Incidental discovery of oesophageal-gastric pathologies on chest X-ray.

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Learning objectives

To illustrate the role of plain chest X-ray in the incidental discovery of upper gastrointestinal pathologies, and underline the importance of upper GI barium series or barium swallow study.
Background

During chest X-Ray is commonly observed to discover the presence of unsuspected gastro-intestinal pathologic conditions.

In our hospital we perform a large number of chest X-Ray, about 15000 a year.

The most frequent pathologies observed are hiatal hernias, oesophageal diverticula, and achalasia. Diagnostic imaging gold standards include barium swallow X-Ray and esophagogastroduodenoscopy (EGD).

Hiatal hernia consists in loss of distal oesophagus and stomach location in the abdomen, with sliding of part or entire of these organs through oesophagus hiatus into the chest.

Hiatal hernia is a very common pathology and is often associated with gastroesophageal reflux disease.

It mostly affects middle aged women and causes symptoms like cough, heartburn, dyspepsia, dysphagia and loss of weight. However in some cases of chest pain we perform a chest X-Ray in the suspect of cardiovascular pathologies. All cases of improving abdominal pressure can lead to hiatal hernia: pregnancy, obesity and abdominal trauma. There is no association between clinical symptoms and hernia width in fact large hernias can remain asymptomatic for all life, while small hernias can cause important discomfort.

Possible complications of hernia are pulmonary aspiration, slow bleeding and iron deficiency anemia and strangulation.

Diagnostic exams of choice are barium swallow X-Ray and esophagogastroduodenoscopy (EGD).

The goals of treatment are to relieve symptoms and prevent complications.

Medications that neutralize stomach acid, decrease acid production, or strengthen the lower esophageal sphincter may be prescribed.

If these measures do not control the symptoms, or in presence of complicances, surgery may be needed to repair the hernia.

Achalasia is a rare swallowing disorder that affects about 1 in every 100,000 people. Most people are diagnosed between the ages of 25 and 60 years. The most common symptom of achalasia is an increasing dysphagia (for liquid or solid).
The specific cause of achalasia is unknown. However, patients with achalasia have two problems in the esophagus: the lower two-thirds of the esophagus does not propel food toward the stomach properly and/or the lower esophageal sphincter (LES), does not function correctly.

Damage to the LES and esophagus causes large volumes of food and saliva to accumulate in the esophagus. Eventually, the barrier progresses to the point where food and saliva cannot reliably enter the stomach.

Due to its rarity there can be a delay in diagnosis with consequent significant morbidity, including developmental disorders. Presenting symptoms include among with dysphagia, weight loss, chest pain, coughing, halitosis, recurrent pulmonary and respiratory infections and noisy respiration.

Achalasia is usually suspected based upon symptoms, although tests are needed to confirm the diagnosis: chest x-rays, barium swallow test, manometry, endoscopy.

Several options are available for the treatment of achalasia.

Drug therapy (nitrate and calcium channel blockers) and Botulinum toxin injections can relax the LES and decrease symptoms. However, these drugs tend to become less effective over time.

Balloon dilatation (pneumatic dilatation) is effective in two-thirds of people, although chest pain persists in some people.

Surgery (myotomy) can be used to directly cut the muscle fibers of the LES.

Recognizing and treating these problems can help to prevent the development of severe enlargement of the esophagus (mega-esophagus) as well as esophageal strictures and cancer, which could require surgical removal of the entire esophagus. Regular endoscopic screening for early detection of neoplastic degeneration is mandatory.

The esophageal diverticulum is a pouch, or pocket, of stretched tissue that develops anywhere along the esophagus, pushing outward through its muscular wall. Esophageal diverticula are rare and can be congenital or acquired. Typically a single pouch forms, most often near the top of the esophagus; this is called Zenker's diverticulum. The herniation in the thorax of the gastric pouch as a complication of bariatric surgery, may mimic an epifrenic diverticulum. Single diverticulum ranges from 1 to 10 cm in diameter.

Non-congenital diverticula develop from a combination of uneven pressure and weak areas of muscle and tissue in the esophagus. Pressure can stem from structural disorders, from poor coordination of the swallowing mechanism, poor movement of food through the esophagus, and from inflammation on the outside of the esophagus that pulls on its wall.
Diverticula do not always cause problems. Some collect food, which can lead to food regurgitation, dysphagia, chest pain, aspiration pneumonia. Symptomatic esophageal diverticula might be treated with a change to a bland diet and increased water intake and/or antiacids.

