GASTROINTESTINAL IMAGING

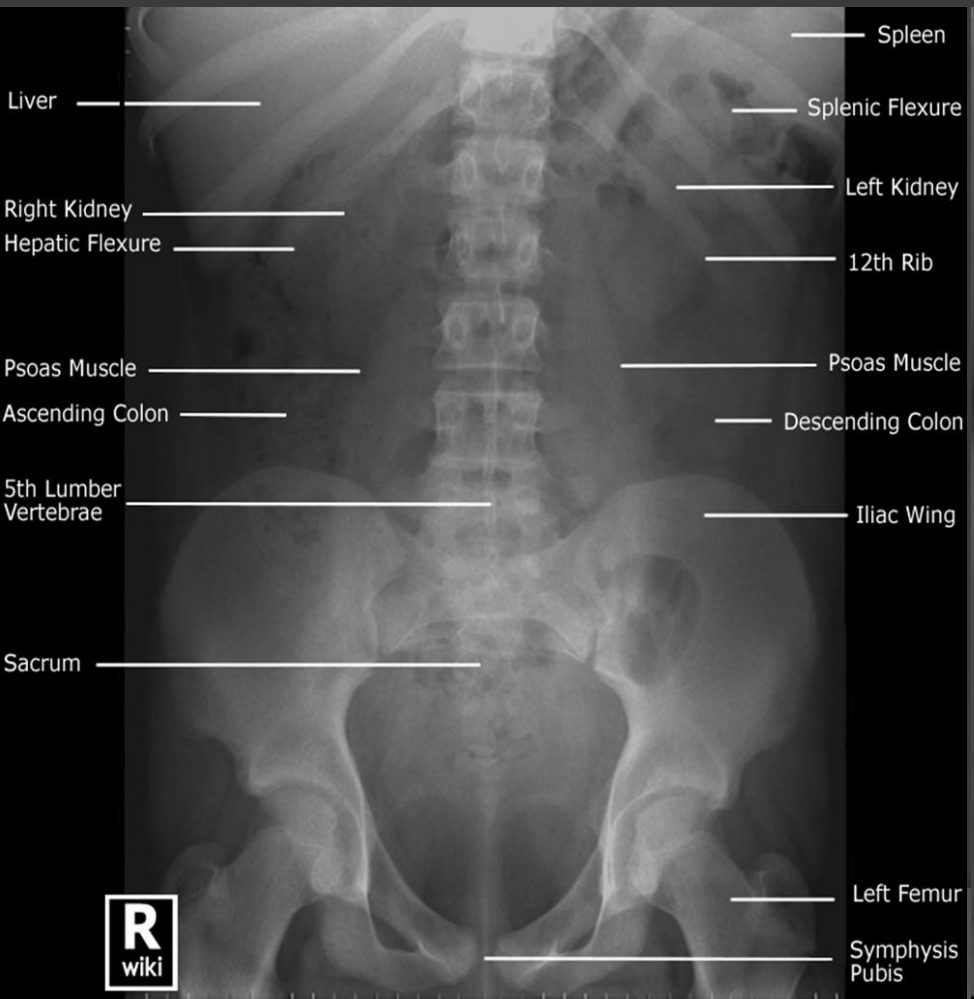
SEQUENCE FOR RADIOGRAPHY READING

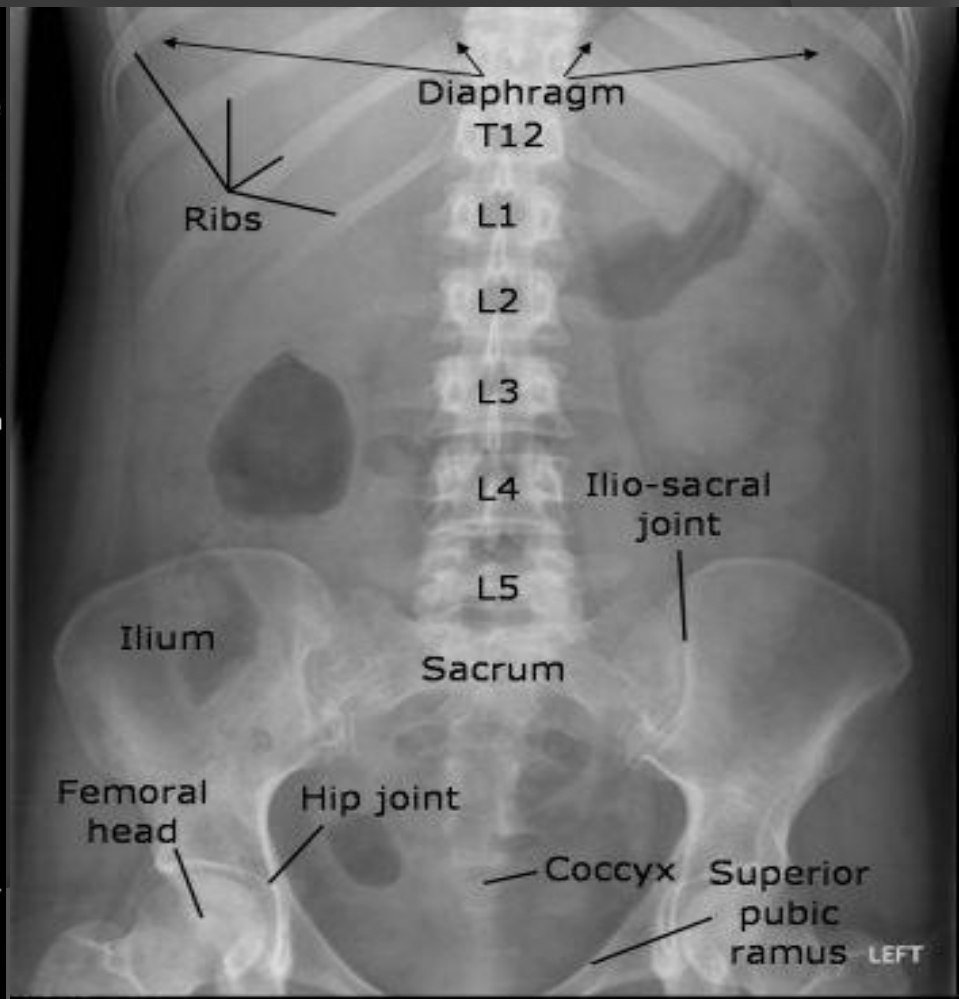
1. Correct name of investigation:
2. Radiological features (signs) by symptoms and syndroms:
3. Conclusion (what pathology)

IMAGING MODALITIES

1. Plain Radiograph of the abdomen
2. Barium study
3. Fluoroscopy
4. Ultrasonography
5. Computerized tomography
6. Radionuclide imaging
7. Magnetic Rezonance Imaging (MRI)
8. Angiography (aorta, celiac trunk, mesenteric arteries)

simple radiography of abdomen



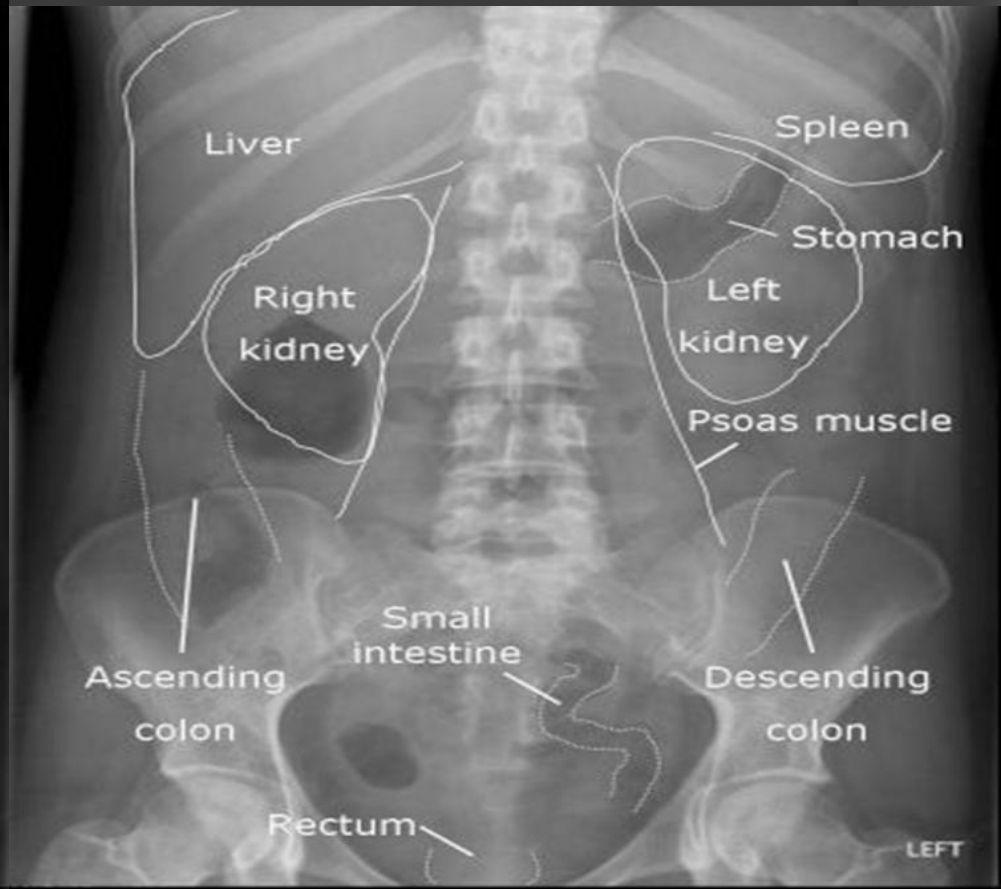


Indications

- Bowel obstruction
- Perforation
- Acute abdomen
- Foreign body localization
- Toxic megacolon
- Control or preliminary films for contrast studies
- Detection of calcification or abnormal gas collection

What to examine?

