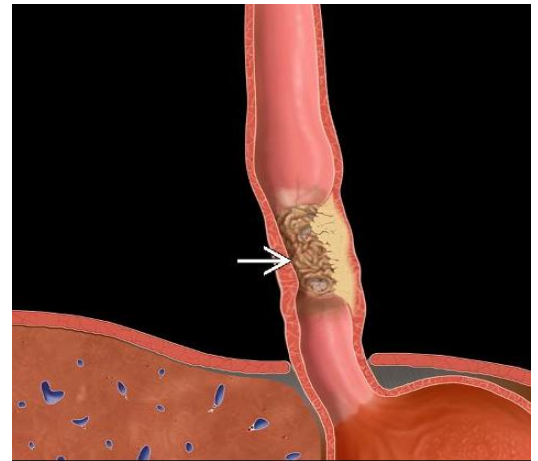
- A plain x-ray shows the **air fluid level in the esophagus** (black arrow).
- In pic B air fluid is seen behind the trachea.
- There is a risk of malignancy (you have to exclude cancer).

Additional notes (it was written in the note area but the doctor didn't explain it):

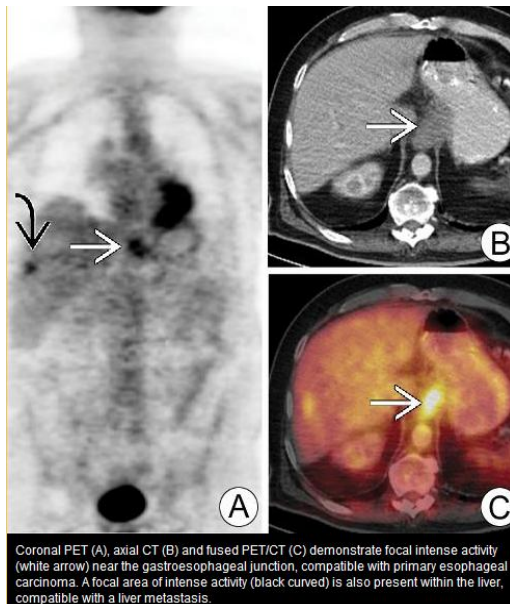
- Imaging Classified based on etiology: Primary or secondary.
- Primary (idiopathic) "Bird-beak" deformity: Dilated esophagus with smooth, symmetric, tapered narrowing at esophagogastric region.
 - Temporary transit via cardia when hydrostatic pressure of barium column is above tonic LES pressure
- Secondary (pseudoachalasia) Intrinsic or extrinsic tumor, peptic stricture, post-vagotomy, Chagas disease Manometric characteristics of achalasia Increased or normal resting lower esophageal sphincter pressures Incomplete or absent LES relaxation on swallowing.
- Manometric characteristics of achalasia Absence of primary peristalsis Increased or normal resting lower esophageal sphincter (LES) pressures incomplete or absent LES relaxation on swallowing.

Esophageal Cancer:

- Problem in the muscoa which lead to narrowing of the esophagus.
- Terminology: Esophageal cancer or carcinoma (EC).
- Types:
 - **Squamous cell carcinoma** (SCCA): Malignant transformation of squamous epithelium
 - **Adenocarcinoma** (ACA): Malignant dysplasia in columnar metaplasia (Barrett mucosa).
- Imaging modality:
 - Barium study
 - **Fluorodeoxyglucose CT (CTFDG)**
- Imaging Findings:
 - Best diagnostic clue **Thickening and irregularity of esophageal lumen** on CTFDG.
- Top Differential Diagnoses:
 - Inflammatory Esophagitis.
 - Intramural Primary Esophageal Tumor.
 - Other Thoracic Malignancy.



Barium study showing a filling defect in the lower portion of esophagus (arrows) → cancer



- On C.T there is an obvious mass → cancer
- In pic C → CTFDG (CT + Flurodeoxyglucose) → shows active tumor.

Note: Flurodeoxyglucose is a contrast that is used to check the activity of the cells.

