BARIUM MEAL

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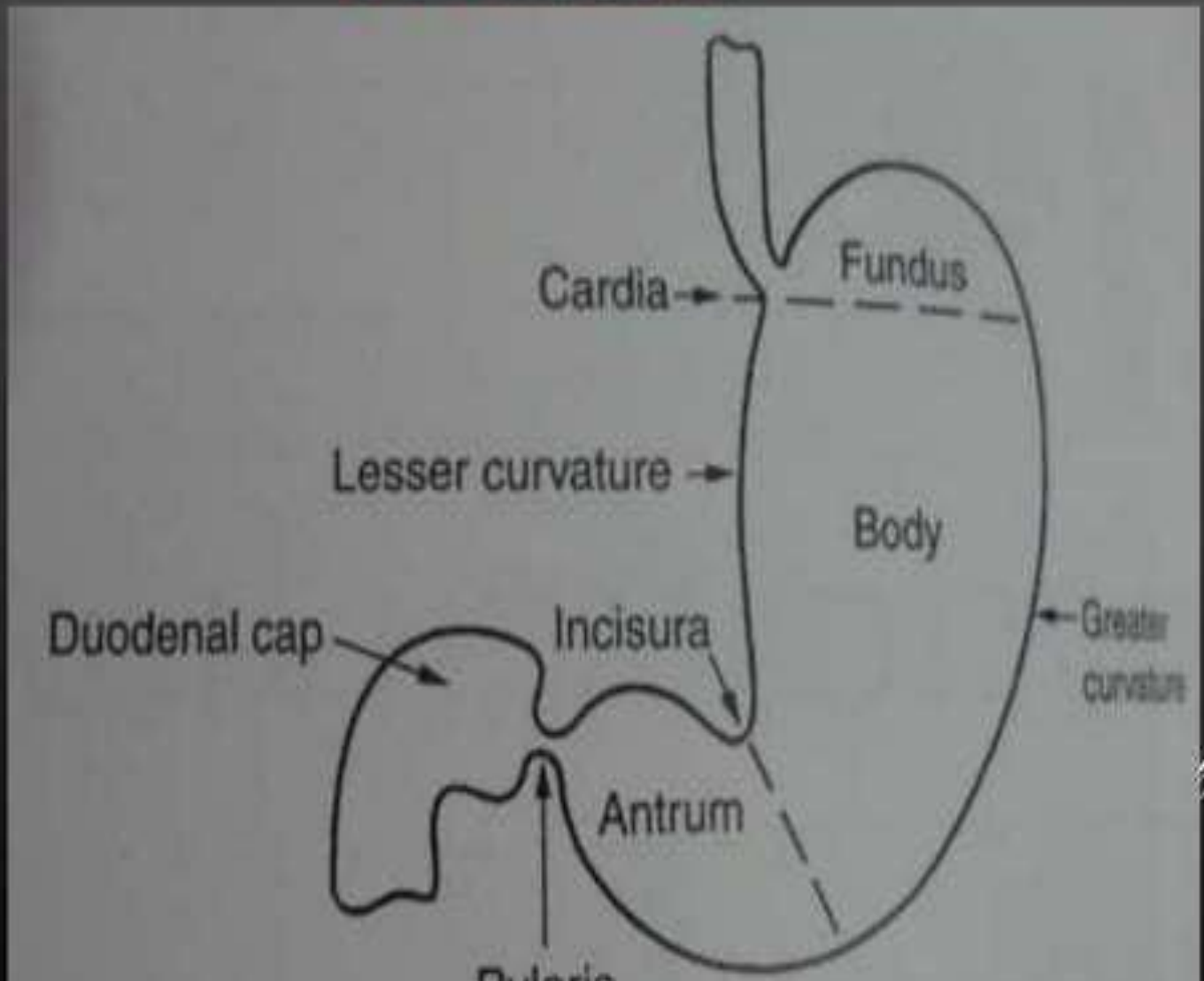
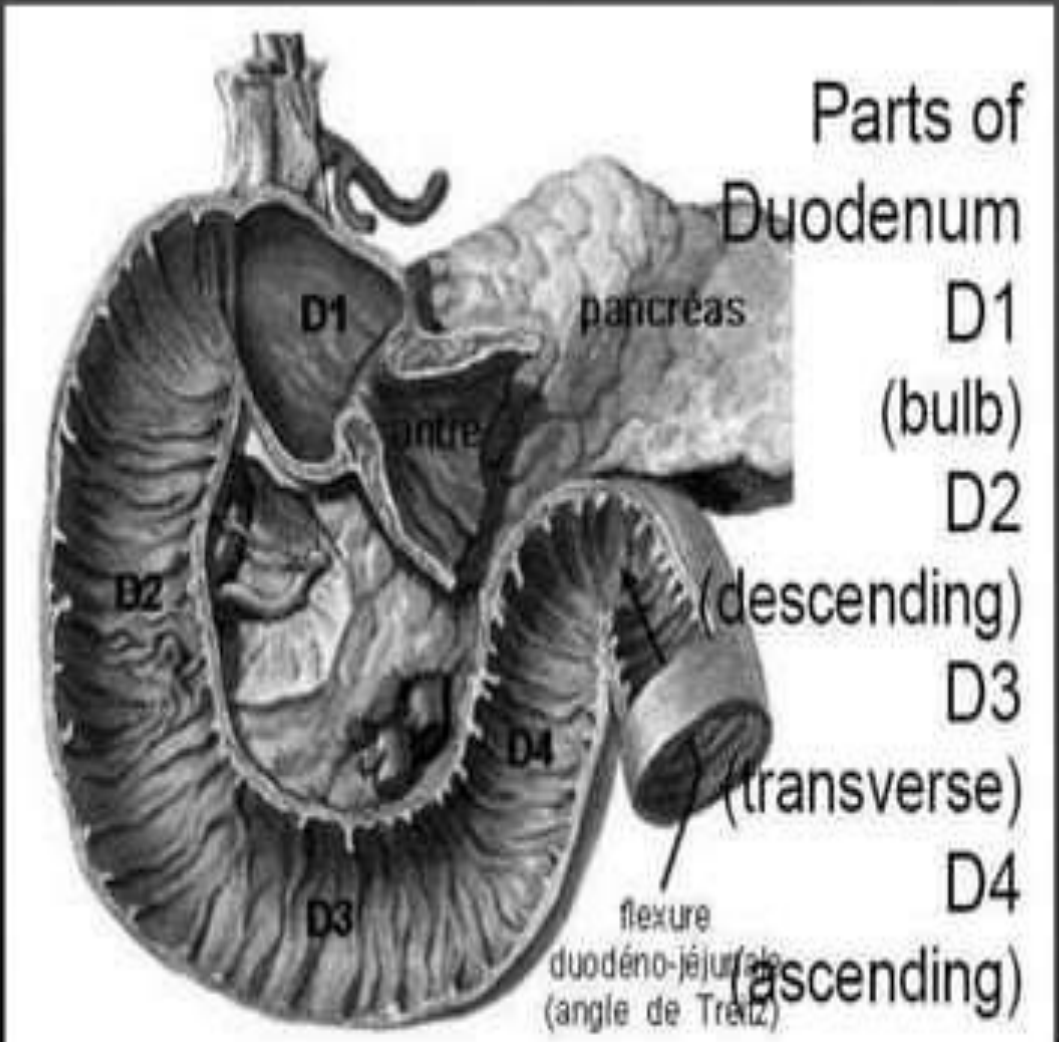
DY PATIL MEDICAL COLLEGE AND

- Barium meal is the radiological study of oesophagus, stomach, duodenum and proximal jejunum. It is done by oral administration of contrast media.
- **Gross anatomy**
  - Cardiac sphincter / Oesophageal sphincter
  - Stomach
    - Fundus
    - Body
    - Pyloric antrum
    - Rugae
    - Pyloric sphincter
    - Greater/lesser curve
  - Duodenum

STOMACH


Cardia
Fundus
Lesser curvature
Body
Duodenal cap
Incisura
Greater curvature
Antrum


Parts of
Duodenum
D1
(bulb)
D2
(descending)
D3
(transverse)
D4
(ascending)
D1
pancréas
D2
D3
D4
flexure
duodéno-jéjunale
(angle de Treitz)

INDICATIONS

- 1. Symptoms which prompts Barium meal study are :
- (a) Epigastric pain suggestive of peptic ulceration.
- (b) Anorexia.
- (c) Weight loss.
- (d) Vomiting.
- (e) Anaemia.
- (f) Heart burn.