- Air (bowel gas)
- Bone density
- Calcifications
- Soft tissues



Air:

- Look at the stomach:
  - If the stomach contains air it may be visible in the left upper quadrant of the abdomen. The lowest part of the stomach crosses the midline.
- Look at the diaphragms:
  - Are they raised or flattened?
  - Are the costophrenic angles clear?
- Is there any free intra-abdominal air? (better evaluated if erect or decubitus)

Air:

Free air under the diaphragm ➔ visceral perforation

gas under the right hemidiaphragm ➔ visceral perforation

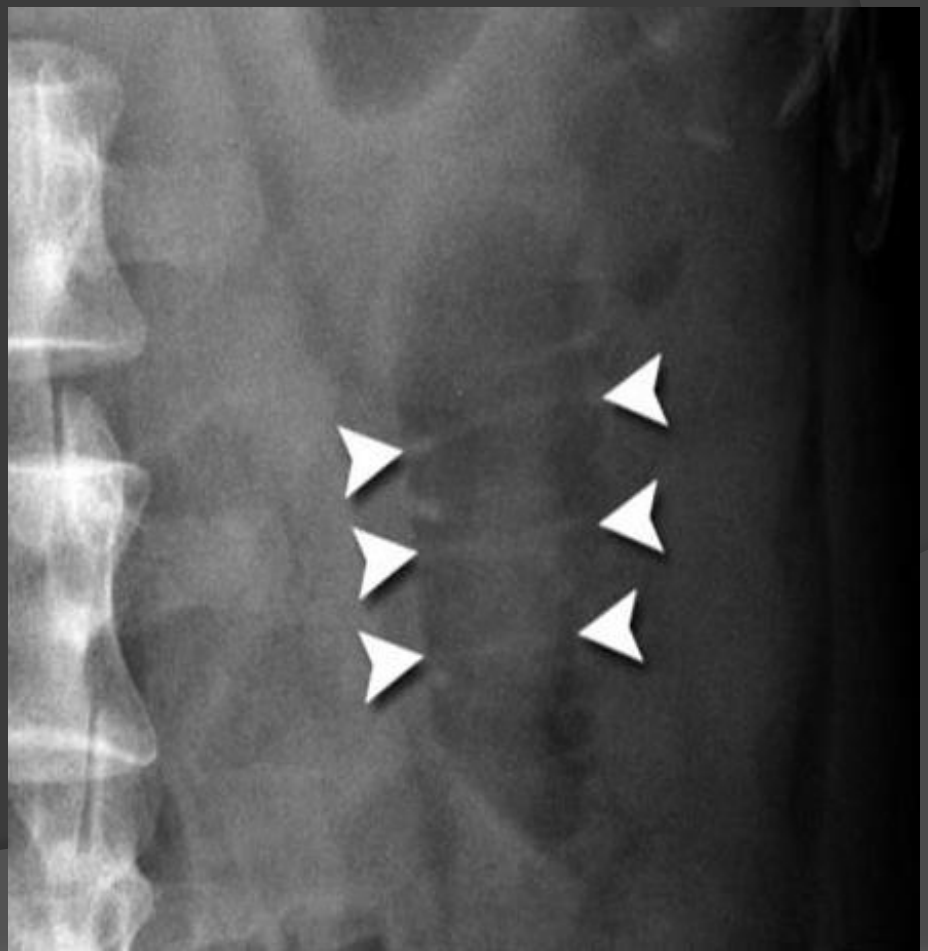
Bowel gas pattern

- 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?
  - Is there too much intraluminal gas?

- What is the intraluminal caliber of the small and large bowel?
- Are there any dilatations of the small and/or large bowel?
- Are there any air-fluid levels?