The stomach

Gastric Ulcer:

- Most common disease of the stomach.
- Imaging modality: double contrast study.
- Best diagnostic clue: **Sharply margined barium collection with folds radiating to edge of ulcer crater (opening) on upper GI series**
- 1st most common cause of gastric ulcer is H.pylori, while the 2nd most common cause is NASIDs.
- Duodenal ulcers are more common than peptic ulcers.
- Types of ulcers:
 - Benign (90-95% of the cases): Sharply defined mucosal defect (ulcer); **smooth**, even, radiating **thin folds** to edge of **ulcer crater**. Usually on lesser curve, posterior wall, or antrum.
 - Malignant (5-10% of the cases): Uneven shape; **irregular or asymmetric edges**; interruption and **clubbing of radiating folds**. Usually greater curvature
- Complications:
 - **Perforation.**
 - **Hemorrhage.**
 - Gastric outlet obstruction.
 - Fistula.



Additional notes from the note space:

CT Findings:

CECT (use water or water-soluble oral contrast, with oral gas granules)

May visualize ulcer itself as outpouching

Associated signs:

- Wall thickening ± luminal narrowing of stomach
- Submucosal edema
- Infiltration of surrounding fat or organs (pancreas, liver)
- Free air or oral contrast in abdomen or lesser sac

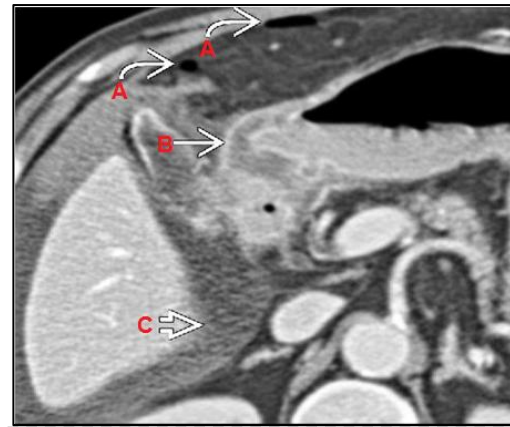
Malignant ulcer "Virtual gastroscopy"

Obtain thin axial sections with gas distention of lumen

Construct MPR and 3D views of gastric lumen

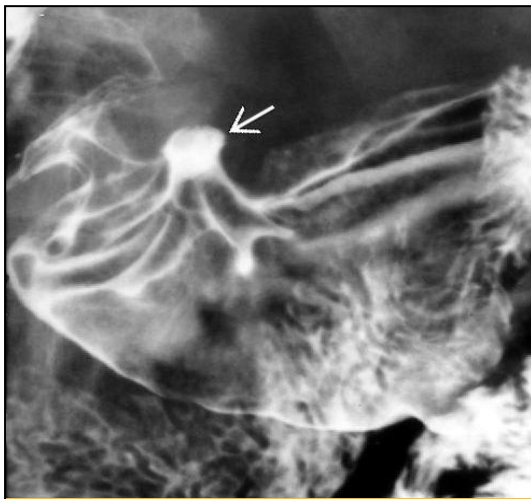
Reported to detect benign and malignant ulcers with accuracy comparable to endoscopy

The barium is **collected outside the GI tract** (arrow) → **ulceration.**

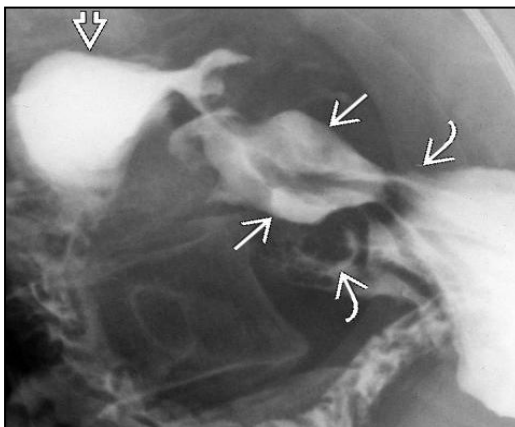


On C.T scan:

- A → **air bubble outside the GI tract** (pneumoperitoneum) → **perforation** (complication of ulcer) → can result in death (require a quick intervention).
- B → leaked contrast due to perforation.
- C → leaked gastric content (juices) beyond the liver
- D → thick wall of the duodenum with contrast inside.
- The pic on the left shows duodenal ulcer.



A double barium (air + fluid) study shows a collection of the barium (arrows) with **smooth and thin folds** → **benign**.