2. Upper abdominal mass.
3. Gastro-intestinal haemorrhage.
4. Gastric or duodenal obstruction
5. Malignancies of oesophago-gastric junction, stomach and duodenum.
6. Systemic diseases like Tuberculosis
7. Motility disorders of gastro-intestinal tract.

8. In children for vomiting due to :
(i) Gastroesophageal reflux;

CONTRAINDICATIONS

- Suspected cases of gastro-duodenal perforation
- History or suspicion of aspiration.
- Large bowel obstruction (Barium inspissation occurs)•
- Fistulous communication with any organs
- Recent biopsy from GIT. (barium granuloma may form)

PREPARATION

Fasting for 6 hours/over night fasting

•Avoid cigarette smoking as it may interfere with optimum coating of the mucosa.

•In patients with gastric outlet obstruction, prolonged fasting or I.V Metaclopramide and sometimes nasogastric intubation and aspiration of the contents may be necessary

CONTRAST MEDIA

Single Contrast Study

- Low density barium suspension (80-100% w /v) is used.
- Water soluble contrast media are indicated when a gastro- duodenal perforation is suspected because it gets resorbed from the mediastinum or peritoneum unlike barium which can cause granulomatous reaction.
- Use of newer non-ionic water soluble contrast

CONVENTIONAL SINGLE CONTRAST STUDY

- 10-15 ml of 80-100% w/v barium suspension is given
- patient lying supine is rotated with the right side going up in a continuous clockwise manner for obtaining a good coating of the entire stomach mucosa.
- 100-250 ml of barium is given. Spot films of the filled fundus in varying obliquity may be taken.

- Patient is turned prone oblique right side dependent as barium enters the duodenum through the pylorus. Spot films for duodenal bulb and C loop can be taken and also in right anterior oblique view.

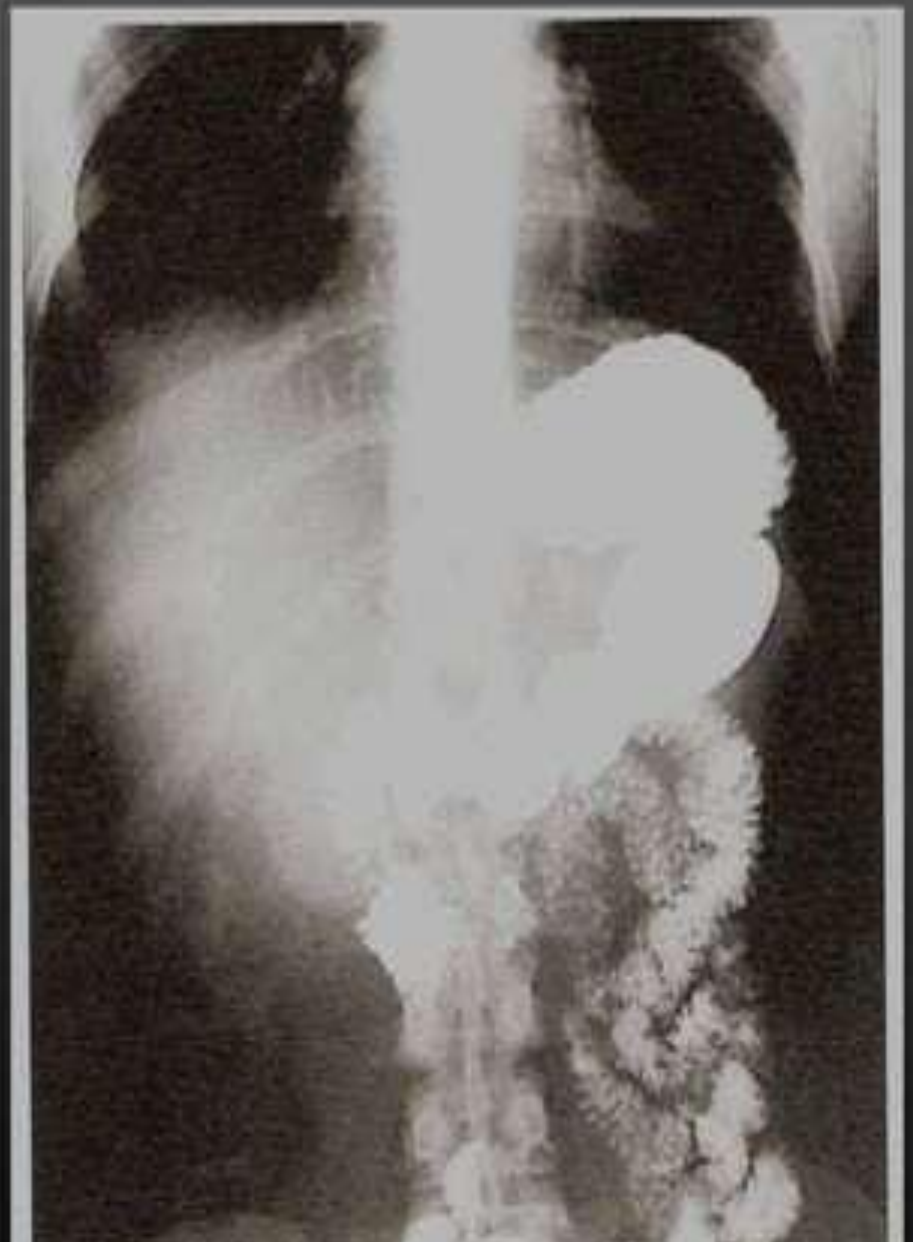
- More barium is given to distend the stomach wall . The gastric peristalsis and rate of emptying through the pylorus is observed. The patient is rotated under fluoroscopy to observe all margins

- In erect position, right anterior oblique view of stomach shows incisura angularis & Proximal jejunum

- For retrogastric space, about 200-250 ml of barium is given in supine position,& translateral film is taken