Small bowel

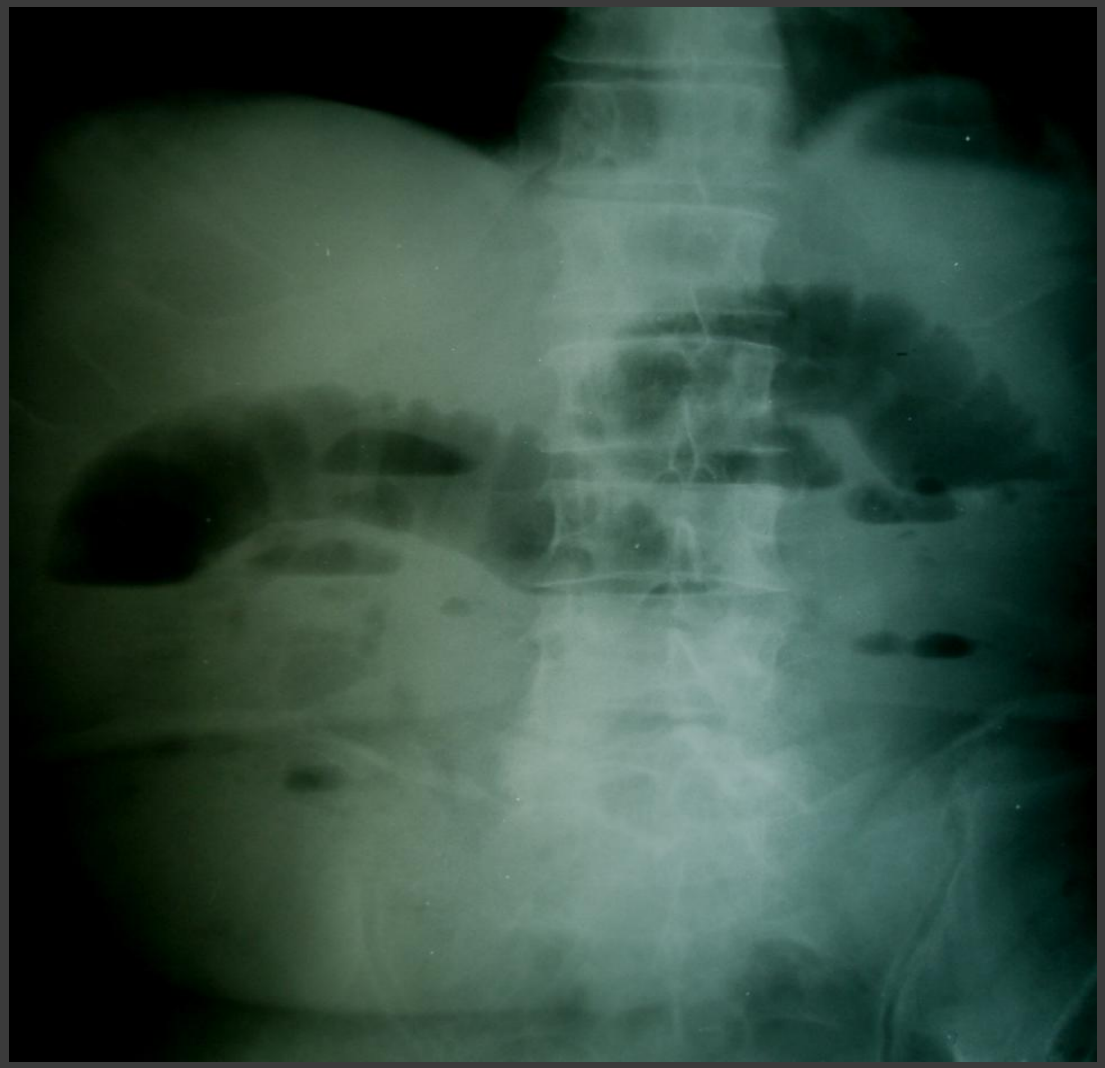
- **Central position in the abdomen**

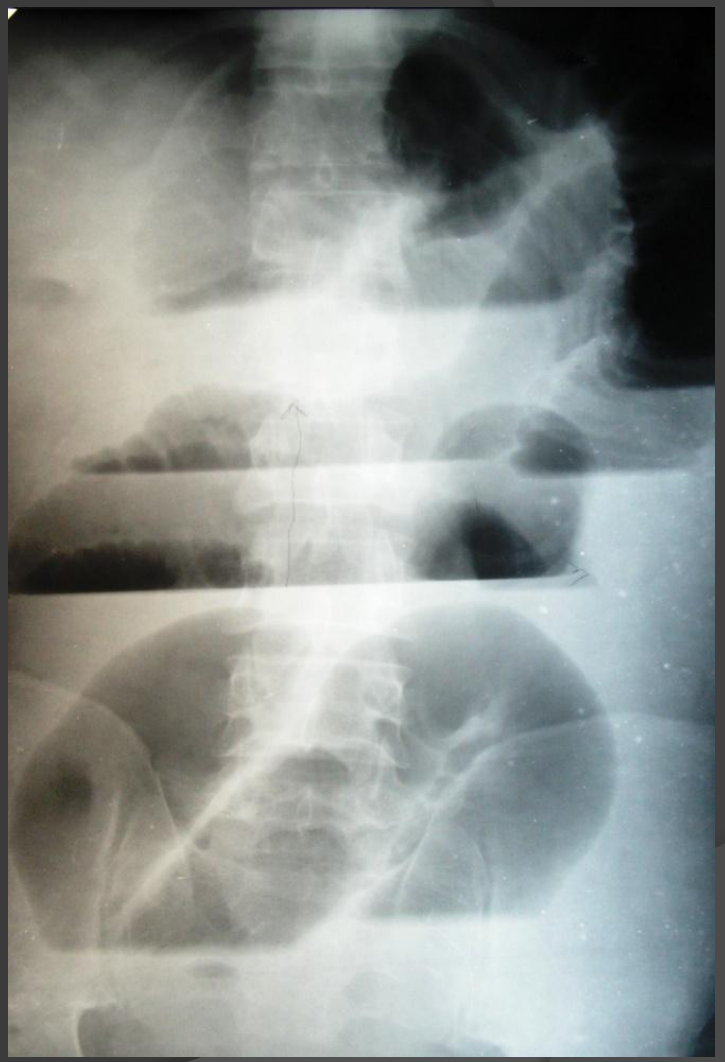


Large bowel

- **Peripheral position in the abdomen** (although the location of the transverse and sigmoid colon may vary)
- **Haustra -** small pouches, giving the colon its segmented appearance. **Haustra don't reach around the entire circumference of the intestine, in contrast to circular folds of the small bowel (valvulae conniventes).**
- Loss of haustra is a sign of chronic ulcerative colitis.

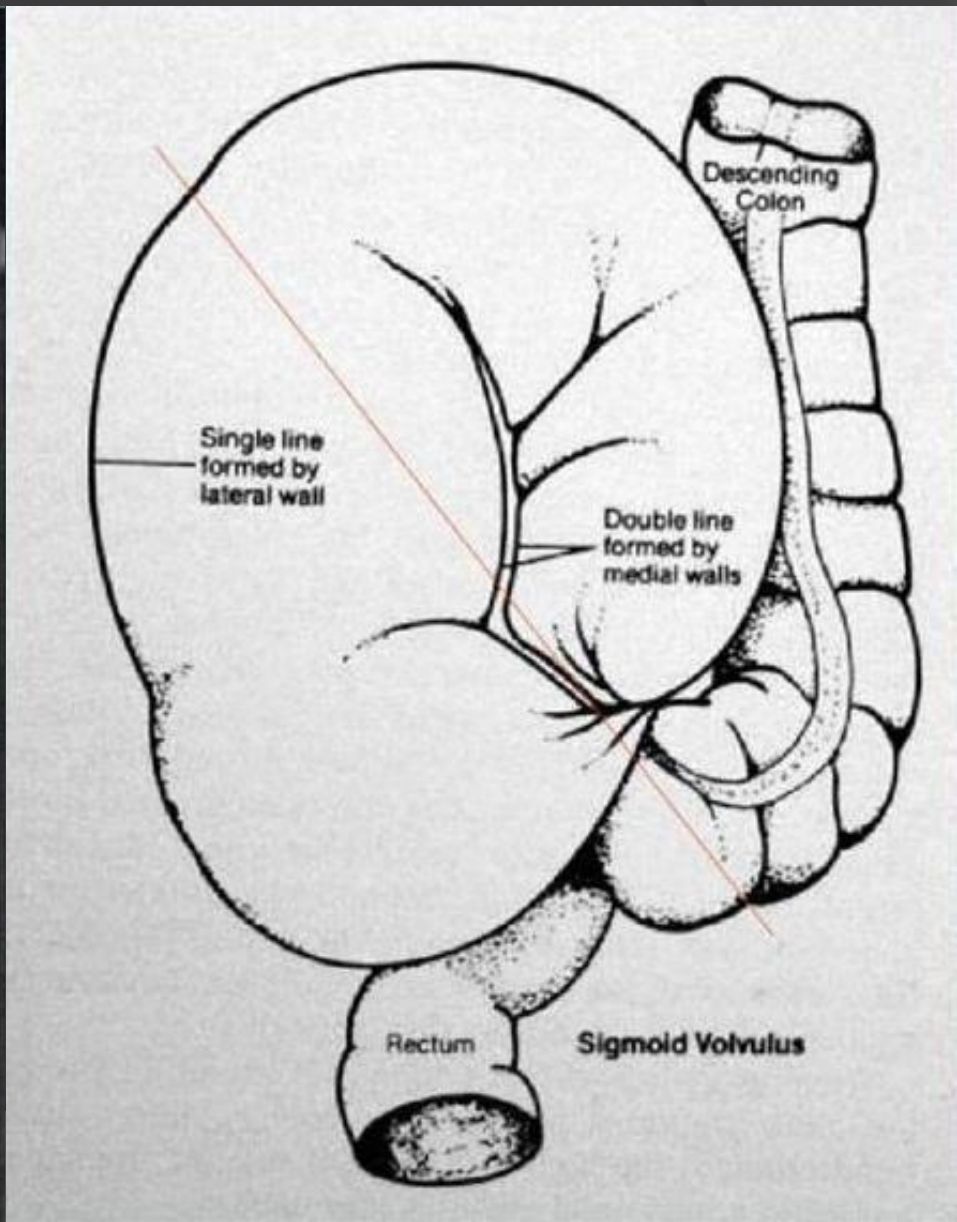
Simple abdominal radiography





Upright abdominal X-ray demonstrating a bowel obstruction. Note multiple air fluid levels

Sigmoid volvulus



BARIUM STUDIES

- **Barium swallow**
- **Barium meal**
- **Barium follow-through**
- **Barium enema**

- Barium contrast are radioopaque and show clearly on a radiograph. If barium is swallowed before radiographs are taken, the barium within the esophagus, stomach or bowel shows the shape of the lumina of these organs.
- Barium sulfate - an inert particulate contrast agent most commonly used in GI tract evaluation.

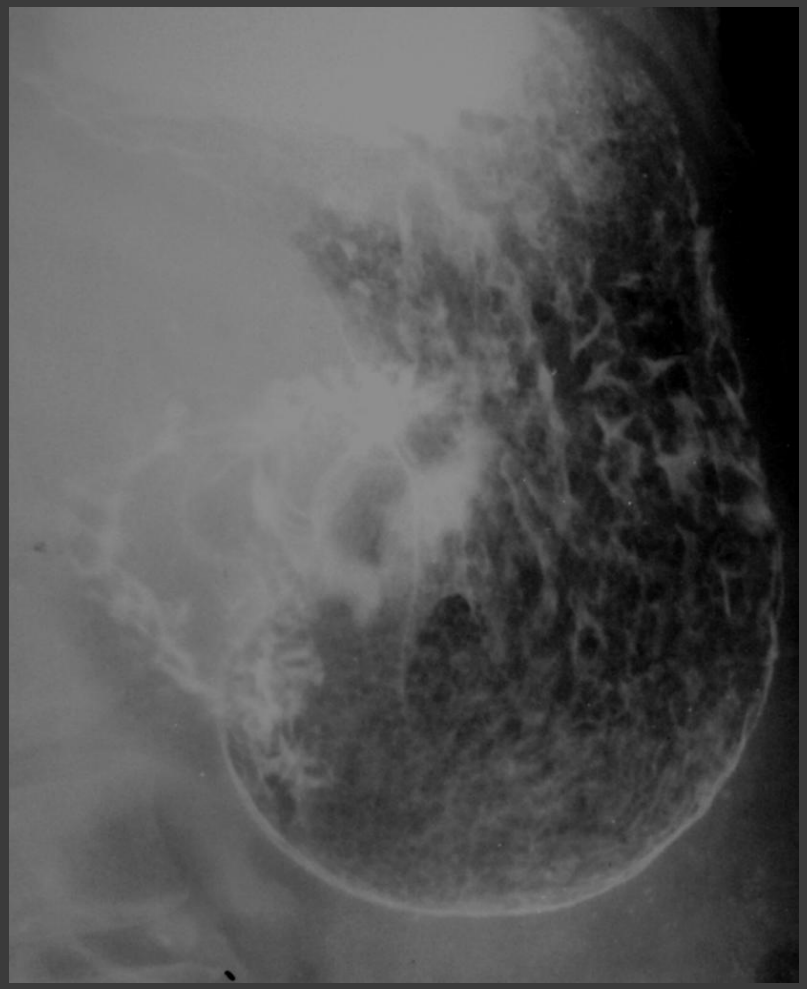
RADIOLOGICAL ANATOMY OF ESOPHAGUS

The esophagus appears as an opaque band with 3 physiological narrowing:

1. Pharyngo-esophageal
2. At aortic arch
3. At the cardia

SINGLE CONTRAST BARIUM MEAL

DOUBLE CONTRAST TECHNIQUE



METHODS OF INVESTIGATION

JEJUNUM and ILEUM

- **SMALL BOWEL FOLLOW – THROUGH MEAL: observation of the barium passage over several hours**

Digestive Tube artificial contrast (barium passage)

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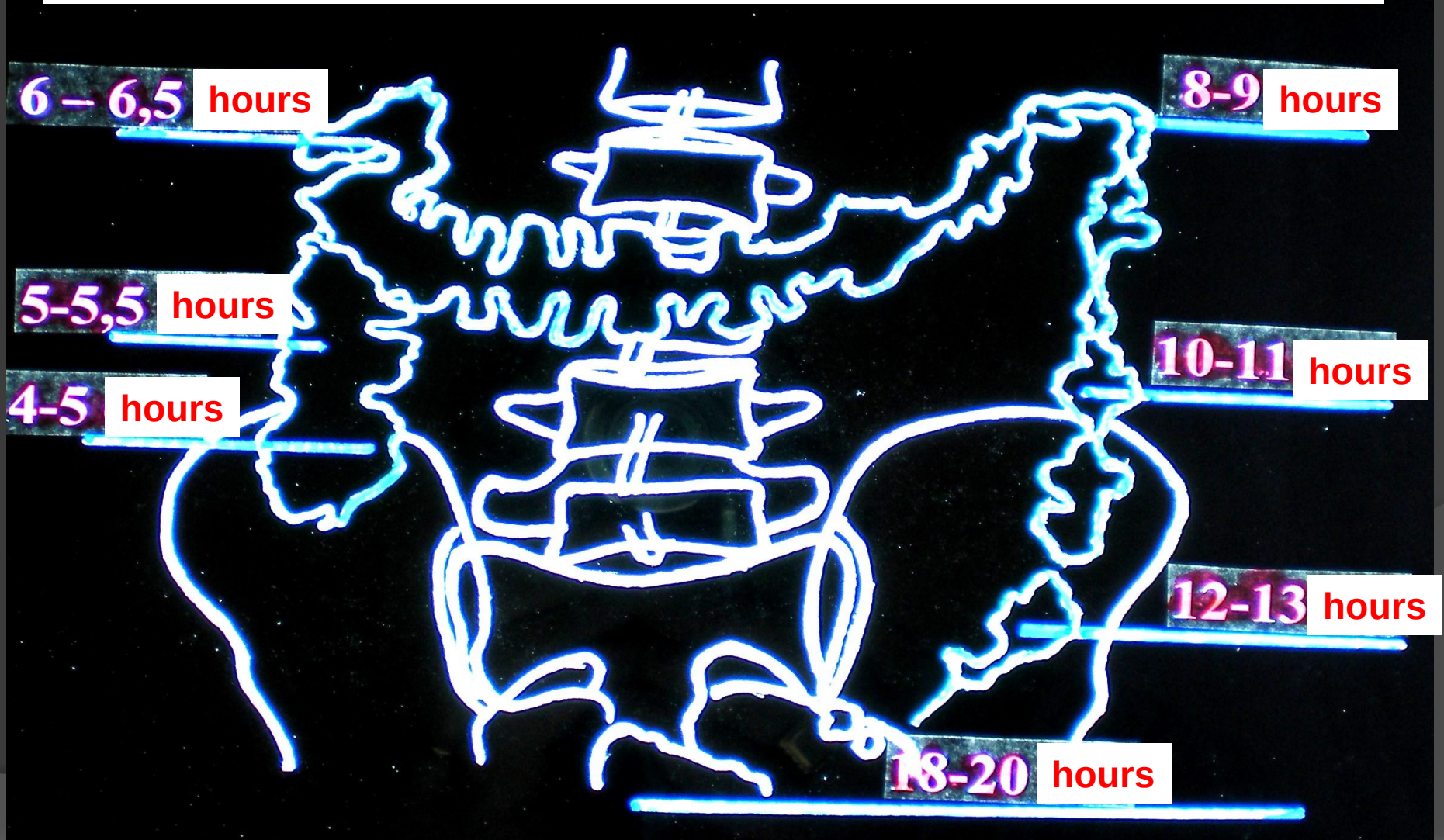
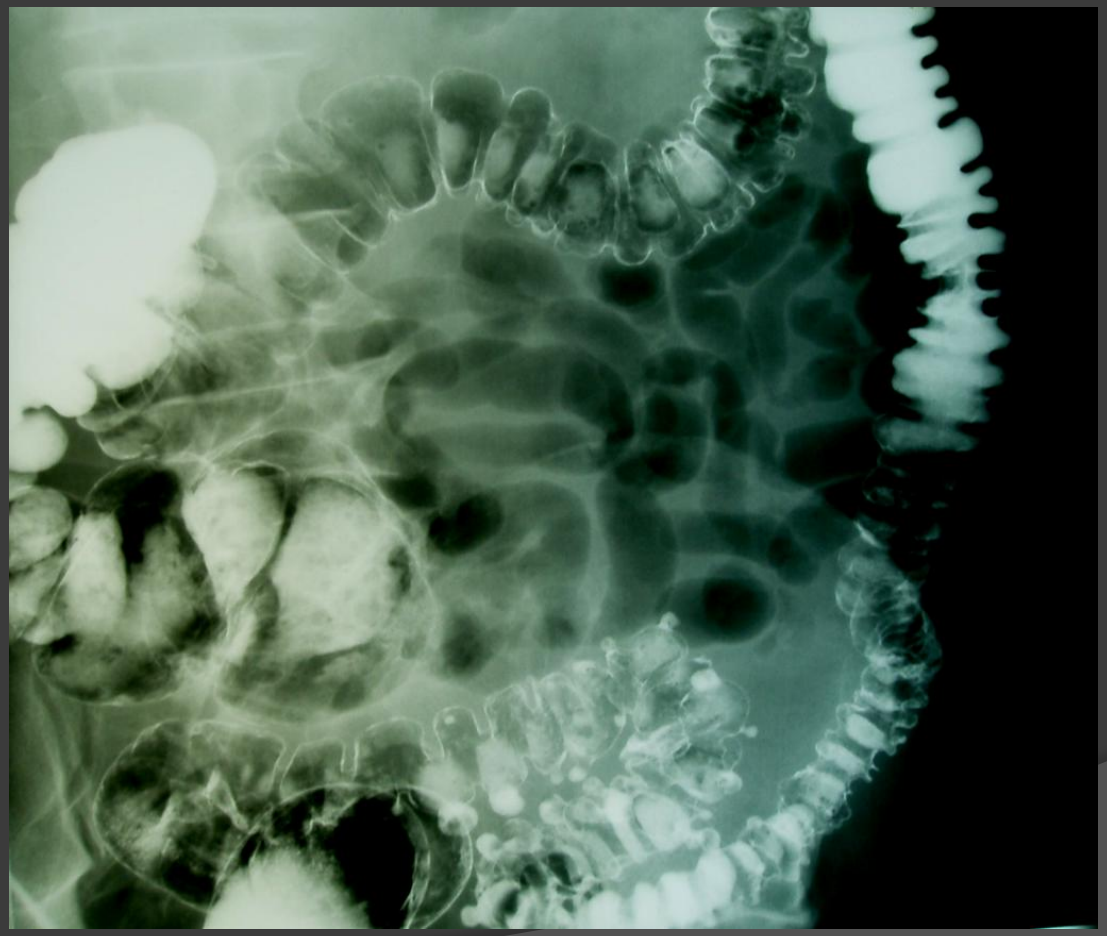


BARIUM ENEMA=irigography



Radiological functional abnormalities of DT

Muscular abnormalities

- Distonia
  - Hypertonia
  - Atonia
  - Hypotonia
- Diskinesia
- Spasm
- Evacuation disturbances

