

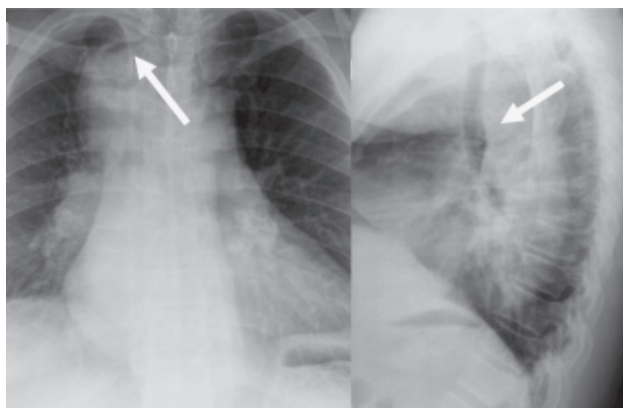
## Imaging of the Esophagus

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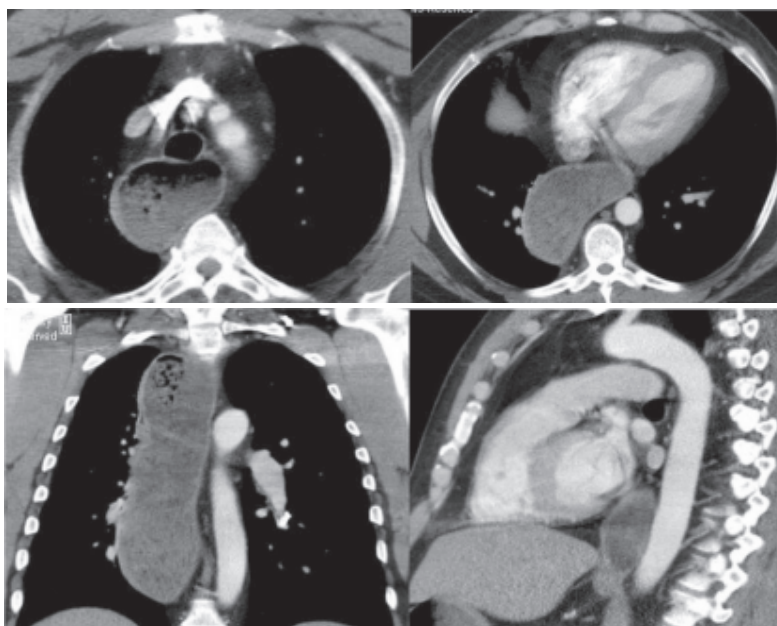
Imaging modalities used in esophagus include plain CXR, barium swallowing, endoscopic US, CT, PET CT and MRI. Although barium study is declining in popularity for the study of GI tract, barium swallowing is still alive because of its ability to visualize the swallowing function, and assess hernia as well as mucosal abnormality. In this article, several esophageal abnormalities will be demonstrated, using case-based approach, and emphasizing on imaging findings.

**Case 1.** A 35-year-old man presented with chest pain.

Achalasia cardia is a condition of which there is a failure of lower esophageal sphincter to relax, probably secondary to decreased or absent myenteric plexuses<sup>(1)</sup>. Most cases of achalasia are idiopathic, but Chaga's disease may present with the identical appearance. Risk of squamous cell carcinoma is increased in achalasia cardia. The word "achalasia" comes from



**Figure 1.** Chest PA view shows a right-sided mediastinal mass with air-fluid level (arrow). Chest lateral view shows a tubular-shaped mass at the posterior mediastinum displacing the trachea (arrow). Findings are consistent with esophageal dilatation.



**Figure 2.** CT confirms marked dilatation of the esophagus down to the level of the GE junction without focal mass. Findings are consistent with achalasia cardia.

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the Greek term meaning “does not relax” (Figure 1, 2).

**Case 2.** A 60-year-old man presented with abdominal discomfort.

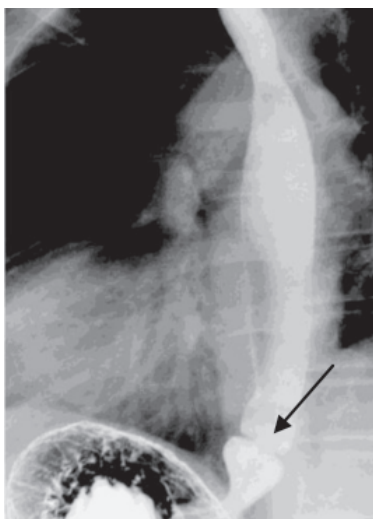
Hiatal hernia is caused by rupture of phrenico-esophageal membrane due to repetitive stretching with swallowing<sup>(2)</sup>. It is usually associated with GE reflux, reflux esophagitis, and Barrett’s esophagus. The incidence of hiatal hernia is increased with age (Figure 3).



**Figure 3.** UGI study shows herniation of the gastric fundus via the esophageal hiatus into the thorax (arrow). Finding is consistent with a hiatal hernia.