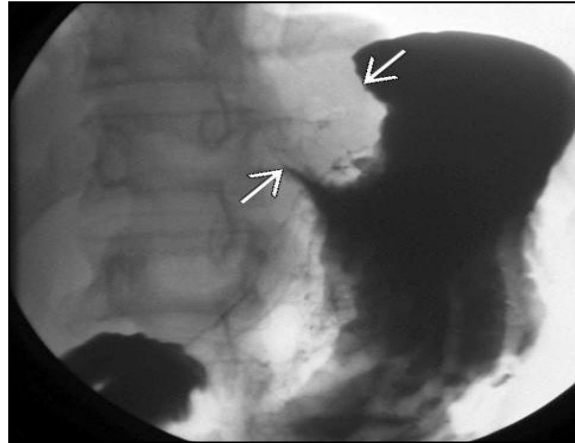
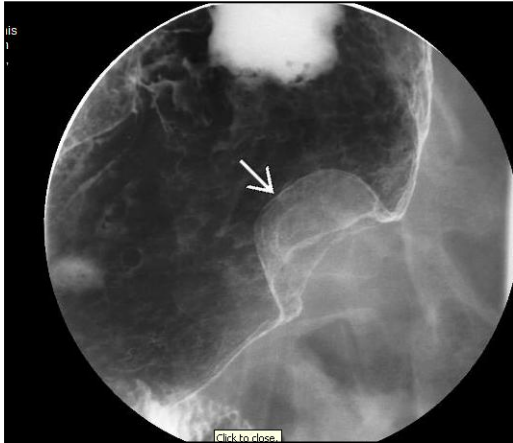


The Ulcer can be seen in the left upper part of the Pic (thick arrow)

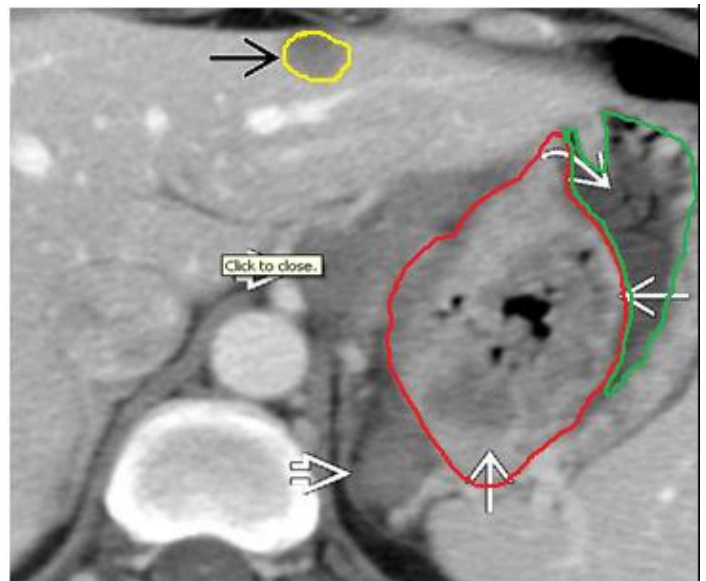
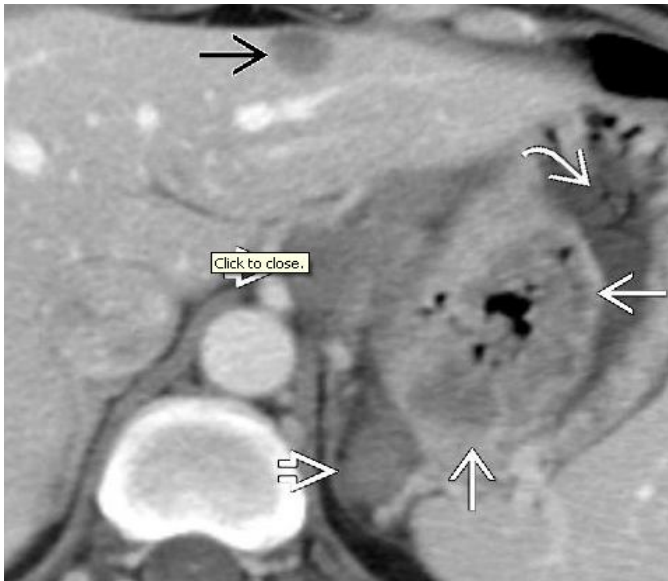
It is a Duodenal Ulcer.