Mucosal abnormalities

- Hypersecretion

Radiological morphological abnormalities of DT

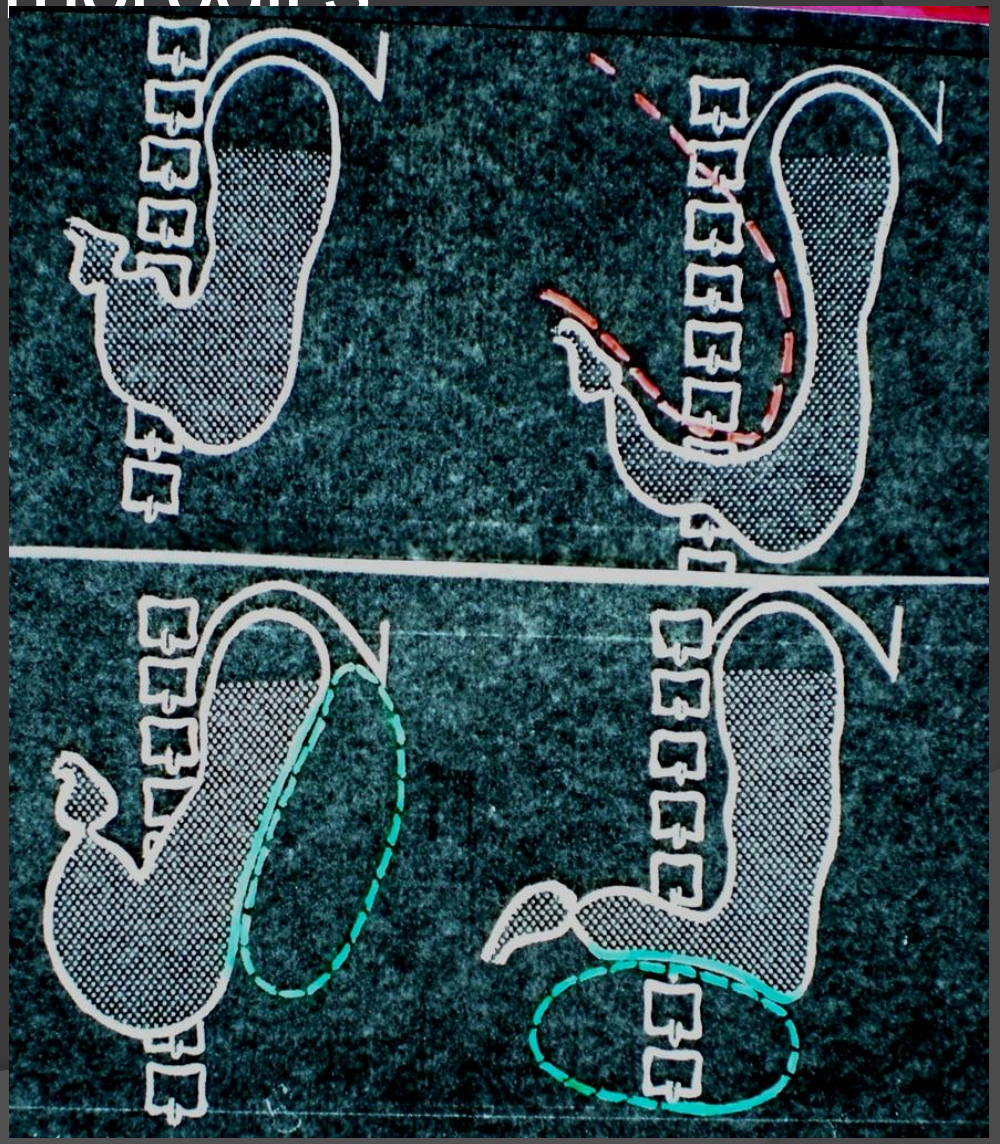
- **Abnormalities of position and shape**
  - Ptosis
  - Volvulus
  - Dislocation
- **Disturbances of mobility** of mobile segments (fixing) and fixed segments (abnormal mobility)
- **Volume abnormalities**
  - Dilations (diverticulum-image ,,plus filling”)
  - Stenosis

Radiological morphological abnormalities of DT

- **Lacuna (defect of filling-**image ,,minus filling”**,** (ex.: polip, cancer)
- **Niche (defect of filling-**image ,,plus filling”**,** (ex.:ulcer)
- **Mucosal abnormalities**
  - Hypertrophy
  - Atrophy
  - Diversion of plica gastrica
  - Interruption of plica gastrica
- **Pathological presence of gas and liquid** in intestine
- **Pathological presence of gas** in peritoneal cavity, retroperitoneal space, or intramural (in the wall of intestine)

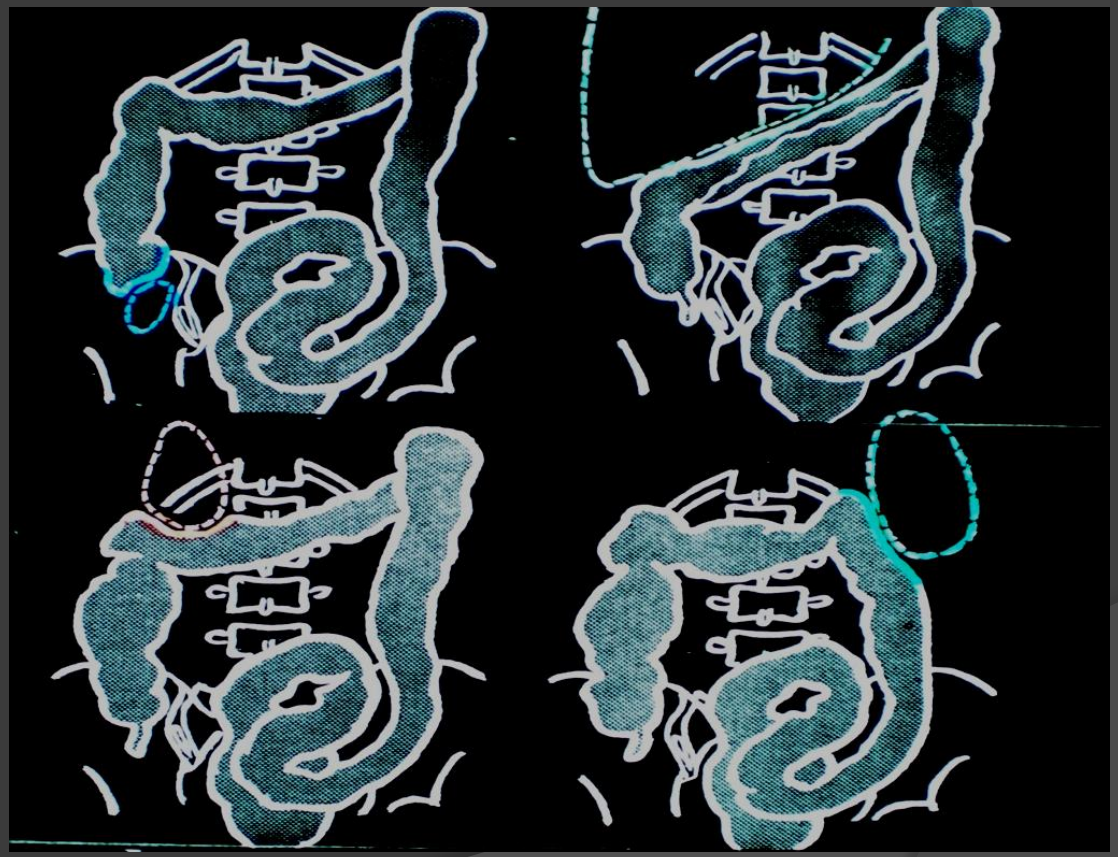
Abnormalities of position - STOMACH DISPLACEMENT IN VISCERO-ABDOMINAL PATHOLOGIES

- Normal
- Hepatomegaly
- Splenomegaly
- Pancreatic pathology



Abnormalities of position - COLON DISPLACEMENT IN VISCERO-ABDOMINAL PATHOLOGIES

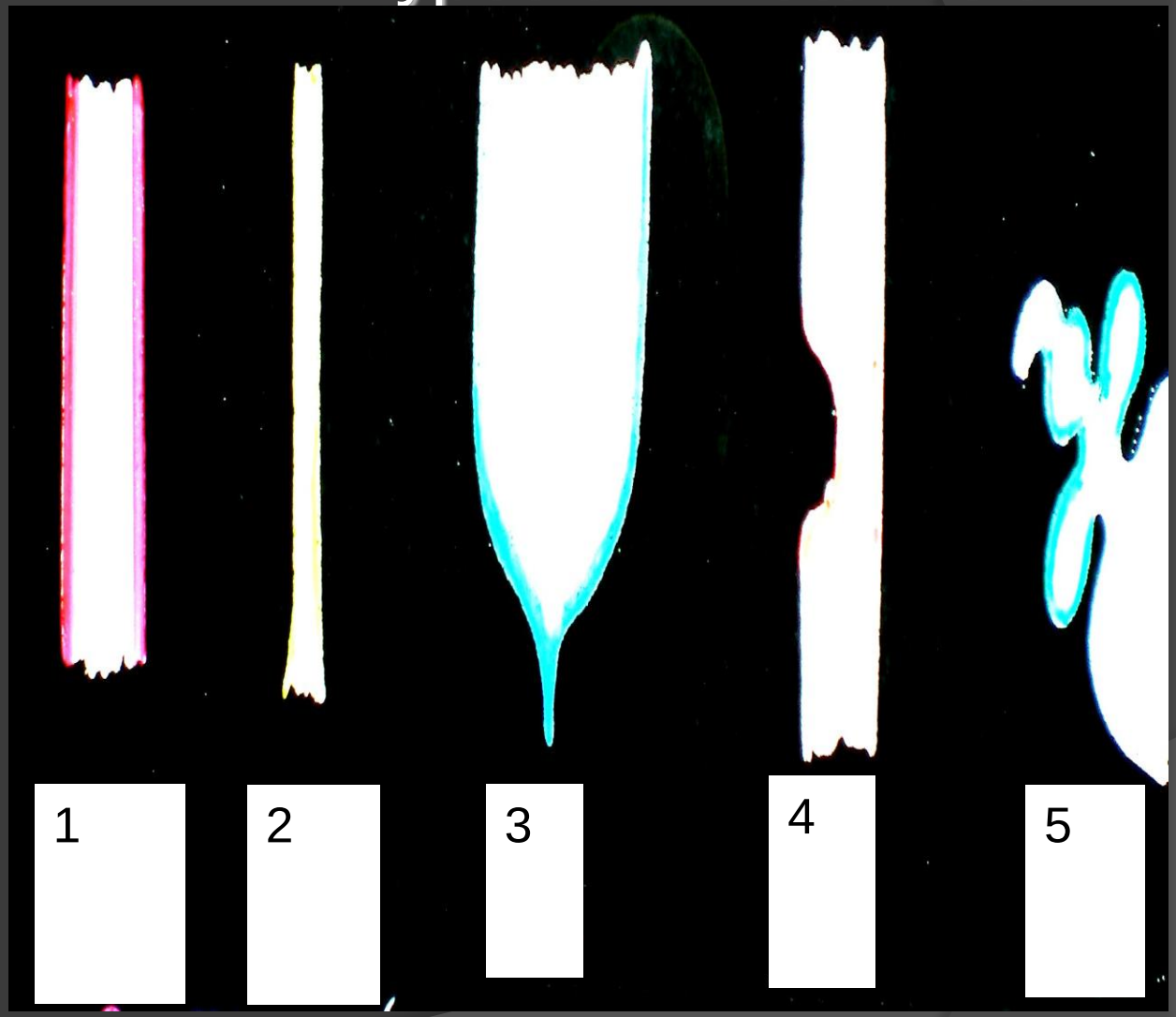
1. Appendicular plastron
2. Hepatomegaly
3. Gallbladder pathology
4. Splenomegaly



