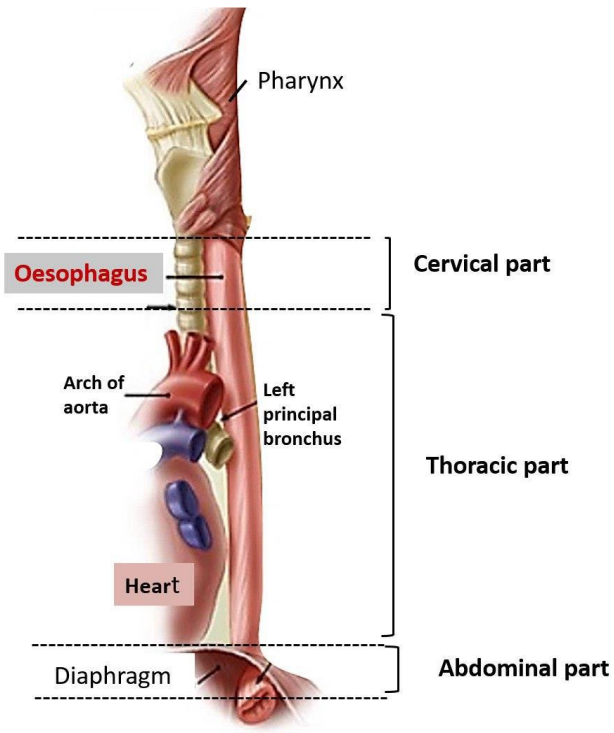
Normal and Radiological anatomy of the esophagus:

Is a muscular tube about (25 cm) long, that extends down from the laryngopharynx to the cardiac orifice of the stomach. It begins posterior to the cricoid cartilage and descends through the thoracic cavity between the trachea and anterior longitudinal ligament of the vertebrae.

The **esophagus** then enters the abdominal cavity through an opening in the diaphragm termed the **esophageal hiatus** to join the stomach.

Esophagus anatomically divided into three parts: cervical, **thoracic** and **abdominal portions** as follows:

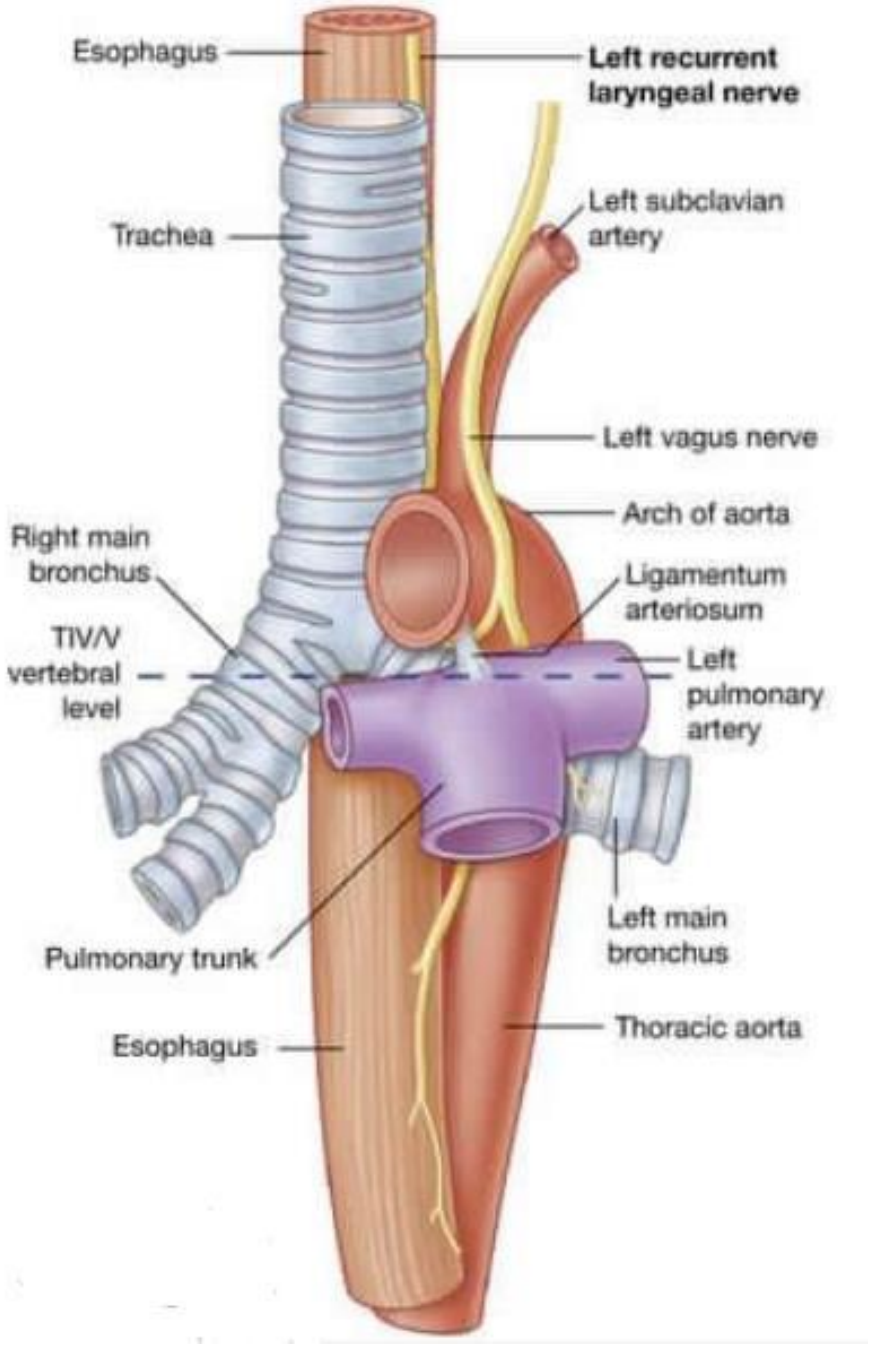
- The **cervical portion** extends from the cricopharyngeus muscle to the suprasternal notch.
- The **thoracic portion** extends from the suprasternal notch to the diaphragm.
- The **abdominal portion** extends from the diaphragm to the cardiac portion of the stomach