Patients with more problematic diverticula, including those with underlying motility disorders, might require minimally invasive or open surgery, or other procedures such as repeated mechanical dilations of the esophagus.

All diverticula are diagnosed by fluoroscopic barium swallow.

Diverticula associated with motility disorders require treatment of the primary disorder.
A chest X-ray may be sufficient for diagnosis of a large hiatal hernia. A retrocardiac air-fluid level due to the intrathoracic stomach is a classic finding.

The best practice to reveal a hernia is the double contrast exam with the patient in the horizontal position. The hernia is sometimes only visible, when the bolus passes through the esophagogastric junction. Most patients with a clinically significant reflux have a sliding hiatal hernia. In these patients, the cardioesophageal junction and the fundus of the stomach are displaced upward into the posterior mediastinum, exposing the lower oesophageal sphincter to intrathoracic pressure. Normally, the intra-abdominal position of the lower oesophagus causes it to be exposed to higher external pressures, and a loss of this position accounts for the close association of reflux with hiatal hernias.

According to disease progression, diagnosis of achalasia can be suggested on radiographic findings if there is one of the following features: an additional soft tissue density line parallel to the mediastinal contour with widening of the mediastinum representing the dilated oesophagus (mostly a right convex opacity projected behind the right heart border or in the upper part of the thorax, occasionally seen as a left convex opacity); the normal gastric air bubble is usually present in early stages, but is mostly absent in the later stages of the disease; on a lateral chest radiograph, an air-fluid level within the oesophagus may be present, usually in a retrosternal location, but it can also occur in the neck.

A barium swallow test (barium oesophagram with fluoroscopy) is the best initial diagnostic test. Even in early achalasia, this examination can demonstrate the classic features of achalasia: the narrowing at the cardia has a characteristic contour and the dilated body of oesophagus blends into a smooth cone-shaped area of narrowing; on fluoroscopy the peristaltic waves are weak, simultaneous, irregular, uncoordinated, or absent; as the disease progresses, the oesophagus dilates further and becomes tortuous and, in far-advanced cases, sigmoid in shape. The lowermost segment retains the classic long, linear narrowing even in late stages of the disease. The column of barium is held up at the narrowed area because the sphincteric mechanism fails to relax normally.

The radiological study of esophageal diverticula on chest X-Ray may depict a focal abnormal dilatation of the esophagus that protrudes over the normal mediastinal profile.

This protrusion can affect every segment of the organ, and is visible both in posteroanterior and lateral view, where there is the typical air fluid level.

The most appropriate diagnostic exam to study this abnormality is the barium oesophagram with fluoroscopy that demonstrate the location, size and motility of the
diverticulum. The barium swallow test shows also complications like perforation of diverticula and the presence of tracheo-esophageal fistula. It is also important to show possible complications of bariatric surgery like the erosion of the gastric pouch through the diaphragm into the thorax.
Images for this section:

**Fig. 1:** Hiatal hernia with air-fluid level.

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Fig. 2: Hiatal hernia with air-fluid level, lateral view.

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Fig. 3: Hiatal hernia permagna.
Fig. 4: Hiatal hernia permagna.

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**Fig. 5:** Compilance of bariatric surgery (gastric bend): herniation of gastric pouch.

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Fig. 6: Complicance of bariatric surgery (gastric bend): herniation of gastric pouch, lateral view.

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Fig. 7: Esophageal mid level diverticulum.

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Fig. 8: Zenker's diverticulum.

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Fig. 9: Zenker's diverticulum, chest X-Ray PA.

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Fig. 10: Zenker's diverticulum, particular view.

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Fig. 11: Achalasia, postero-anterior view.

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Fig. 12: Achalasia, chest X-Ray lateral view. Air fluid level.

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Fig. 13: Achalasia with constant level sign.
In our hospital we have collected several cases in which chest-X-Ray shows signs of previously unknown gastro-esophageal pathologies. Here we demonstrate how important is the barium swallow exam to give the final diagnosis.
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