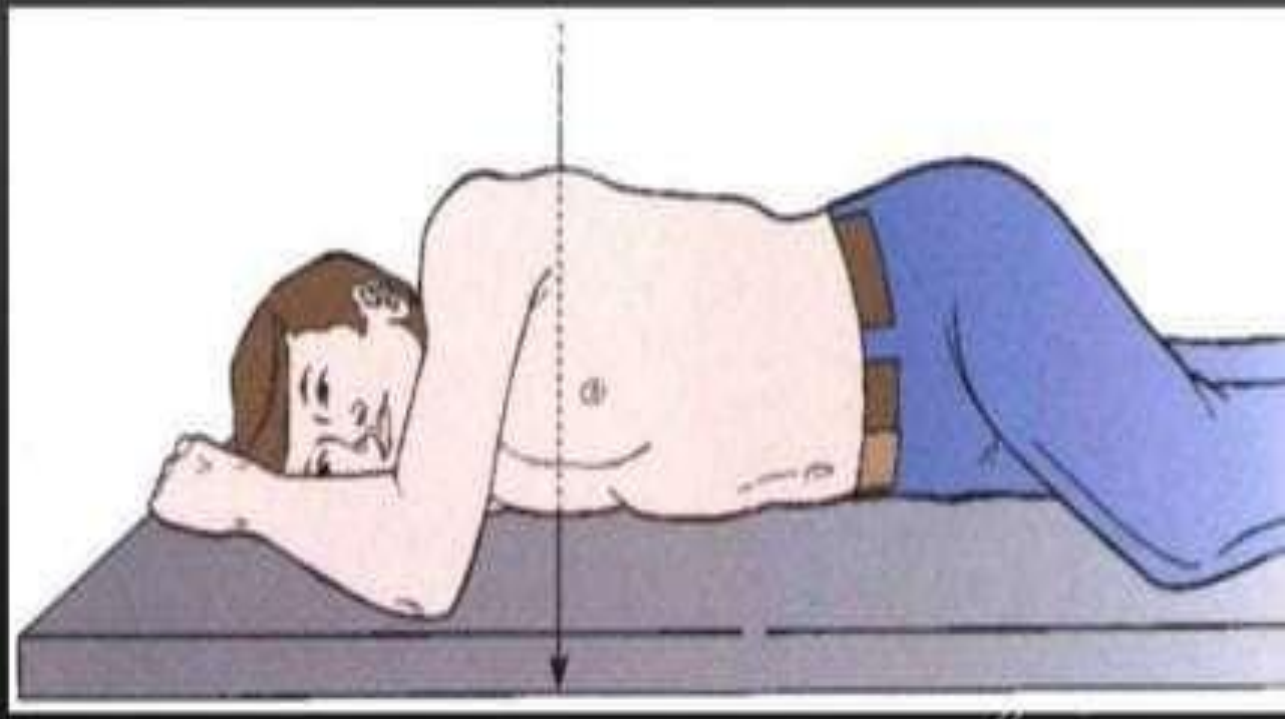
ANTEROPOSTERIOR

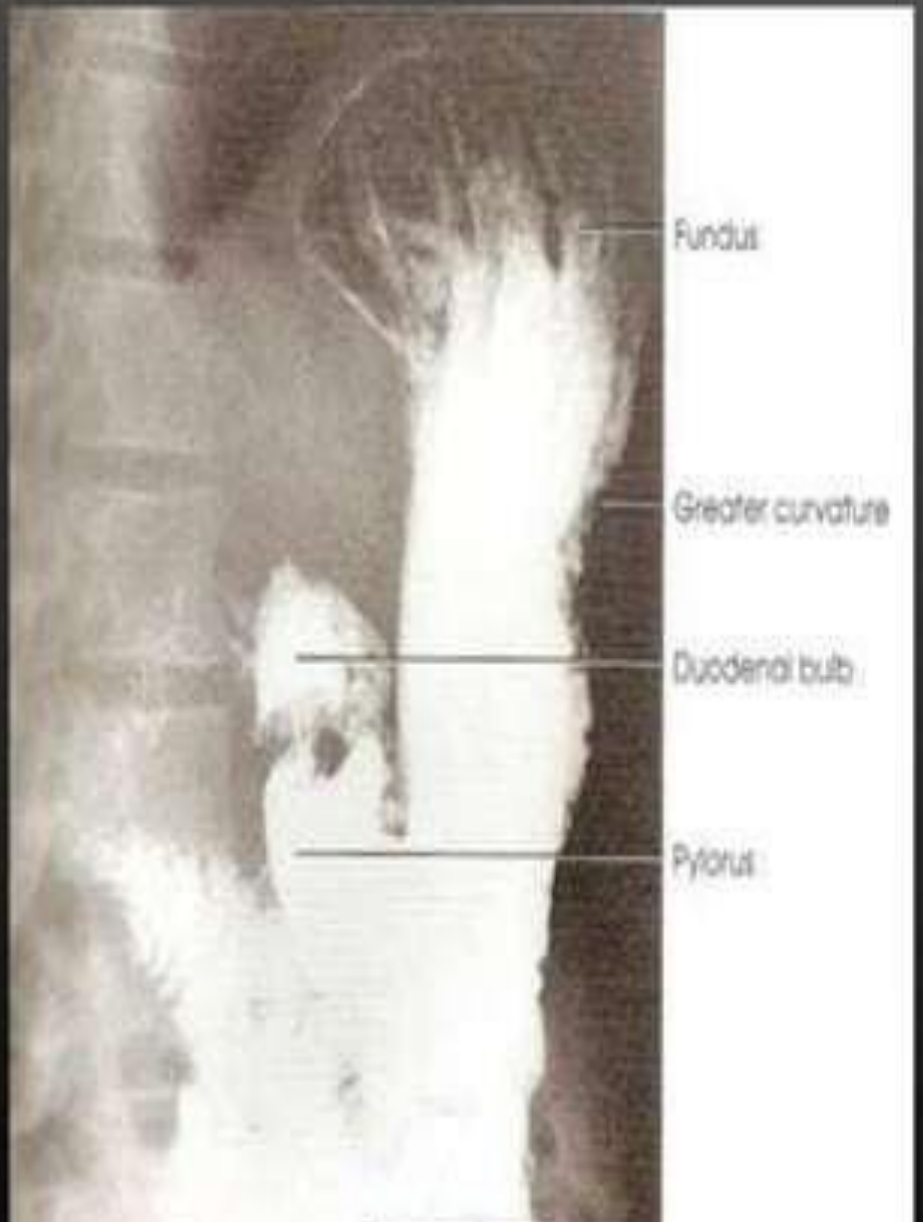
- Patient position
  - Supine
  - Arms at sides outside of radiographic field
  - Gonad shielding



RIGHT ANTERIOR OBLIQUE (RAO)

- Especially pyloric canal and duodenal bulb
- Patient position
  - Semiprone (RAO)
  - Patient head in right lateral position
  - Gonad lead protection



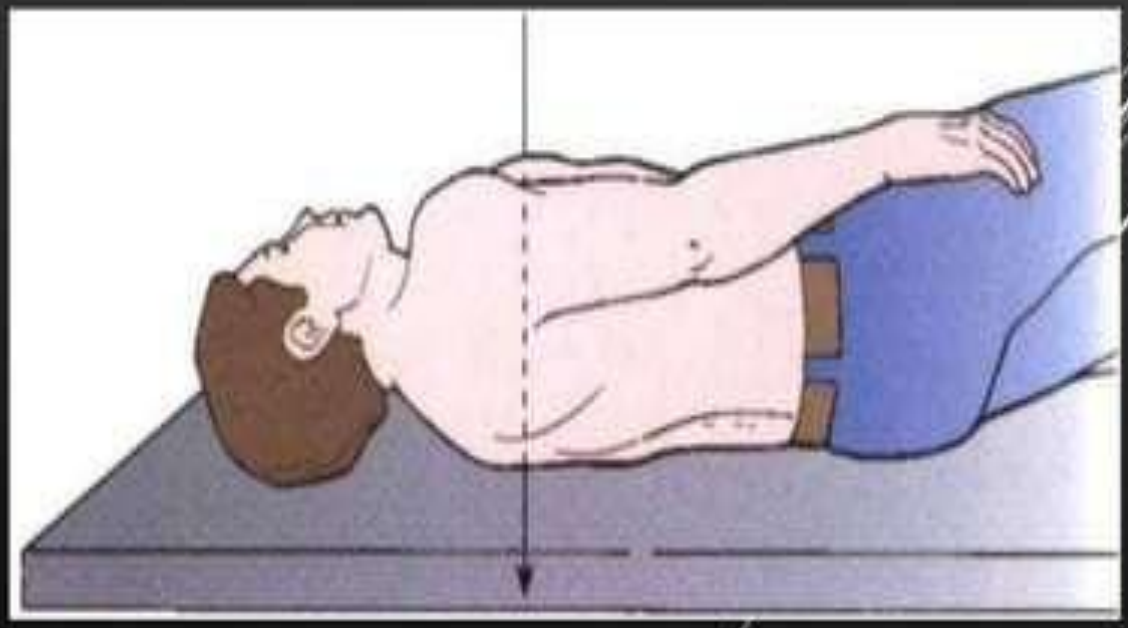

Fundus
Greater curvature
Duodenal bulb
Pylorus

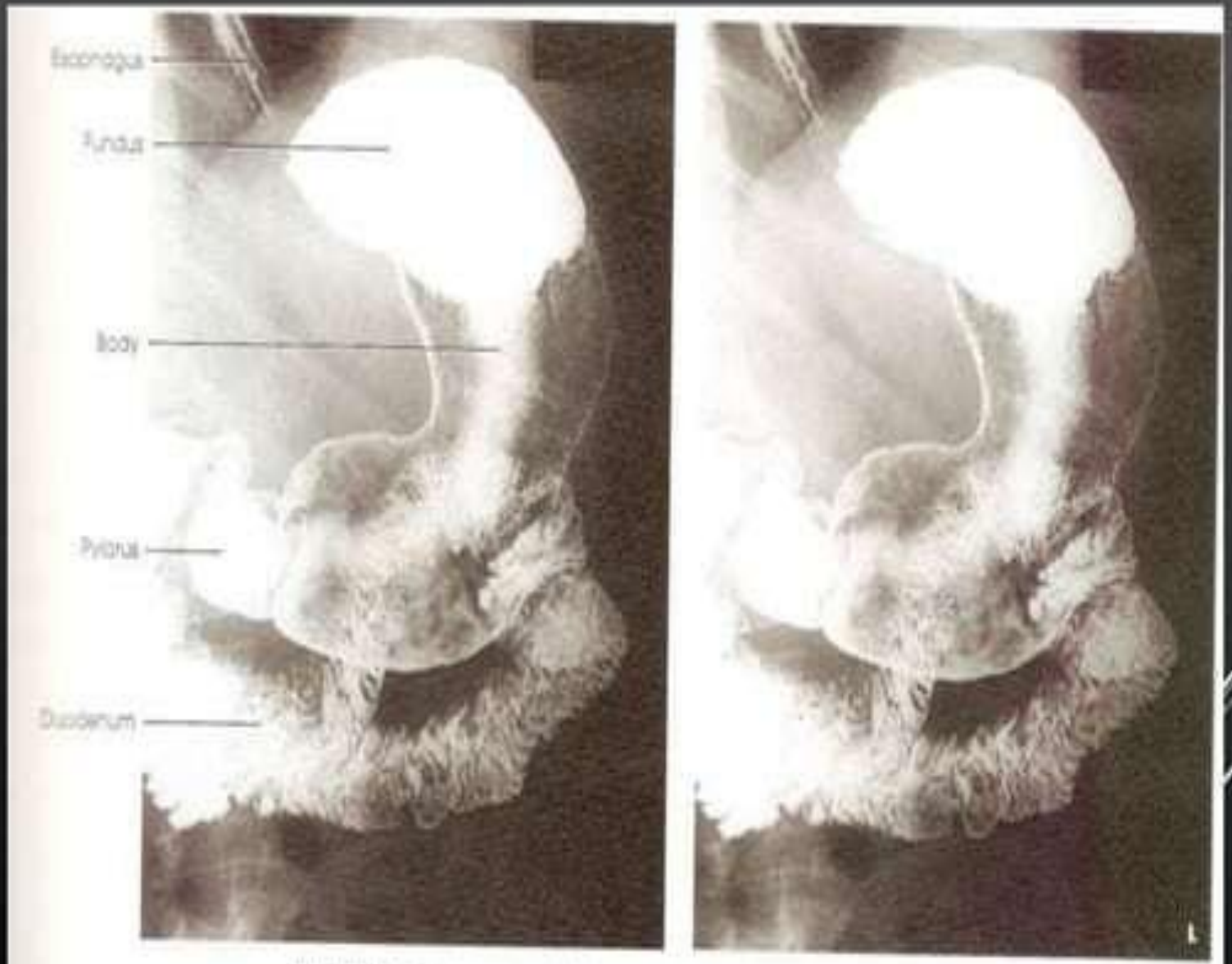
LEFT POSTERIOR OBLIQUE (LPO)
(AP OBLIQUE)