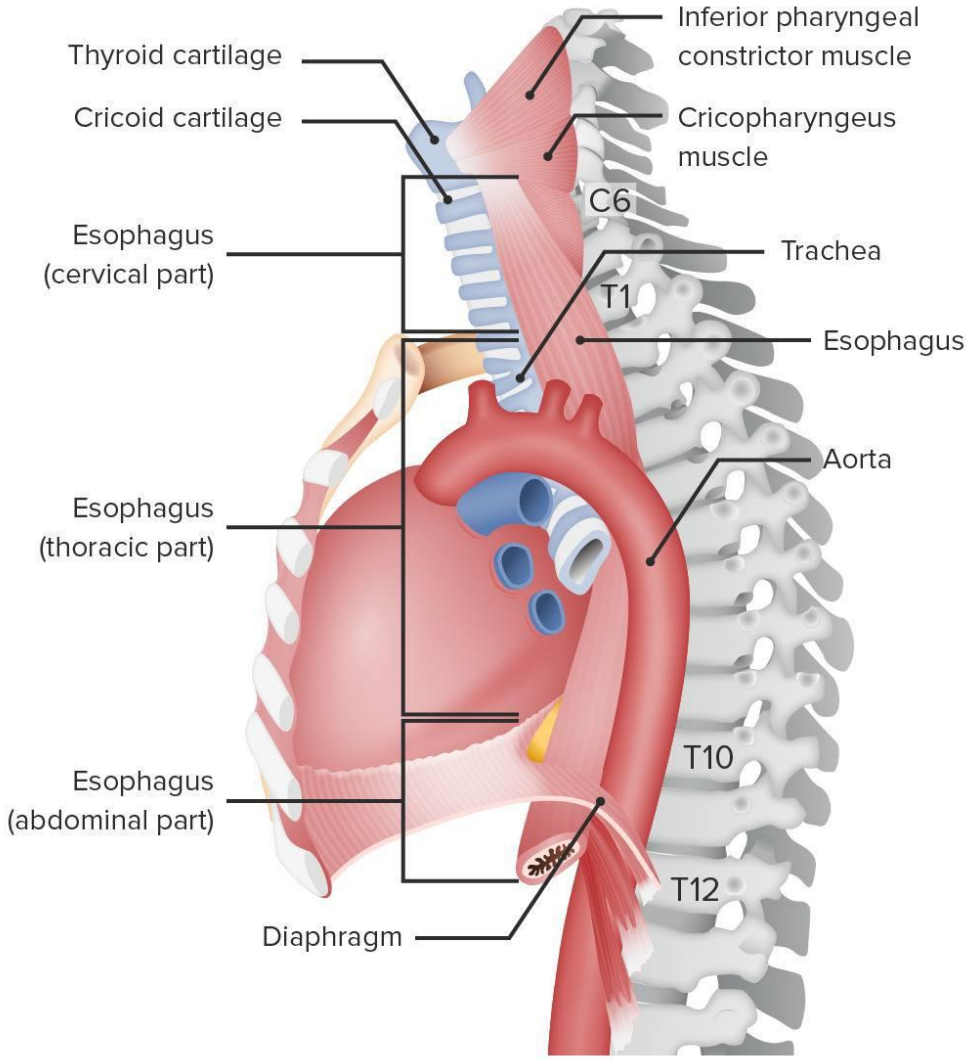
The esophagus

Normal anatomical relations of the esophagus:

1. Cervical Part	Relations
Anteriorly	• Trachea. • Recurrent laryngeal nerves.
Posteriorly	Vertebral column.
Laterally	• Lobes of the thyroid gland.