**Case 3.** A 60-year-old man presented with episodic dysphagia.

Schatzki’s ring is a thickened mucosal B-ring at the squamocolumnar junction, which is a few centi-

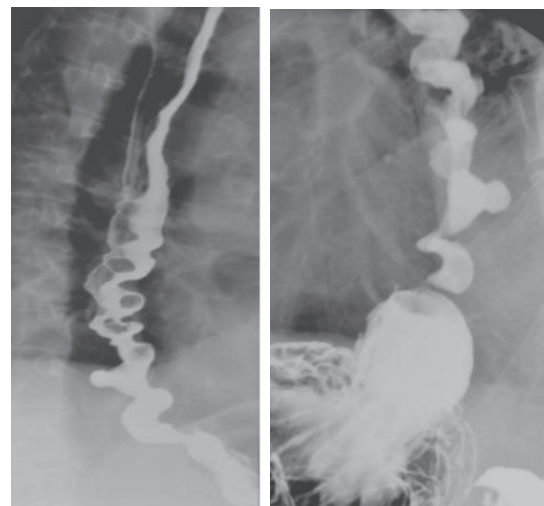


**Figure 4.** Barium swallowing shows thick transverse B-ring of the lower esophageal sphincter, consistent with Schatzki’s ring.

meters above the A-ring at the GE junction. It is believed to be scarring secondary to reflux esophagitis. Symptoms depend on its luminal diameter, which range from asymptomatic, intermittent dysphagia, to complete obstruction. Most of offending agent is inadequately chewed meat, so called “steakhouse syndrome”. Schatzki’s ring is named after Dr. Richard Schatzki, American physician, born in Germany<sup>(3)</sup> (Figure 4).

**Case 4.** A 65-year-old man presented with chest pain and dysphagia.

DES is uncommon motility disorder of unknown etiology. It is characterized by chest pain, often accompanied by dysphagia. The abnormality involves smooth muscle causing muscular hypertrophy, particularly the circular layer of muscularis propria. Diagnosis is confirmed by manometry<sup>(4)</sup> (Figure 5).



**Figure 5.** Barium swallowing shows non-peristaltic tertiary contraction with compartmentalization of the lower esophagus, producing the “corkscrew” or “nutcracker” appearance. Findings are consistent with diffuse esophageal spasm (DES).

**Case 5.** A 27-year-old female presented withodynophagia. She took doxycycline before bed time for several days.

Ulcer from drug-induced esophagitis is usually at the mid-esophagus, near the level of aortic arch or left main bronchus, where the pills tend to stagnate. Common etiologic agents include doxycycline, tetracycline, potassium chloride, quinidine, aspirin, and NSAIDs<sup>(5)</sup>. Ulcers from CMV, herpes, and HIV may

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present in the similar fashion. Good clinical history and endoscopic biopsy will help confirm the diagnosis (Figure 6).



**Figure 6.** Barium swallowing shows an ulcer at mid-esophagus (arrow), associated with surrounding mucosal edema. Correlation with history of medication before bedtime, this is consistent with drug-induced esophagitis.

**Case 6.** A 53-year-old man presented with melena.

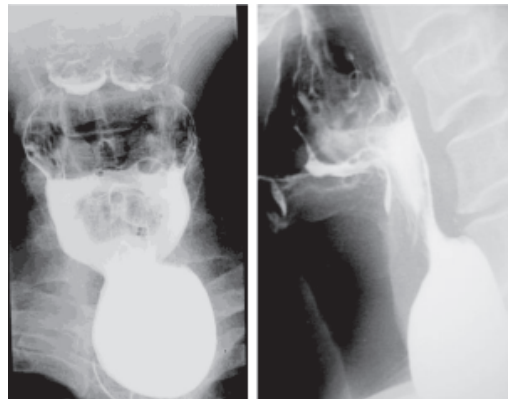
Esophageal varices are abnormal dilated veins of the esophagus. Esophageal varices secondary to portal HT are uphill varices with the upgrade flow via esophageal vessels to SVC. Esophageal varices are of clinical concern because they are prone to hemorrhage<sup>(6)</sup> (Figure 7).



**Figure 7.** UGI study shows tortuous or serpiginous filling defects of the distal esophagus (arrow). A large spleen is noted indenting upon the gastric body. Combination of findings is consistent with esophageal varices secondary to cirrhosis and portal HT.

**Case 7.** A 20-year-old male presented with globus feeling in his throat.

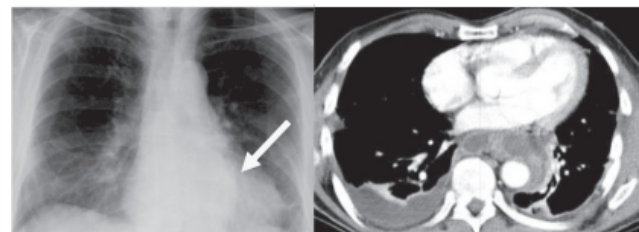
Zenker's diverticulum is a pulsion diverticulum of the mucosa through the weakness in the region of cricopharyngeal muscle. Complications include bronchitis, lung abscess, diverticulitis, ulceration, fistula, and carcinoma<sup>(7)</sup>. Zenker's diverticulum is named after Dr. Friedrich Albert von Zenker who was a German pathologist (Figure 8).