Especially fundus

Pyloric canal and duodenal bulb should be seen without superimposition

- Patient position
  - LPO
  - Patients head on
  - pillow
  - Left arm extended away from body, to prevent unwanted superimposition
  - Gonad protection




Fundus
Body
Pylorus
Duodenum

LATERAL

- Especially anterior and posterior walls of stomach, duodenal bulb, and duodenal loop.
- Patient position
  - Right lateral
  - Raise patients arms,
  - Flex knees
  - Gonad protection

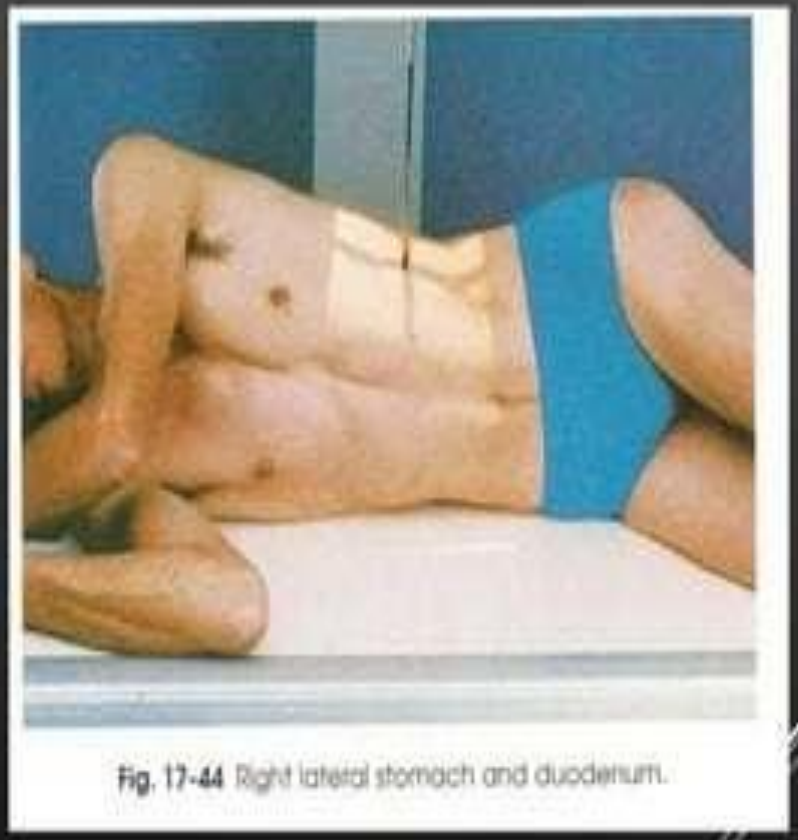
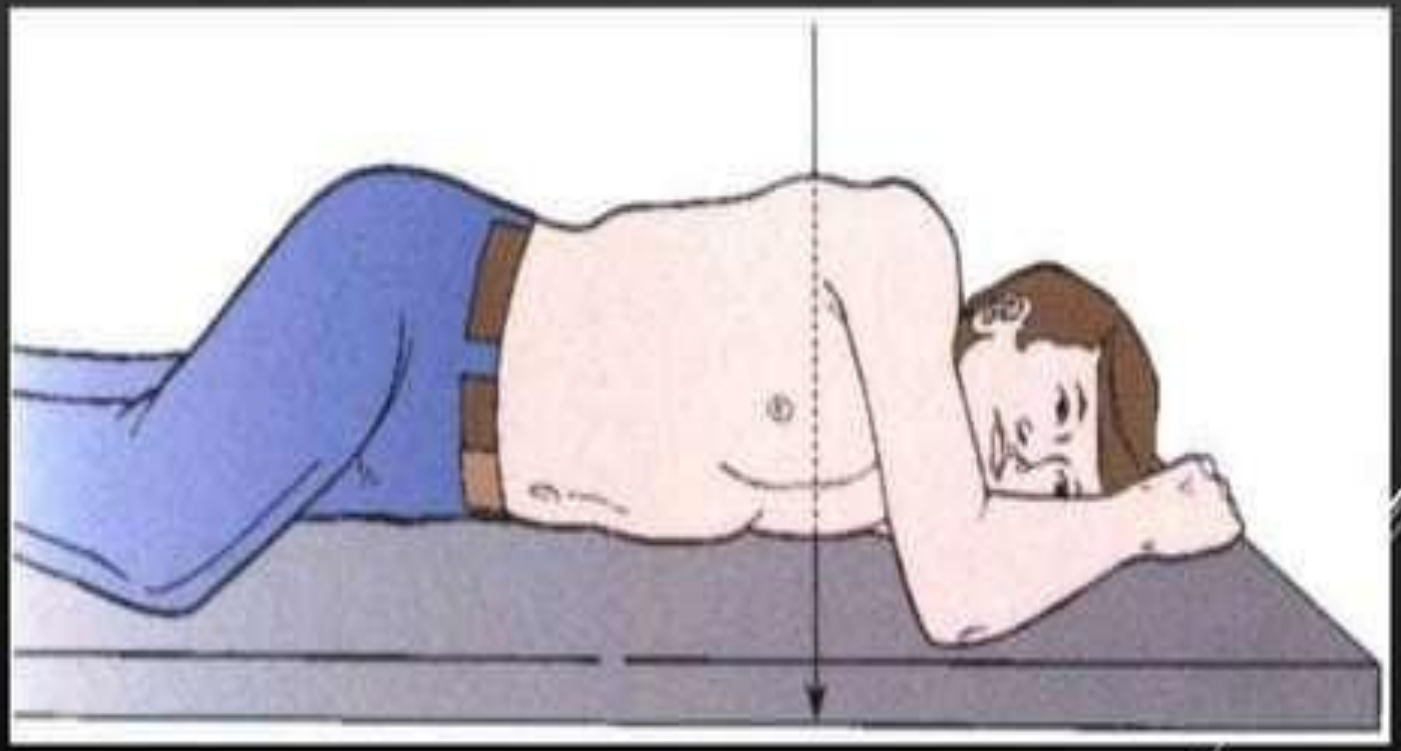
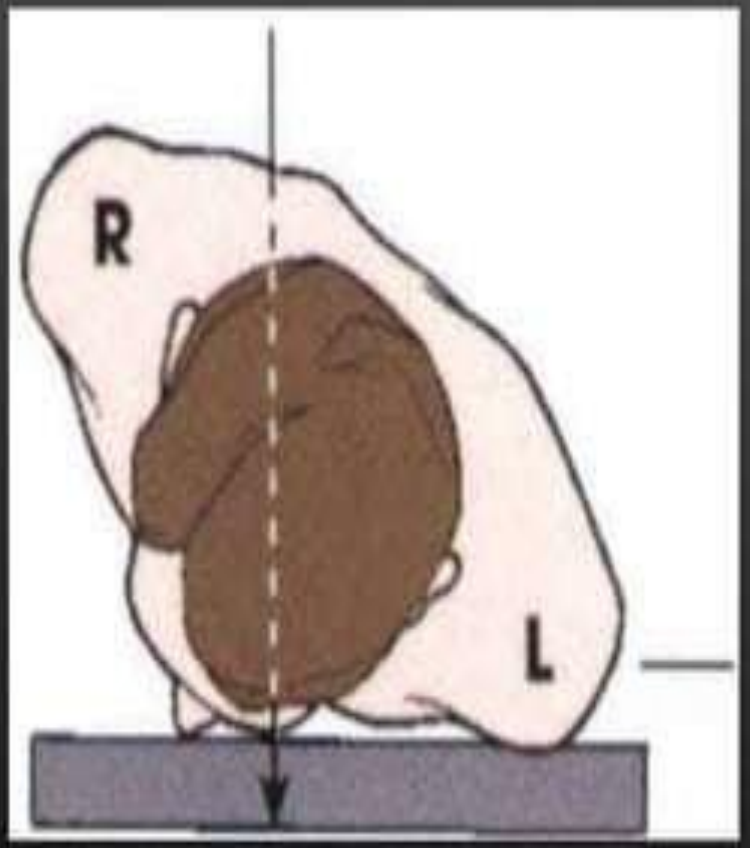