GASTRIC VOLUME ABNORMALITIES

By expansion:

1. Normal
2. Diffuse
3. Local with suprastenotic dilatation
4. Local by defect of filling (eccentric)
5. Local with deformation



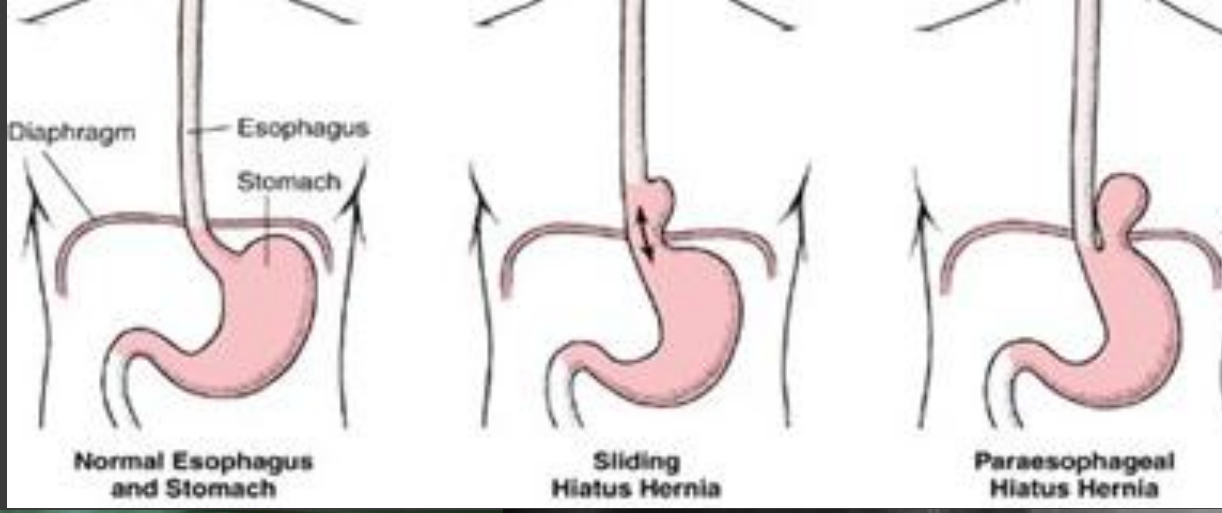
ACHALASIA

Esophageal achalasia, achalasia cardiae, cardiospasm, esophageal aperistalsis, is an esophageal motility disorder involving the smooth muscle layer of the lower esophageal sphincter, and characterized by aperistalsis and functional obstruction of the esophagus

1. Stenosis of cardiae
2. Absence of air in fundus of stomach
3. Suprastenotic expansion of the esophagus

HIATAL HERNIA

=is the protrusion (or herniation) of the upper part of the stomach into the chest cavity through the esophageal hiatus because of a weakness in the diaphragm