**Figure 8.** Barium swallowing shows a large outpouching sac posterior to the cervical esophagus, consistent with Zenker's diverticulum.

**Case 8.** A 67-year-old, alcoholic man presented with chest pain and fever.

Boerhaave's syndrome is a spontaneous perforation of the distal esophagus, following by mediastinitis, sepsis and shock. It is usually resulted from violent



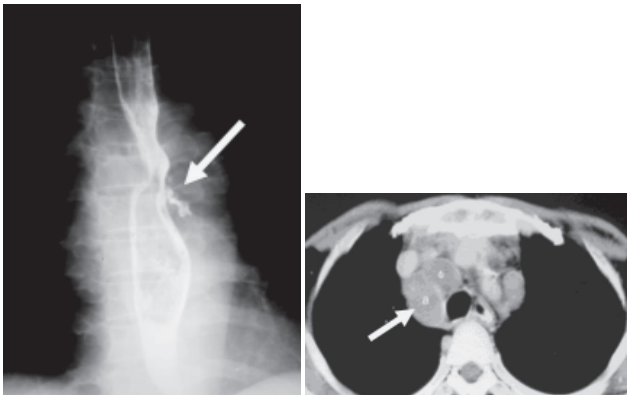
**Figure 9.** CXR shows widening of the posterior mediastinum (white arrow). CT demonstrates multi-loculated abscess within the posterior mediastinum and bilateral pleural effusion. Water-soluble esophagram reveals extravasation from the distal esophagus (black arrow). Combination of findings is consistent with Boerhaave's syndrome.



retching or vomiting after an alcoholic binge. The site of perforation is usually at the left posterolateral wall of the distal esophagus, where there are less supporting mediastinal structures<sup>(8)</sup>. It is named after Dr. Hermann Boerhaave, Professor of clinical medicine, Netherlands (Figure 9).

**Case 9.** A 52-year-old female presented with persistent dysphagia.

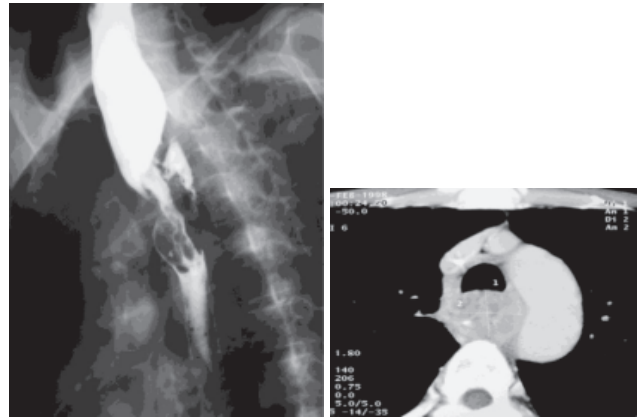
TB esophagitis is uncommon. The most common route of spreading is direct erosion from TB mediastinal nodes, as shown in this case. Other route of spreading includes swallowing infected sputum from active pulmonary TB, and hematogenous seeding from disseminated TB<sup>(9)</sup> (Figure 10).



**Figure 10.** Barium swallowing shows contrast extravasation (sinus tract) from the mid-esophagus (arrow), associated with lobulated contour mass at the adjacent mediastinum. CT scan reveals several low-density mediastinal lymphadenopathies (arrow). Combination of findings suggests TB esophagitis, associated with TB mediastinal nodes. Endoscopic biopsy confirms the diagnosis of TB.

**Case 10.** A 68-year-old man presented with dysphagia.

Squamous cell carcinoma is the most common primary cancer of the esophagus because of its underlying squamous cell mucosal lining. Adenocarcinoma is less common, but may occur as a complication of Barrett's esophagus of which there is metaplasia of squamous epithelial cells to columnar cells as a consequence of reflux esophagitis<sup>(10)</sup> (Figure 11).



**Figure 11.** Barium swallowing shows a large circumferential, ulcerative mass of the mid-esophagus. CT scan reveals a large esophageal mass causing posterior bowing of the adjacent trachea, indicative of invasion. Findings are consistent with esophageal cancer, T4 lesion. Biopsy confirms diagnosis of squamous cell carcinoma.

## CONCLUSIONS

Ten diseases of esophagus are illustrated, emphasizing on the imaging appearances. These cases are achalasia cardia, hiatal hernia, Schatzki's ring, diffuse esophageal spasm, drug-induced esophagitis, esophageal varices, Zenker's diverticulum, Boerhaave's syndrome, TB esophagitis, and esophageal cancer.

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