Fig. 17-44 Right lateral stomach and duodenum.

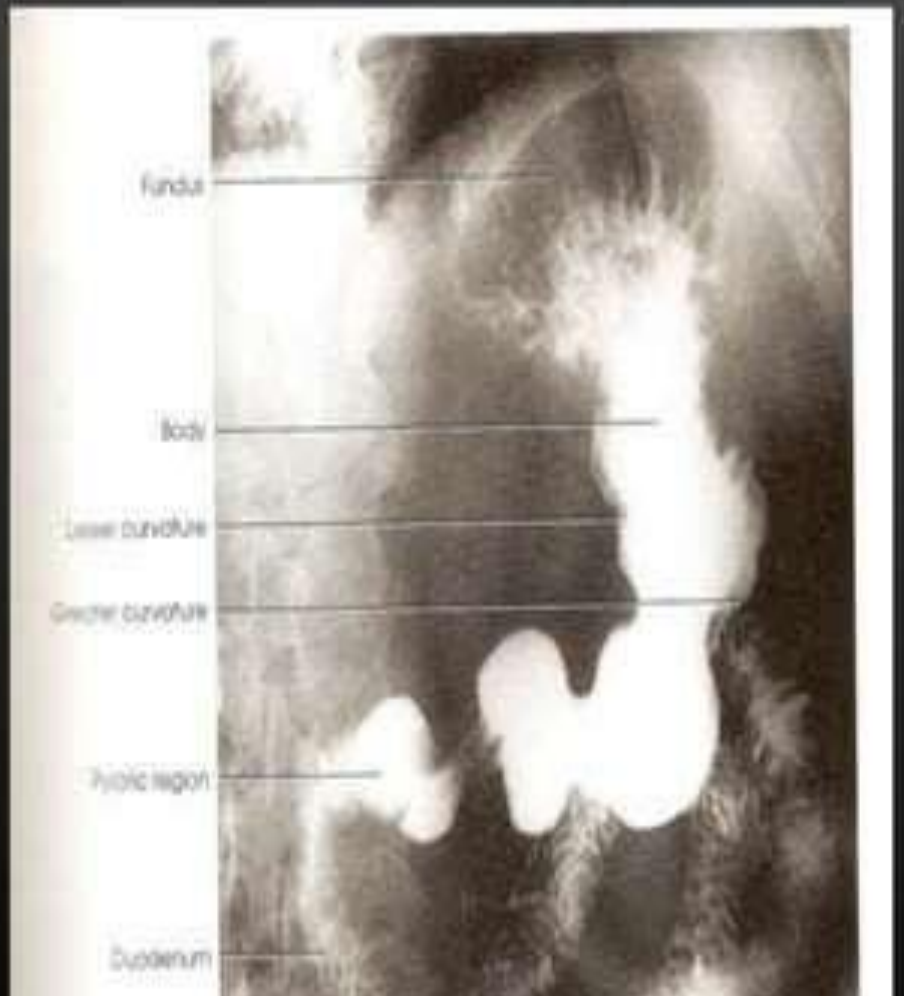
LEFT ANTERIOR OBLIQUE (LAO):

LAO – TO DEMONSTRATE THE LESSER CURVATURE




R
L

PA- AXIAL


Fundus
Body
Lesser curvature
Greater curvature
Pyloric region
Duodenum

EVALUATION CRITERIA:

- ENTIRE STOMACH VISIBLE.
- BODY AND PYLORUS FILLED WITH CONTRAST AGENT.
- SUFFICIENT GAS RETAINED WITH SUITABLE CONTRAST COATING TO SEE GASTRIC MUCOSA.

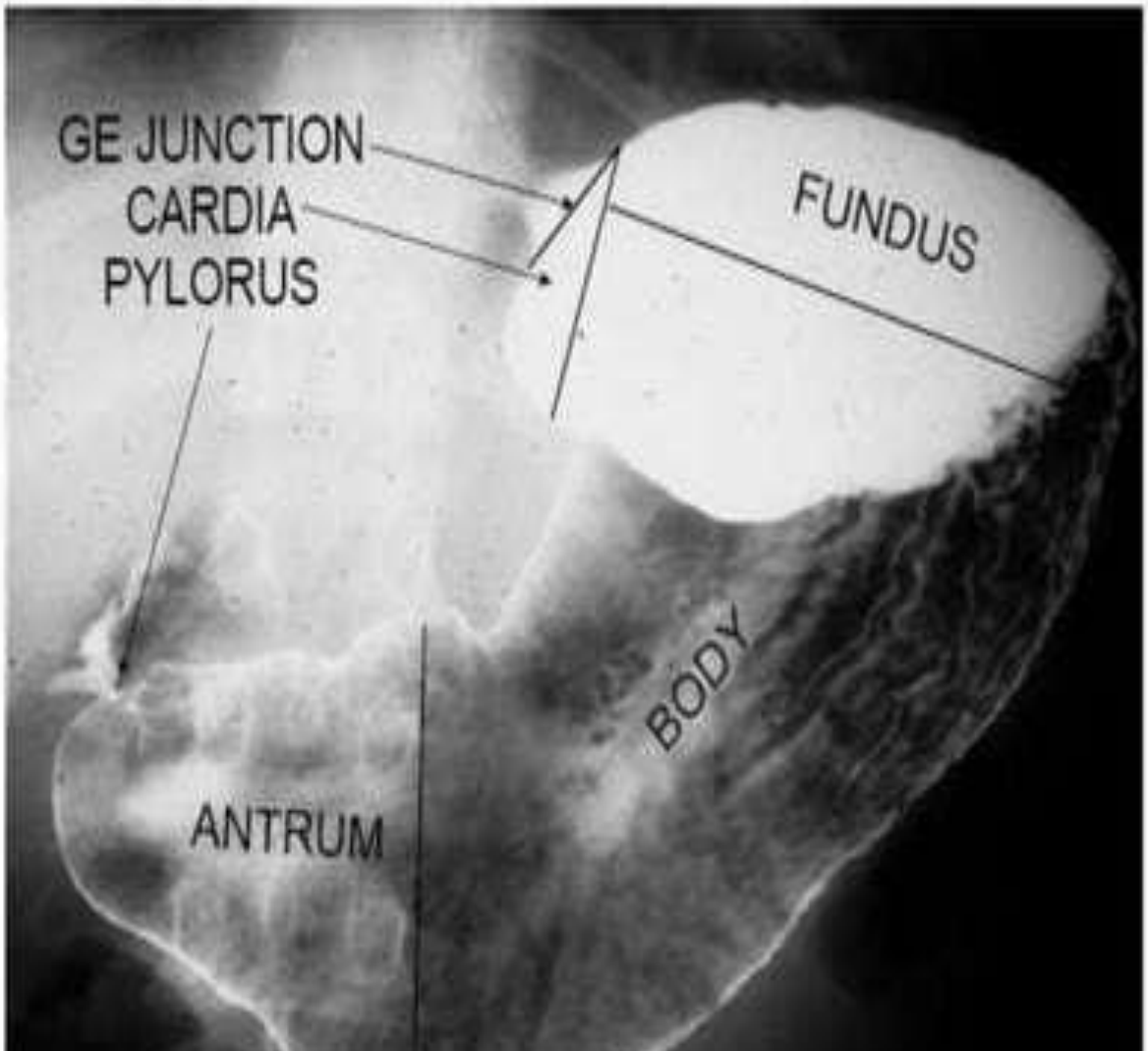
ADVANTAGES OF SINGLE CONTRAST STUDIES

- For patients who are immobile or unable to swallow gas forming tablets.
- Pylorospasm, fistulae and enlarged gastric rugae are best seen.
- Filling defects due to large masses in pyloric and duodenal region are more easily seen than in double contrast
- It is the procedure of choice to examine patients with

DISADVANTAGES OF SINGLE CONTRAST STUDY

- Lack of sensitivity in detecting small erosion/linear ulceration, superficial gastric carcinomas and subtle mucosal abnormalities.