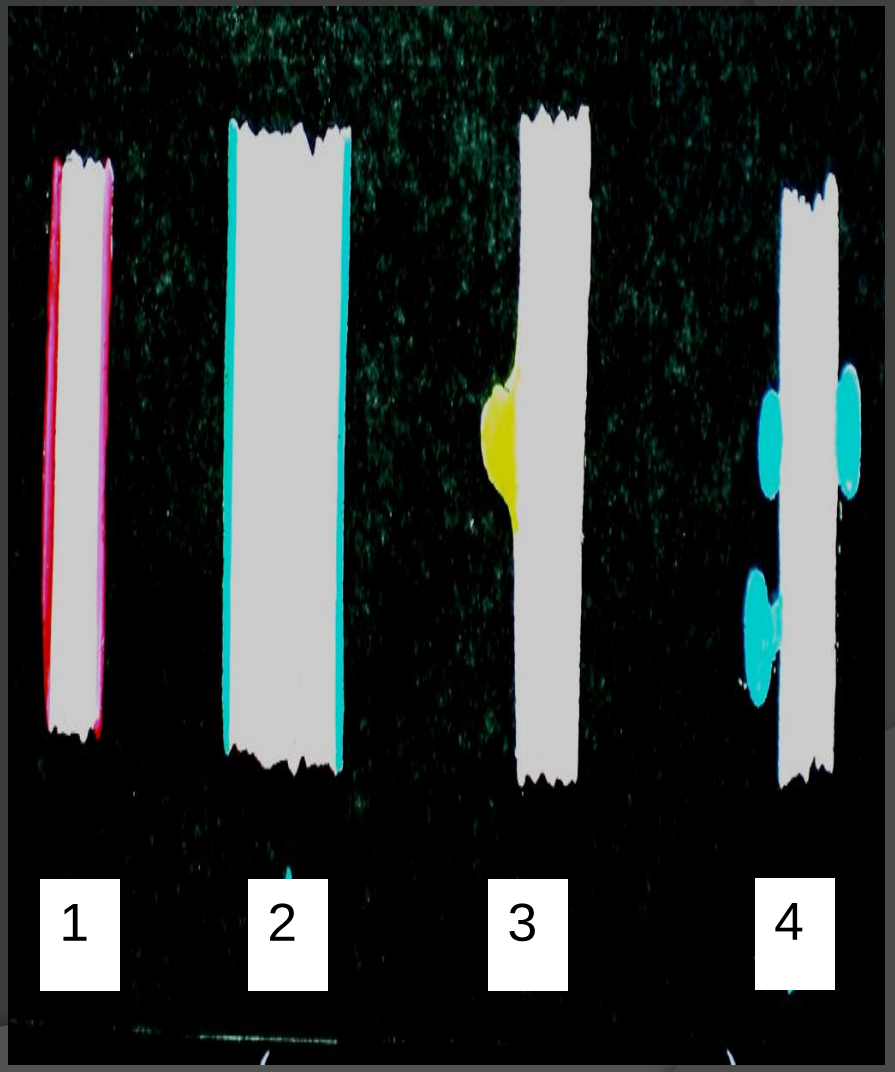
SIGMOID COLON CANCER

- Concentric local stenosis with irregular contours
- Wall rigidity

Types of DT dilations

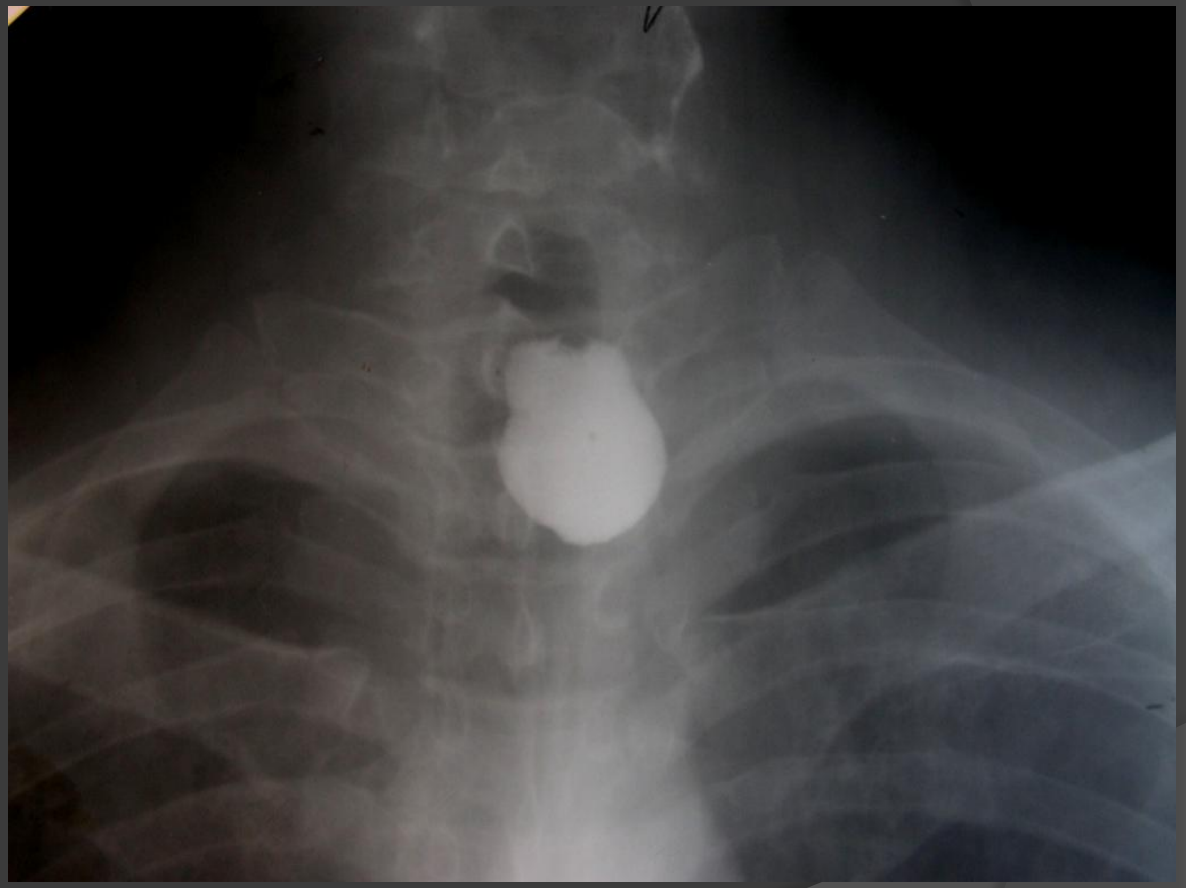
By expansion:

1. Normal
2. Diffuse dilation
3,4. Local dilaton



CERVICAL ESOPHAGEAL DIVERTICULUM

Image ,,plus filling" with local dilatation - **diverticulum**

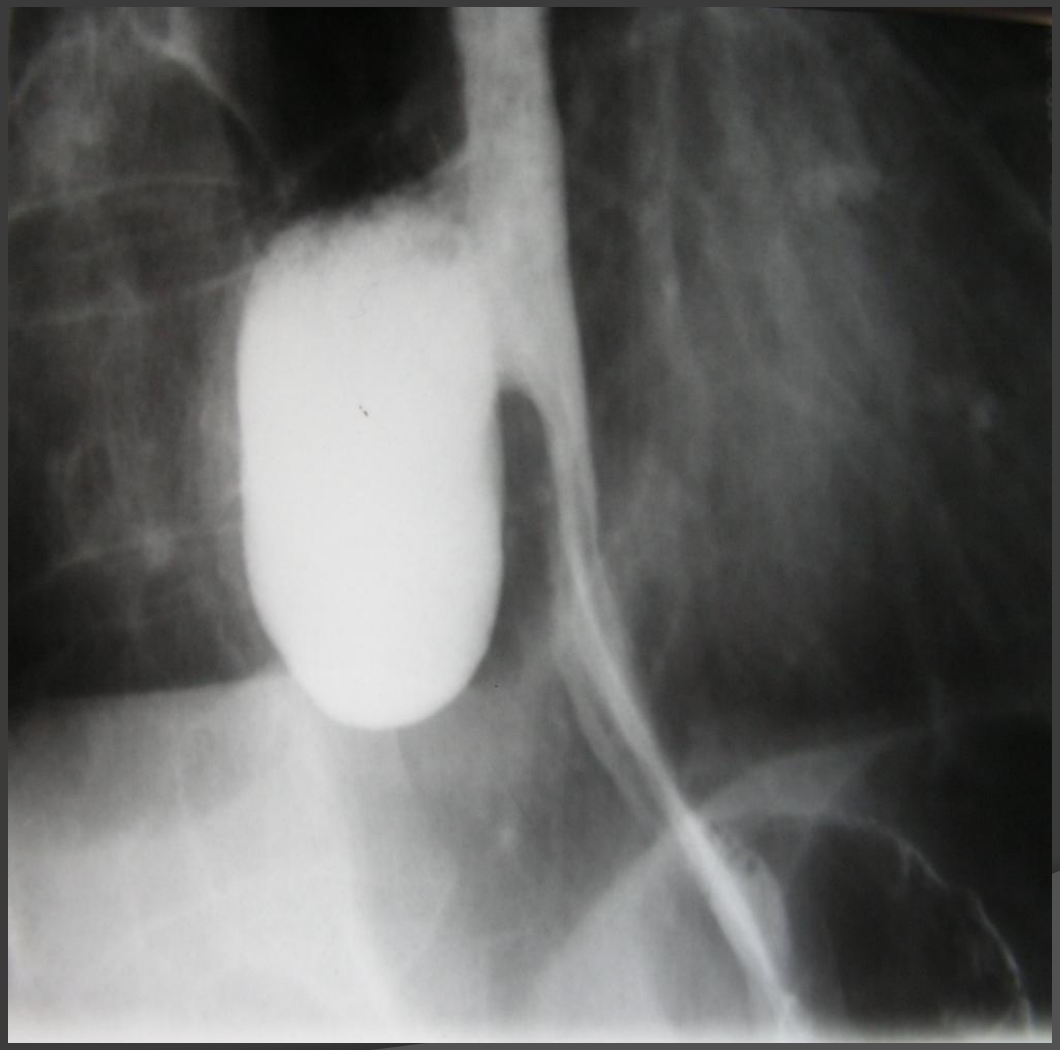


= protrusion of the inner lining of the mucosa through the outer muscular coat to form a small pouch with a narrow neck

