GIT RADIOLOGY

Imaging techniques-General principles:

Contrast examinations:

- Barium sulphate is the best contrast for GIT (with good mucosal coating & excellent opacification & being inert); but is contraindicated if there is suspicion of a possibility of leak into the peritoneum as it can cause severe inflammatory peritonitis (e.g. in suspected perforation or anastomotic leak)

- Water-soluble contrast media (e.g. gastrograffin) are the other available agents which doesn’t cause inflammatory peritonitis.

Contrast examinations are carried out under fluoroscopic control

Double contrast technique: are the standard techniques used in contrast studies, where the mucosa is coated with barium & the lumen is distended by air, often in combination with an injection of smooth muscle relaxant.

Terms used in reporting contrast examinations:

- Mucosal pattern is the appearance of the inner surface of bowel. Abnormalities of mucosal pattern can be categorized as abnormal smoothing (of the mucosal folds) or abnormal irregularity.

- Filling defect is used to describe any process occupying space within the bowel resulting in an area of total or relative radiolucency within the barium column.
  1. An intraluminal filling defects has barium all round it e.g. food.
  2. An intramural filling defects cause indentation from one side only forming a sharp angle with the bowel wall & is not completely surrounded by barium e.g. Ca colon.
  3. Extramural filling defects causes narrowing from one side only forming a shallow angle with the bowel wall, the mucosa is preserved but stretched over the filling defect e.g. enlarged pancreas or LAP.

- Stricture is circumferential or annular narrowing (it must be differentiated from peristaltic waves); it may have tapered ends or abrupt end (or shouldering). Shouldering is an important radiological sign of malignancy.

- Ulceration becomes visible when the crater is filled with barium. En profile, it appears as an outward projection from the lumen & en face, the ulcer appears as a rounded collection of barium.

Oesophagus:
Plain films may show dilated oesophagus in achalasia & may show opaque foreign bodies.

On Ba swallow, the barium filled oesophagus has a smooth outline but when empty, the barium lies in between mucosal folds (3-4 folds).

The aorta impresses the left side of oesophagus (more prominent in elderly). Below the aortic impression, the left main bronchus makes a small impression. The lower oesophagus is closely applied to the back of the left atrium & left ventricle.

Peristaltic waves are observed during fluoroscopic control. Sometimes the contraction waves may not occur in an orderly fashion but are more pronounced & prolonged so that the oesophagus has an undulated appearance (tertiary contraction).

**Indications of Ba swallow:**
1. Swallowing disorders
2. Oesophageal strictures
3. Assessing reflux.

**Strictures:**
When faced with a stricture, try to answer the following:
- Where is the stricture?
- What is its shape?
- How long is it?
- Is there a soft tissue mass?
- Carcinoma may form an irregular stricture with shouldered edges of several centimeters. A soft tissue mass may be visible.
  - CT may show thickening of wall, mediastinal invasion, LAP, liver & pulmonary metastases.

Endoscopic US to assess the depth of invasion & assist Endoscopic biopsy & can be used to assess involvement of paroesophageal LAP.

- Peptic strictures found at the lower oesophagus + hiatal hernia & reflux & are characteristically short & have smooth outline with tapered ends. There may be an ulcer close to stricture.

- Achalasia produces a smooth, tapered narrowing at the lower end of oesophagus +/- oesophageal dilatation & absent peristaltic waves with food residue. The lungs may show consolidation & bronchiectasis (due to aspiration). The stomach bubble is usually absent.

- Corrosive strictures are long strictures begin at the level of aortic arch. It is usually smooth with tapered ends but may be irregular.

**Filling defects:**
1. intramural filling defects
   1. Leiomyoma cause a smooth, rounded indentation & a soft tissue mass may be seen indicating extraluminal extension.
   2. Carcinoma may cause irregular filling defect, but usually causes stricture.

2. Extramural filling defects
   E.g. Ca bronchus, mediastinal LAP & aortic aneurysm.
   An anomalous right subclavian artery (arising from aortic arch) give rise to a characteristic short smooth narrowing as it crosses behind the oesophagus.

3. Intraluminal filling defects e.g. food impaction behind a stricture.

Dilatation:
- obstruction & visible stricture e.g. achalasia.
- Disease of smooth muscle e.g. scleroderma.