GI Tumors:

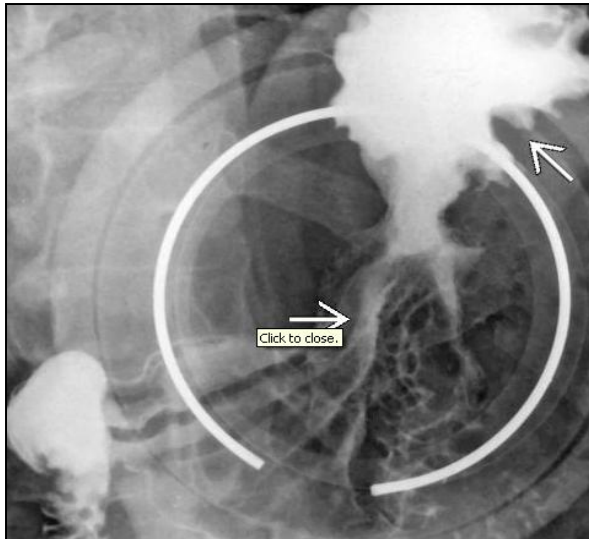
- Most common Types:
 - Adenocarcinoma
 - Lymphoma
 - Metastasis.
 - GI stromal tumor (GIST).
- Clinical presentation: ulcers abdominal pain ..etc.
- Upper GI study should be done → if tumor is suspected you should go for biopsy



Double (left pic - better) & single (right pic) contrast showing out pouching mass (arrows) → **GI tumor** (the patient will undergo endoscopy and biopsy should be taken)



A CT shows **large mass** (red) with ulcerations and air bubbles inside, compressing **the stomach** (green) and **Metastasis to the liver** (yellow).



The crater is not smooth (irregular) with thick folds → malignant ulceration



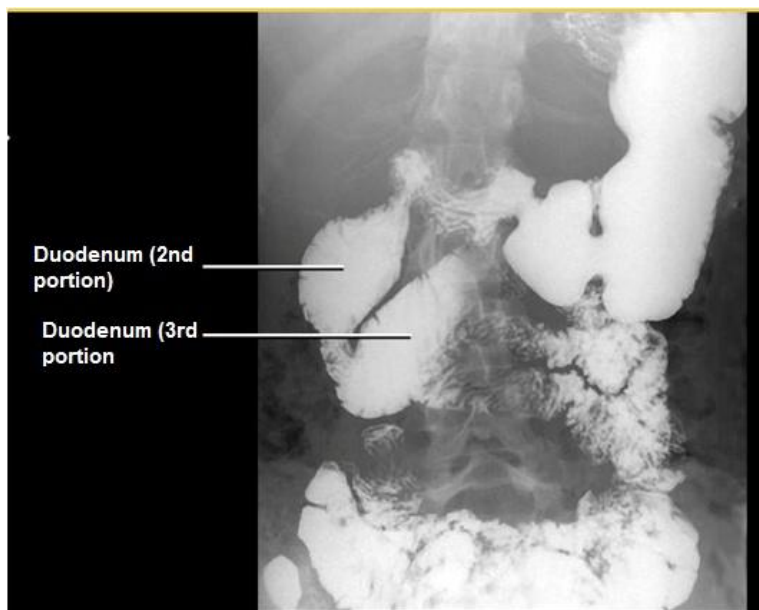
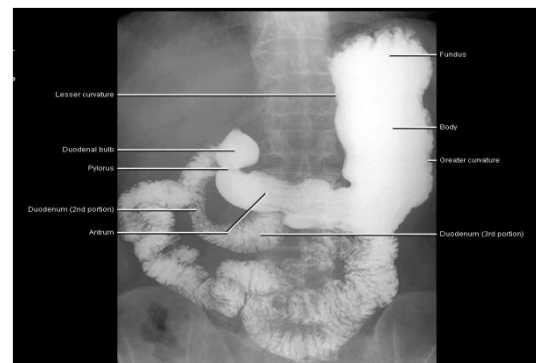
C.T of the same Ulcer shows:
Thick folds (white arrow) → ulceration
Mass in the stomach (black arrow)