ESOPHAGEAL DIVERTICULUM

EPIPHRENIC ESOPHAGEAL DIVERTICULUM

GIANT ESOPHAGEAL DIVERTICULUM

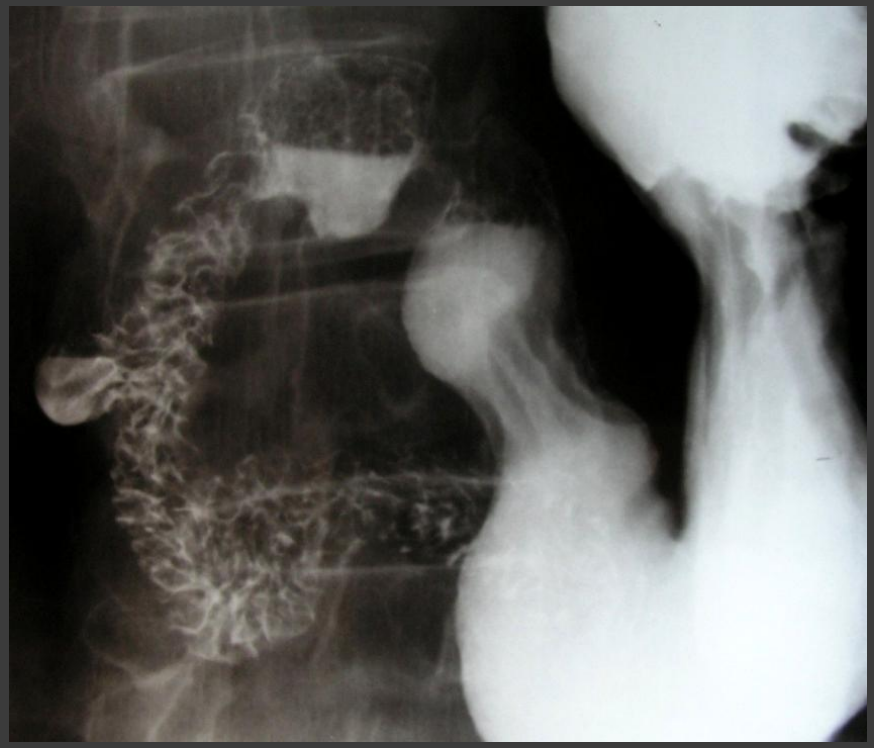


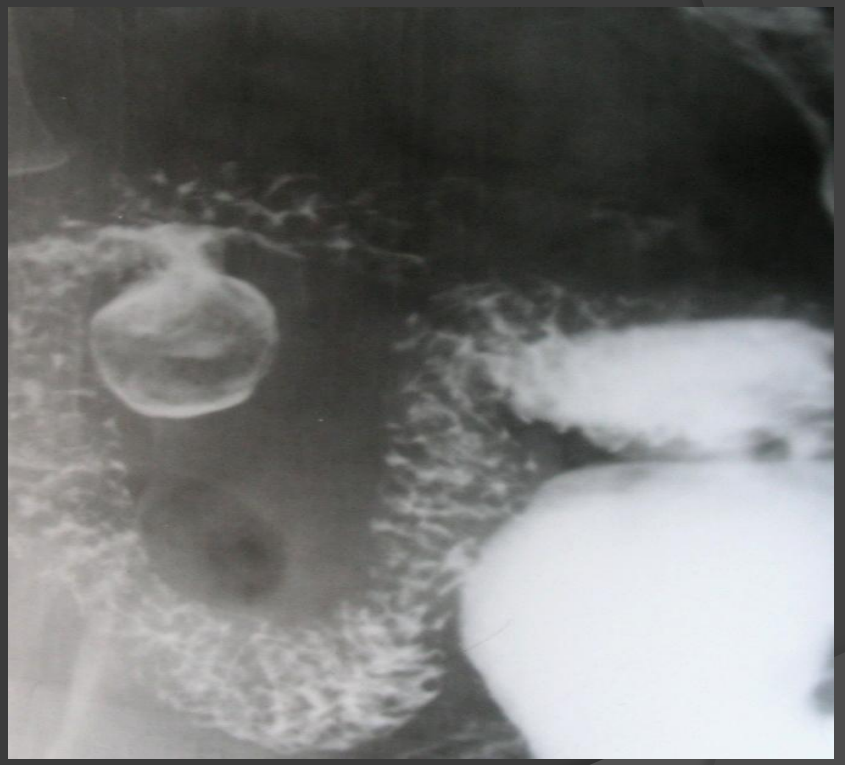
GASTRIC ULCER

Radiological morphological sings

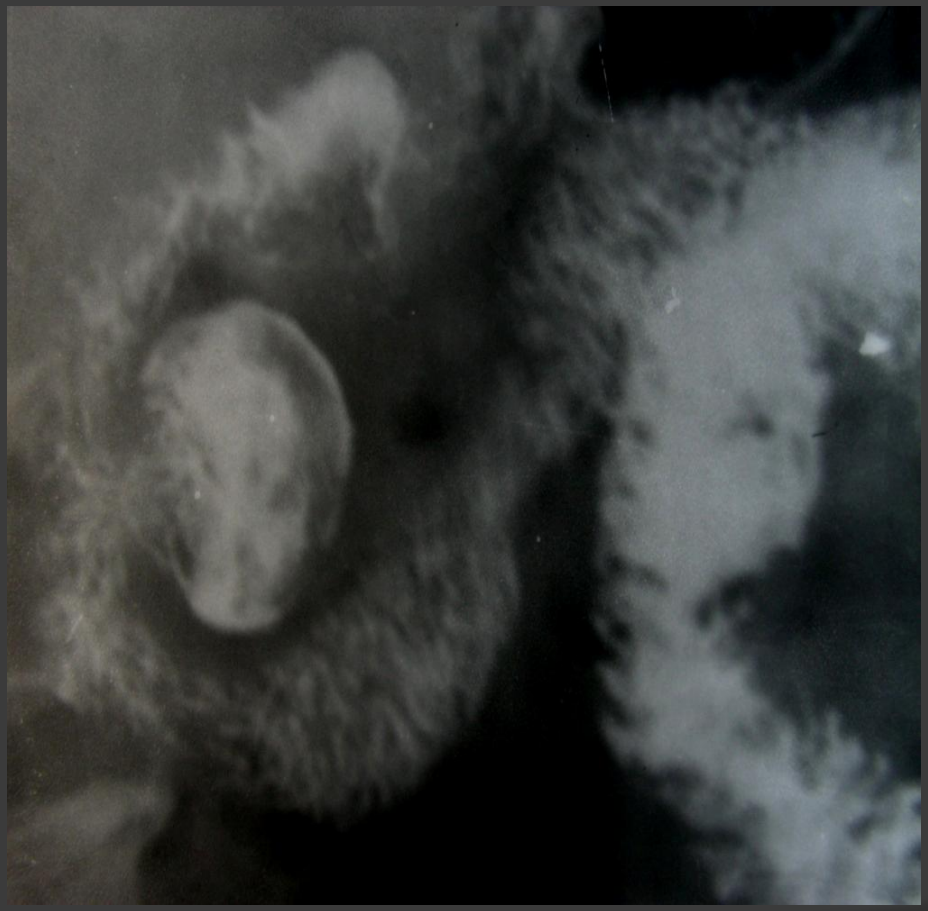
- Niche-image ,,plus filling”
- Marginal edema
- Convergence of plica gastrica

DUODENAL DIVERTICULUM



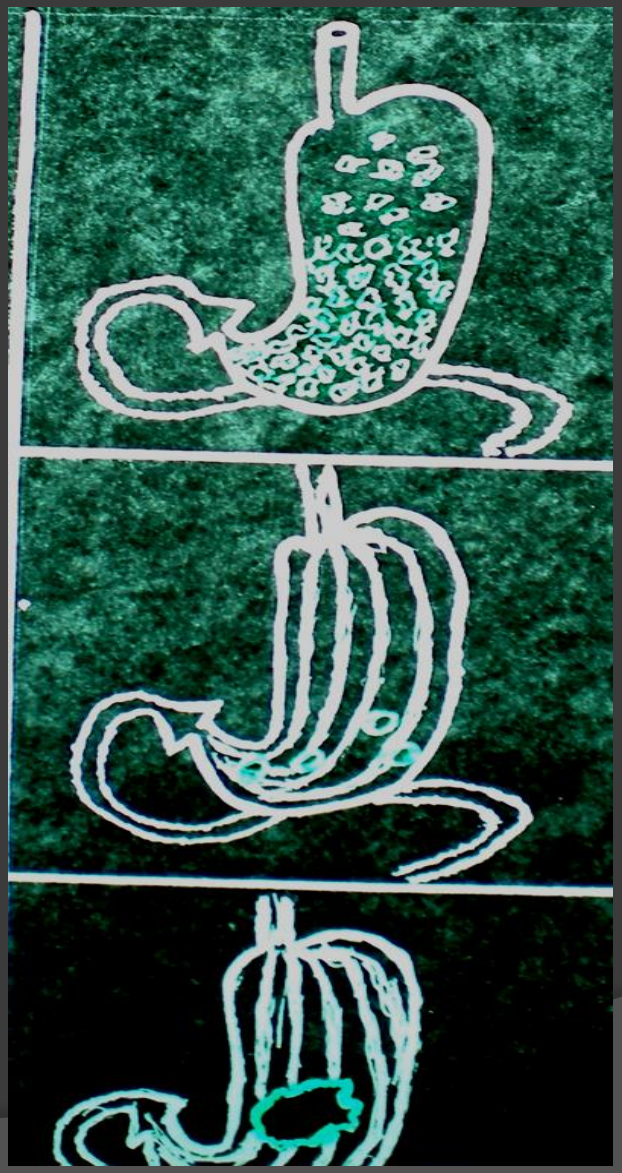


DUODENAL DIVERTICULUM



GASTRIC MUCOSAL ABNORMALITIES

- Enlarged area gastrica
- Ovoid lacunar defect of mucosa
- Interruption of plica gastrica



- Chronic gastritis
- Gastric polip
- Gastric tumor

GASTRIC POLIP

- **Lacunar image (defect of filling-** image ,,minus filling”**,) with regular borders**

1. Barium study of esophagus and stomach (standing view)

2. The position is correct. The image is with good and correct exposure. In the radiography we determine radiological symptoms: local stenosis of lower esophageal sphincter (cardiac) – bird pick sign, suprastenotic physiological dilatation of esophagus. Also it is determined that is partial stenosis of cardia because it seen barium in the stomach, without gas in the fundus.

3. Conclusion: esophageal achalasia grade III-IV.

1. Simple radiography of chest AP view

2. The position of patient is correct, the clavicles are simetric. The image is with good and correct exposure. The lungs are transparent. The pulmonary pattern is enhaced. The pulmonary hilum are structurated bilateral. The costophrenic angle are clear bilateral. The diaphragm is with clear border. The bones are structured and soft tissues are clear. The heart is not enlarged. Bilateral under the diaphragm it is determined a zone of hyperlucency due to accumulation of free gas characteristic for ,,moon sign''.

3. Conclusion: Bilateral Pneumoperitoneum.

1. Barium study of stomach (standing view)

2. The position is correct. The image is with good and correct exposure. In the radiography we determine radiological morphological symptoms: plus filling defect characteristic for niche sign in medial part of lesser curvature of stomach, with marginal edema and convergence of plica gastrica. The rest parts of stomach are structured

3. Conclusion: gastric ulcer.

1. Barium enema

2. The position is correct. The image is with good and correct exposure. In ascendenting segment determine local stenosis of colon for 5 cm, with irregular borders, ill defined shape - „ apple core” sign with absent of haustras.

3. Conclusion: ascending colon Cancer

1. stomach Barium study (standing view)

2. The position is correct. The image is with good and correct exposure. In the radiography we determine radiological symptoms: minus filling defect – lacuna, with irregular borders, ill defined shape, heterogenous structure in the stomach antrum.

3. Conclusion: gastric cancer.

1. Barium study of esophagus (standing view)

2. The position is correct. The image is with good and correct exposure. In the radiography we determine radiological symptoms: plus filing defect in medium part of esophagus, with regular borders, round shape, homogenous structure

3. Conclusion: esophageal diverticulum.

1. Barium study of esophagus and stomach (standing view)

2. The position is correct. The image is with good and correct exposure. In the radiography we determine prolaps of superior part of stomach above diaphragm through esophageal sphincter.

3. Conclusion: hiatal hernia.