Upper GI Series - Stomach



DOUBLE CONTRAST BARIUM STUDY

- Used in Japan with high incidence of gastric malignancy, for mass screening of the gastric tumours for early detection.
- Relies much less on fluoroscopy and more on filming which is done overcouch for better image quality.
- Found very useful for small mucosal lesions like polyps, mucosal erosions and ulcers, recurrent tumours and post operative studies.

PREPARATION

- A 'dry' fluid free stomach is essential. Double contrast study should not be done if secretions exist in the stomach. The secretions will prevent adequate mucosal coating and may mimic tumours

CONTRAST MEDIA

- High density (200-250% w /v) low viscosity barium sulphate is essential. High viscosity barium does not flow well and does not coat mucosa well, hence can produce apparent mucosal lesions.
- Antifoaming agents which are added to barium suspension prevent air bubble formation. Air bubbles can mimic polyps.

GAS FORMING AGENT

- Sodium bicarbonate and Citric acid are given orally. When they come in contact in the stomach, carbon dioxide is produced which acts as negative contrast.

- When Ryle' s tube is placed in the stomach, this can be used to inject air.

TECHNIQUE OF DOUBLE CONTRAST

About 100-150 ml of high density low viscosity barium is given.

Injection Buscopan IV - given just before giving barium to study the stomach.

To study the stomach and duodenum, injection its given when barium enters the duodenum.

Gas forming agents are given.

- **Advantages of double contrast study**
- Highly accurate method of detecting abnormalities following gastric surgery
- bile reflux gastritis
- marginal ulceration
- recurrent carcinomas
- abnormalities of the efferent loop.

Disadvantages of double contrast study

·Probably misses some polyps, ulcers, erosions, superficial carcinoma.

Barium Meal, Double Contrast (Supine Position)

Fig. 17-31 Single-contrast PA stomach and duodenum.

Fig. 17-32 Double-contrast PA stomach and duodenum.

BIPHASIC STUDY OF UPPER GIT

Introduction

•Gives good anatomic & physiologic information & has accuracy comparable to endoscopy.

Goal

•To have both mucosal delineation in double contrast phase & full column distention in single contrast phase

INFLAMMATORY AND ULCERATIVE DISEASES

•Double-contrast : Thickened, lobulated folds are present in the body and antrum of the stomach

• Double-contrast : Nodular fold thickening is present in the gastric antrum.

Differential Diagnosis

1. Gastritis (e.g., caused by *Helicobacter pylori*, alcohol, medication)
2. Zollinger-Ellison syndrome

Findings

Single-contrast :

An ulcer crater is located along the
lesser curvature of the gastric antrum.

Symmetric and smoothly contoured folds radiate to the crater.

The mound of edema is smooth in contour, and the crater is located centrally within the mound.

Findings

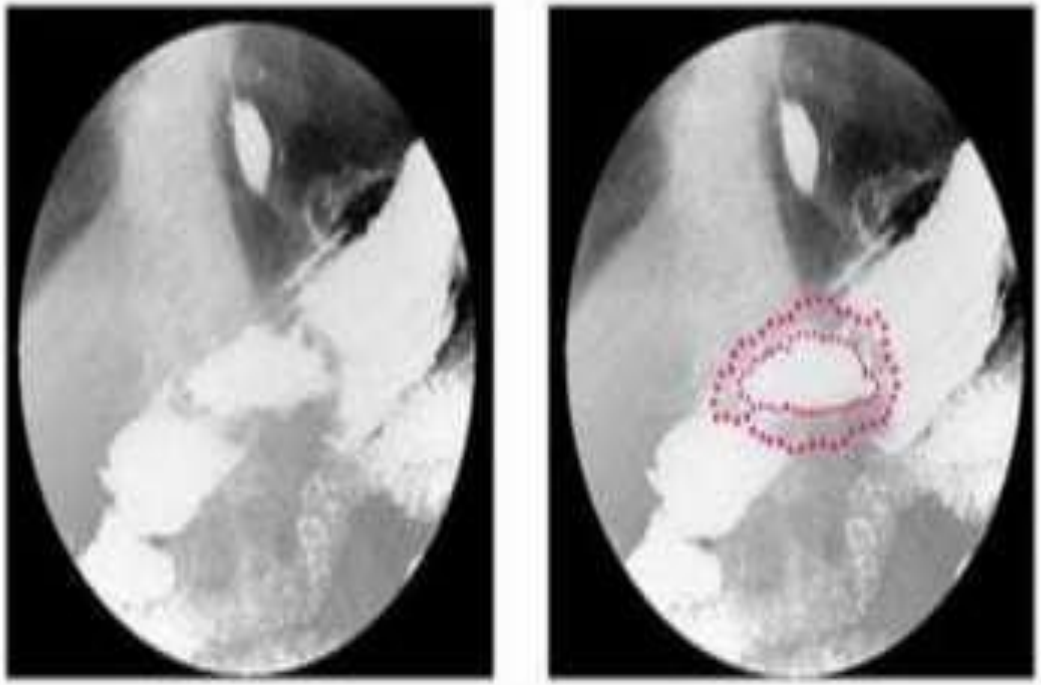
Double-contrast: An ulcer crater is present on the greater curvature of the stomach. A smooth mound of edema

Differential Diagnosis

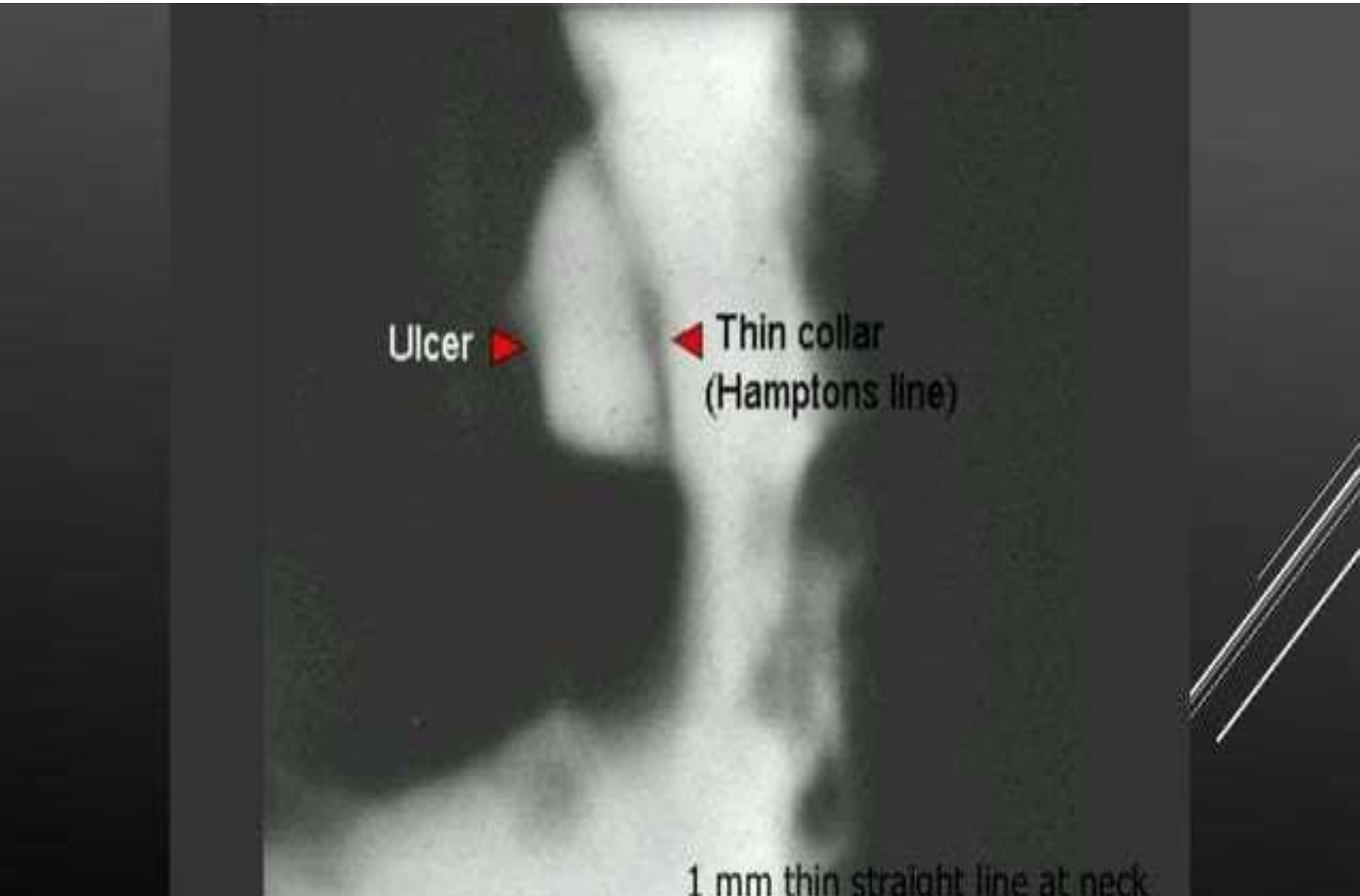
1. Benign sump ulcer
2. Gastric adenocarcinoma