Small Bowel

Small bowel obstruction

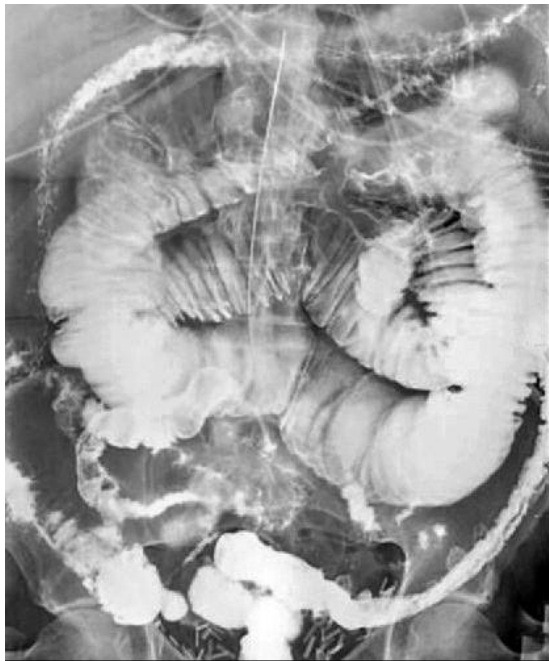
Causes:

- 1) Post operative:
→ Adhesions
→ Fibrosis
- 2) Hernia.
- 3) Tumor
- 4) Gall stone.



Barium study shows a duodenal dilatation in the 2nd and 3rd portions → due to postoperative fibrosis.

3D CT scan shows terminal ileum obstruction result in dilatation of the small bowel.

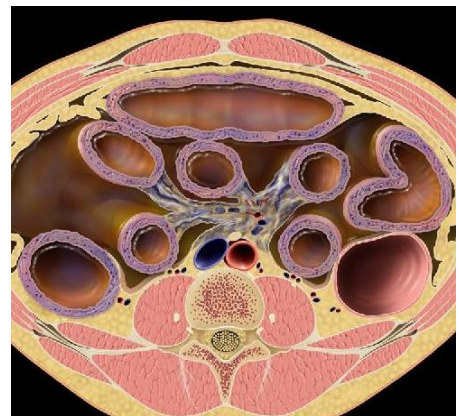


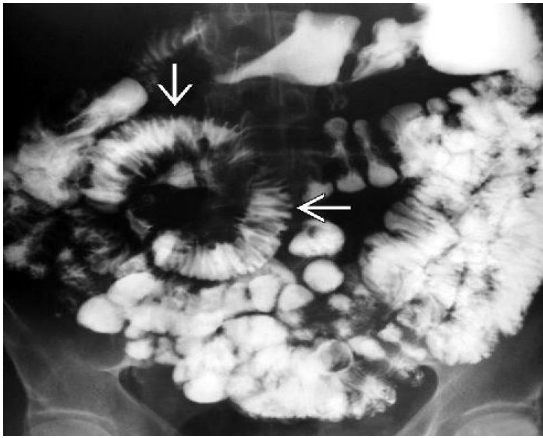
Small bowel dilatation (Jejunum & ileum) due to obstruction resulted from post operative adhesions.

Cacinoid tumor of the small bowel can cause obstruction.

Clinical presentation: hyperemia and sweating

Imaging findings: spoke wheel appearance (arrow) in the small bowel.

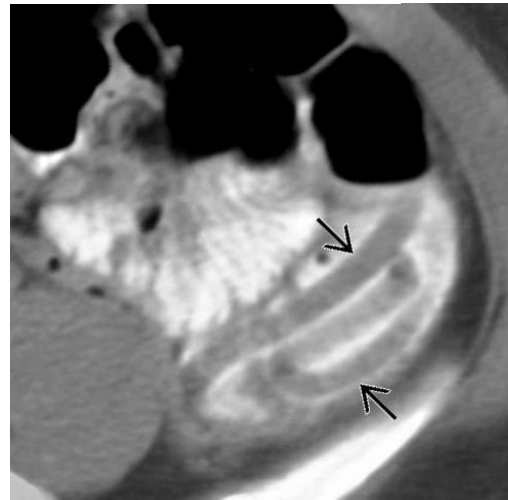




Spoke wheel appearance (arrows) of small bowel → carcinoid tumor causing obstruction result in dilation.



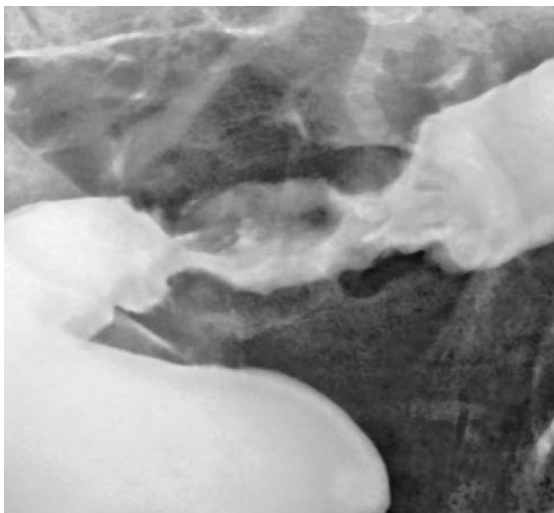
Dilated small bowel with **Tubular round long filling defects** (black arrows) → **ascariasis** → need to do laboratory investigation.