Varices:
Appears as lucent, tortuous, wormlike filling defects on barium swallow which distorts the mucosal pattern.

Web:
Thin shelf like projection arising from the anterior wall of cervical oesophagus. The oesophagus must be filled with barium to be demonstrated
It can be isolated finding or as part Plummer-Vinson syndrome (anemia, web, dysphagia & iron deficiency anaemia).

Diverticulae:
- Zenker's diverticulum arises through a congenital weakness in inferior pharyngeal constrictor & lie behind the oesophagus & can displace or compress the oesophagus.

Oesophageal atresia:
A plain abdominal film will show air in the bowel (if there is a fistula between the trachea & oesophagus)
The diagnosis is made by passing a tube that holds up or coils in a blind ending pouch. Contrast examination may be dangerous in cases of spillage to the trachea.

*The stomach & duodenum:*
In centers with expert endoscopy, indications for Ba meal are:
- Failed gastroscopy.
- Duodenal strictures.
- Assessment of functional patency/gastric emptying following gasteroenterostomy.
- Suspected anastomotic leak following surgery (use water soluble & not barium).

**Barium meal:**
Fasting for at least 6 hours is important. 200 ml of barium is required. Each part of the stomach & duodenum should be checked to ensure that there is no abnormal narrowing. The outline of lesser curvature is smooth, while the greater curvature is irregular. The gastric mucosa has smooth folds.

The duodenal cap is triangular & may be difficult to recognize in chronic ulcers with deformity. Diverticula of the duodenal loop are common & without significance.

**Filling defects:**
May arise from the wall or indent the wall from outside. Ca is the commonest cause of filling defect in adult.

- Carcinoma produce irregular filling defect with alteration of mucosal pattern. Overhanging edges or shouldering may be seen at the junction of the tumor & the stomach. Ca near fundus may obstruct the oesophagus, while that near the antrum can lead to gastric outlet obstruction. When the whole stomach is involved, it may appear narrowed & lacking peristalsis with obliteration of folds.
  - Early gastric cancer may appear as effacement of folds or shallow ulcer.
  - Diffuse infiltration of the stomach with lymphoma can produce fold thickening.
  - CT is useful in assessing the extent of tumor & metastases to LN & liver.

- Leiomyoma produce a smooth, round filling defect. It may have a large extraluminal extension (easily seen on CT). It may have ulcer on its surface.

- Polyps may be single or multiple, sessile or with stalk. Imaging can not differentiate between malignant & benign.

- Intraluminal filling defects e.g. food or blood following hematemesis or bezoar.
**Gastric ulcers:**
- Gastric ulcers may be benign or malignant, so confirmation at gastroscopy is routinely taken.
- Ulcers are seen in profile, as projections of barium beyond mucosal surface.
- En-face the ulcers are seen as collection of barium.

**Gastric outlet obstruction:**
Ba normally leaves the stomach within minutes. Prolonged delay with a dilated stomach needs explanation.
- Chronic DU with deformed, stenosed duodenal cap.
- Antral carcinoma with irregular filling defect in the antrum.
- Duodenal, ampullary, pancreatic carcinoma.
- Acute or chronic pancreatitis +/- pseudocyst.
- Poor functional patency of a gastroenterostomy.
- Pyloricstenosis in infants (confirmed with US).

**Gastritis:**
Erosive gastritis (when severe) seen as small shallow Ba collections surrounded by a lucent halo.

**Hiatus hernia:**
Either sliding or rolling type.
- In sliding type, the GE junction & portion of stomach are situated above diaphragm. Reflux through incompetent cardiac sphincter may occur & result in oesophagitis, ulceration or stricture.
- In rolling type, the fundus herniates through the diaphragm but the GE junction remains competent below the diaphragm.
- Sometimes hiatal hernia may be seen on CXR.

**Duodenal ulcer:**
Mostly occur in the duodenal cap, few are postbulbar in location. The ulcer crater may have surrounding lucent zone with radiating mucosal folds. When chronic, DU causes deformity of the duodenal cap from scarring (it is impossible to be sure about the presence of ulcer).
- Duodenal ulcers are invariably benign.