FEATURES	BENIGN ULCER	MALIGNANT ULCER
INCIDENCE	95%	5%
MARGIN	SMOOTH & ROUND	IRREGULR,HEAPED
LOCATION	DISTAL STOMACH LESSER CURVATURE	FUNDUS AND GREATER CURVATURE
BASE	SMOOTH & CLEAN	SHAGGY & NECROTIC
RADIATING FOLDS	SMOOTH AND SYMMETRICAL AND REACH UPTO EDGE ULCER	DISTORED FIOLDS THAT DON'T REACH UPTO THE EDGE
ULCER COLLAR	THICKER AND SMOOTH	KIRKIN COMPLEX (heaped margins touching bed cause lucent rim around ulcer on barium meal)
Pathogonomic sign	Hamptons line	Carman's

Kirklin's meniscus complex



- Consists of Carmen's meniscus sign plus elevated rim of tumor surrounding crater
- Ulcer - Barium filled
- Halo - Rim of malignant tissue


Ulcer
Thin collar
(Hamptons line)
1 mm thin straight line at neck

- Masses and filling defects
- Benign tumours
- Malignant tumours

DOUBLE-CONTRAST : MULTIPLE POLYPOID FILLING DEFECTS ARE PRESENT IN THE STOMACH.

Differential Diagnosis

Gastric polyps

FINDINGS

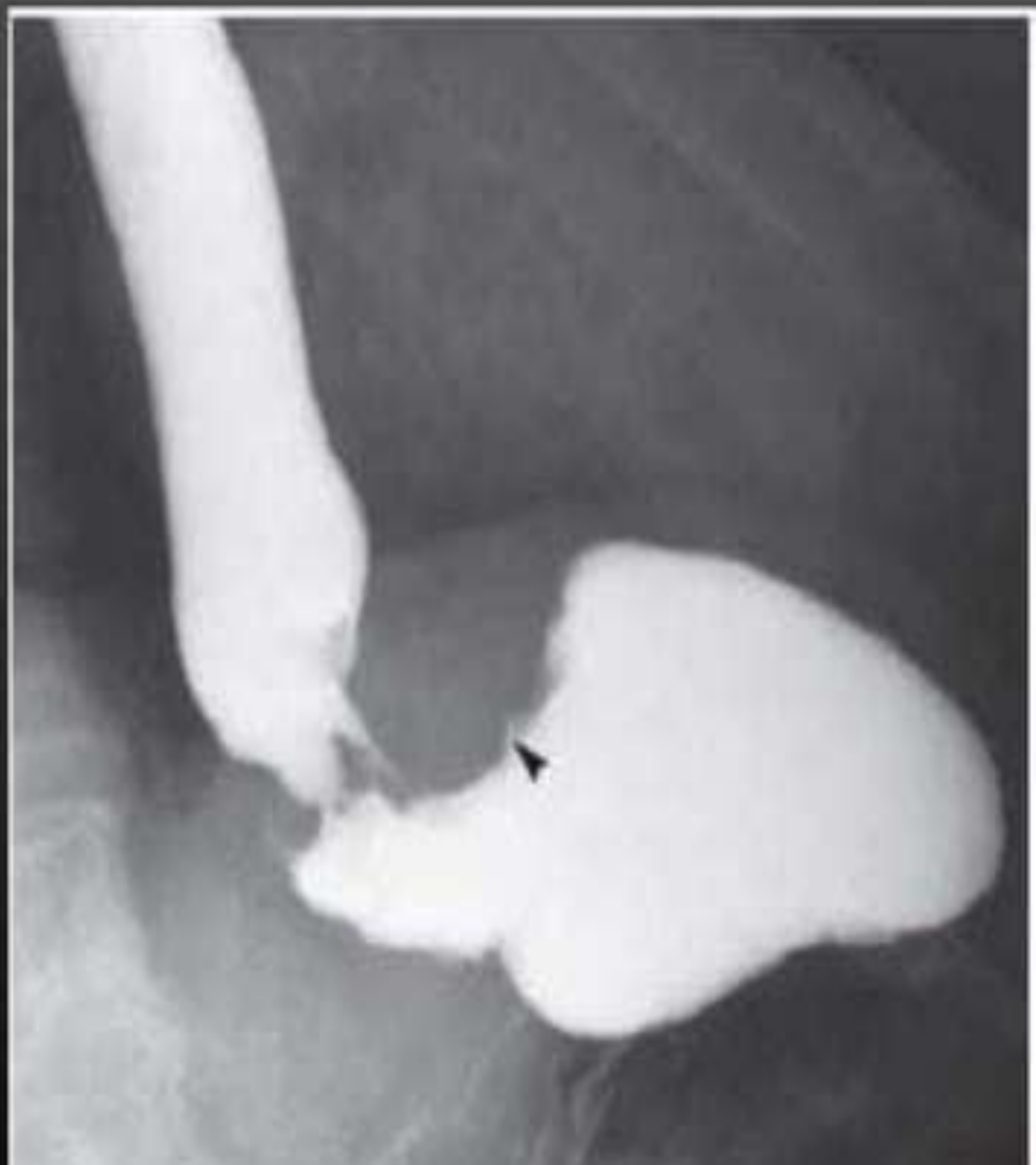
DOUBLE-CONTRAST : INNUMERABLE SMALL POLYPS ARE PRESENT THROUGHOUT THE STOMACH. THEY ARE MOST NUMEROUS WITHIN THE FUNDUS.

Differential Diagnosis

1. Gastric polyps

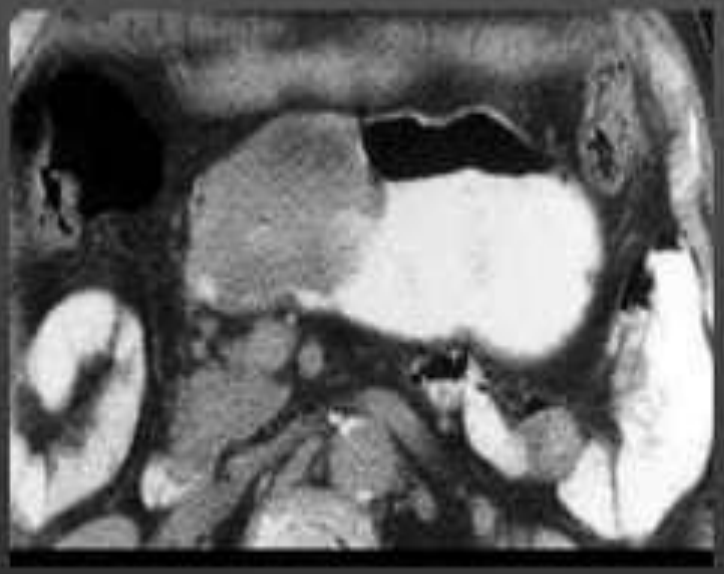
FINDINGS

DOUBLE-CONTRAST : A POLYPOID IRREGULAR SURFACE FILLING DEFECT (ARROWHEAD) IS PRESENT IN THE GASTRIC FUNDUS AND CARDIA.