Large bowel

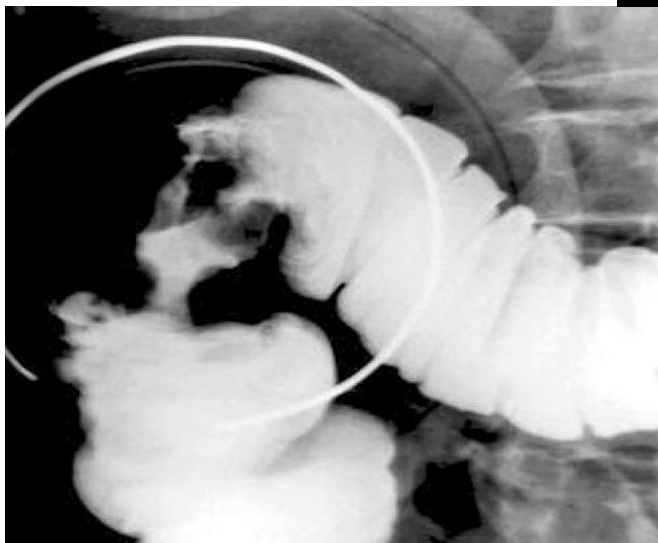
Large bowel cancer (Rectal cancer):

- Imaging modality: double contrast.
- Barium Is given :
 - Either orally
 - Or I.V
 - or per rectum (the best)
- Diagnostic finding Tip: Apple core like appearance.
-



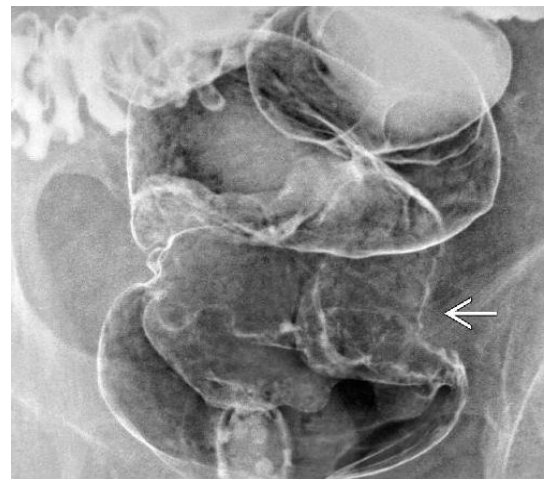
Apple core appearance lesion → rectal cancer.

CT shows metastasis of the tumors to the lung (arrows)



Recto sigmoidal cancer

Double barium (air+barium) barium will show the detail of the mucosa → colorectal cancer.



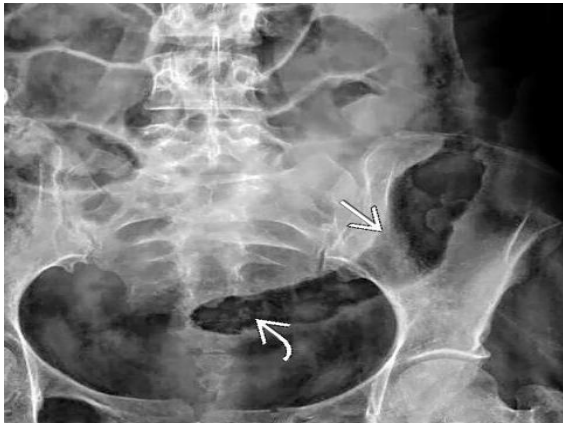
Crohn's disease:

- Inflammatory disease affecting GIT (especially terminal ileum).
- Most common side: terminal ileum
- Complications:
 - Fistula.
 - Ulceration
 - abscesses
- affect young group age.



Ulcerative colitis:

- inflammatory bowel disease result in featureless large bowel (absence of **hesitations**)
- Treatment: bronchocolitomy



Air without contrast shows no hustrations (feature less large bowl)



CT shows feature less large bowel (without **husters**)