Differential Diagnosis

1. Gastric adenocarcinoma
2. Gastrointestinal stromal tumor
3. Lymphoma
4. Solitary varix
5. Metastases



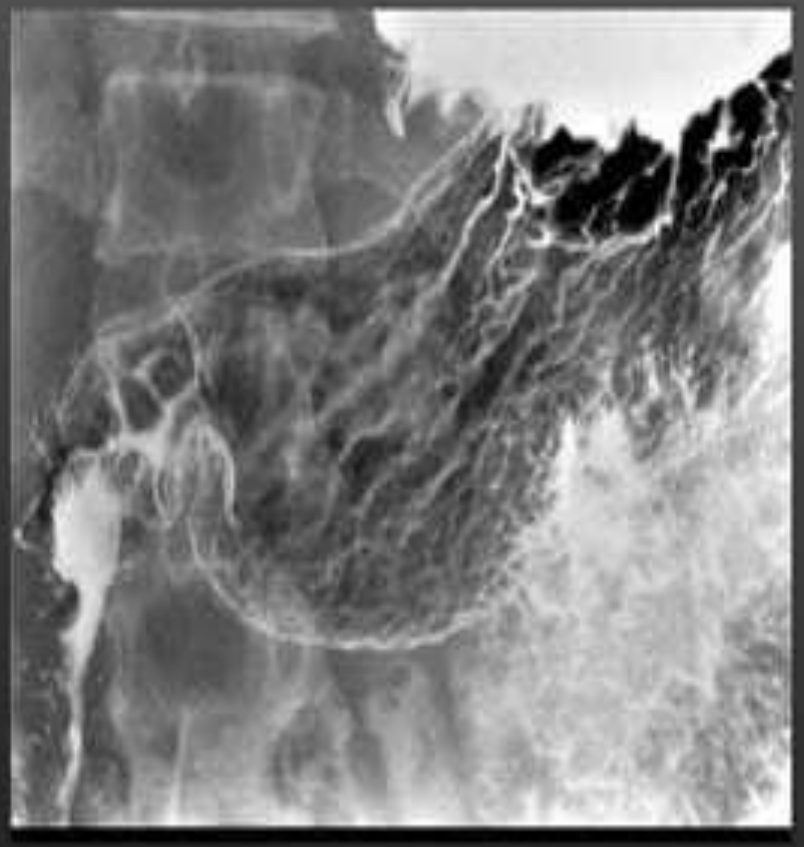
Enhanced abdominal CT. A large polypoid mass is seen arising from the anterior wall of the gastric antrum.

Single-contrast : The gastric antrum is markedly narrowed by a large constricting mass.

Differential Diagnosis

1. Gastric carcinoma

A. Double-contrast : Marked rugal fold
thickening is present throughout the stomach. Multiple nodules are



B. Double-contrast : Diffuse nodularity and fold thickening are present within the gastric body and fundus.

Differential Diagnosis

1. Lymphoma

NARROWINGS

FINDINGS

SINGLE-CONTRAST :
WITHIN THE GASTRIC ANTRUM, THERE IS SYMMETRIC, SMOOTH, TAPERED NARROWING.

Differential Diagnosis

1.Scarring from chronic peptic ulcer disease
2.Granulomatous disease (Crohn disease, sarcoidosis, tuberculosis, syphilis,

Findings

Single-contrast :
The distal third of the stomach
Is narrowed, tapered, and
nondistensible.

Differential Diagnosis

1. Chronic peptic ulcer disease
2.Granulomatous disease
(Crohn disease, sarcoidosis,
tuberculosis, syphilis,
eosinophilic gastroenteritis)
3. Gastric carcinoma
4. Metastatic breast cancer
5. Prior caustic ingestion

Findings

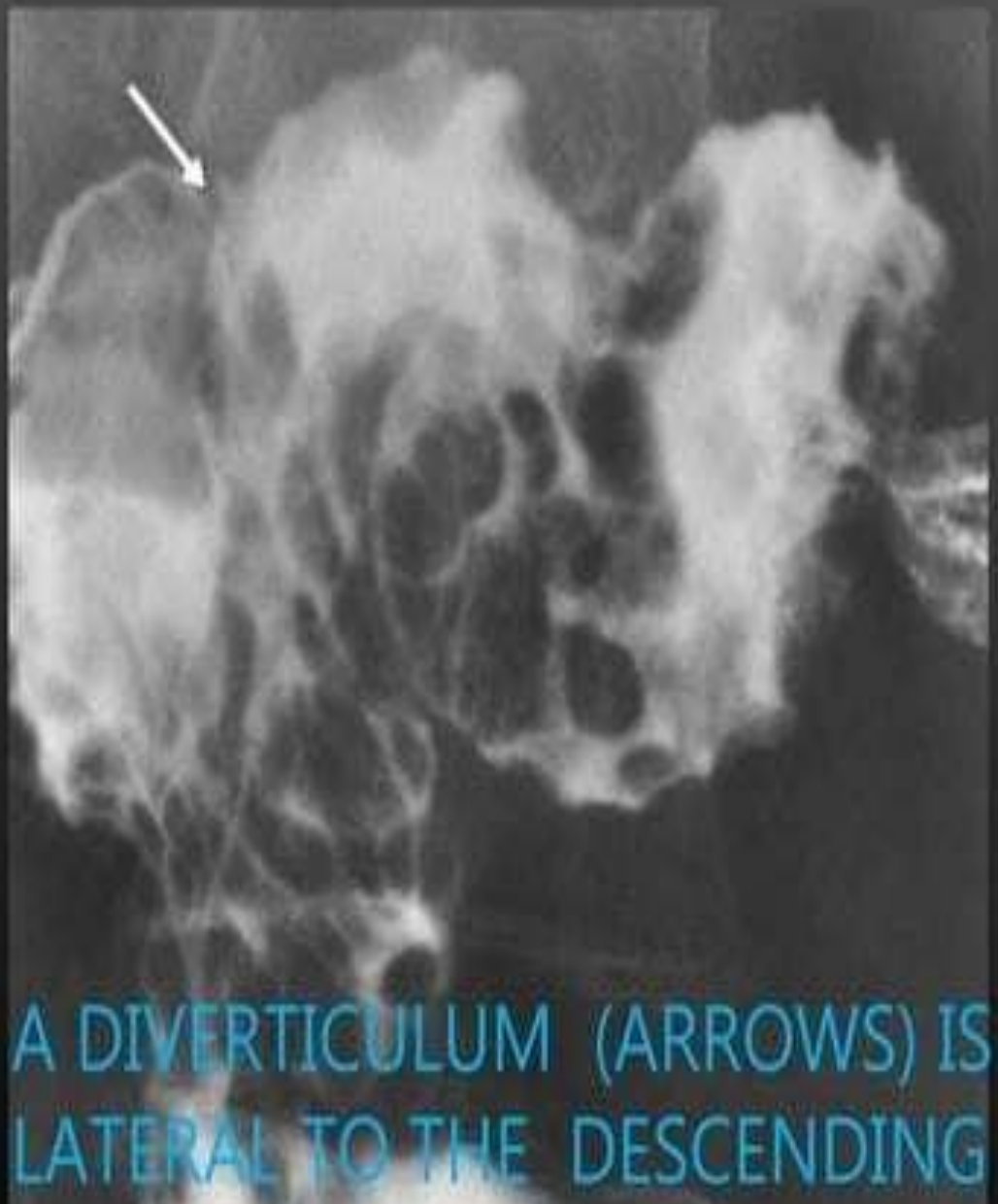
Double-contrast :

The antrum of the stomach is irregularly narrowed. There is an abrupt margin at the junction of the antrum and body along the greater curvature.

Differential Diagnosis

1. Caustic gastric stricture
2. Annular carcinoma
3. Granulomatous infection

DUODENUM



A DIVERTICULUM (ARROWS) IS SEEN LATERAL TO THE DESCENDING

Single-contrast :
Multiple thick and nodular folds are present in the first and second portions of the duodenum.

Differential Diagnosis
1. Duodenitis
2.Brunner gland hyperplasia
3. Crohn disease

FINDINGS

DOUBLE-CONTRAST :A LOBULATED FILLING DEFECT OCCUPIES THE MEDIAL WALL OF THE SECOND PORTION OF THE DUODENUM

Differential Diagnosis

1. Ampullary neoplasm
2. Edematous papilla (recent stone passage or impacted stone)

Single-contrast :The proximal transverse duodenum is dilated to the level of the spine. The bowel abruptly narrows and appears to be pinched closed by a linear extrinsic mass. The underlying duodenal mucosa is intact.

Differential Diagnosis

1. Superior mesenteric artery syndrome
2. Duodenal neoplasm
3. Abdominal aortic aneurysm


THANK
YOU !