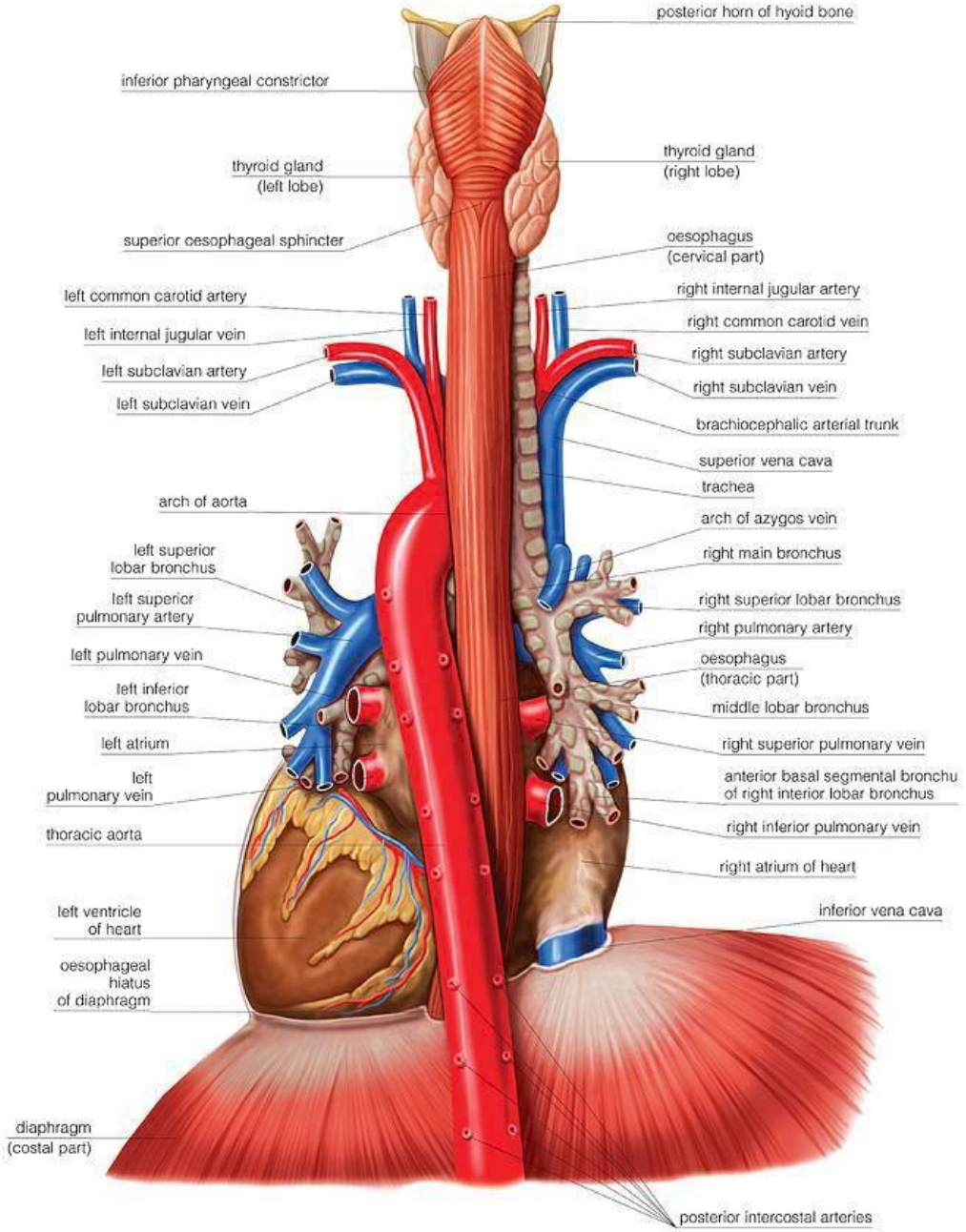
Relations of the esophagus.



Lateral anatomical relations of the esophagus.

2. Thoracic part		**Relations**
Anteriorly		• Trachea. • Left recurrent laryngeal nerve. • Left main bronchus. • Pericardium. • Left atrium.
Posteriorly		• Bodies of the thoracic vertebrae. • Thoracic duct. • Azygos vein. • Right posterior intercostal arteries. • Descending thoracic aorta (at the lower end).
Laterally	**Right side**	• Right mediastinal pleura. • Terminal part of the azygos vein.
	Left side	• Left mediastinal pleura. • Left subclavian artery. • Aortic arch. • Thoracic duct.

3. Abdominal Part	Relations
Anteriorly	• Left lobe of the liver.
Posteriorly	• Left crus of the diaphragm.



Indentations of the esophagus:

The normal indentations of the esophagus seen in a right anterior oblique view during barium swallow are made by (from above downwards):

1. Aortic arch. **2.** Left main bronchus. **3.** Left atrium.

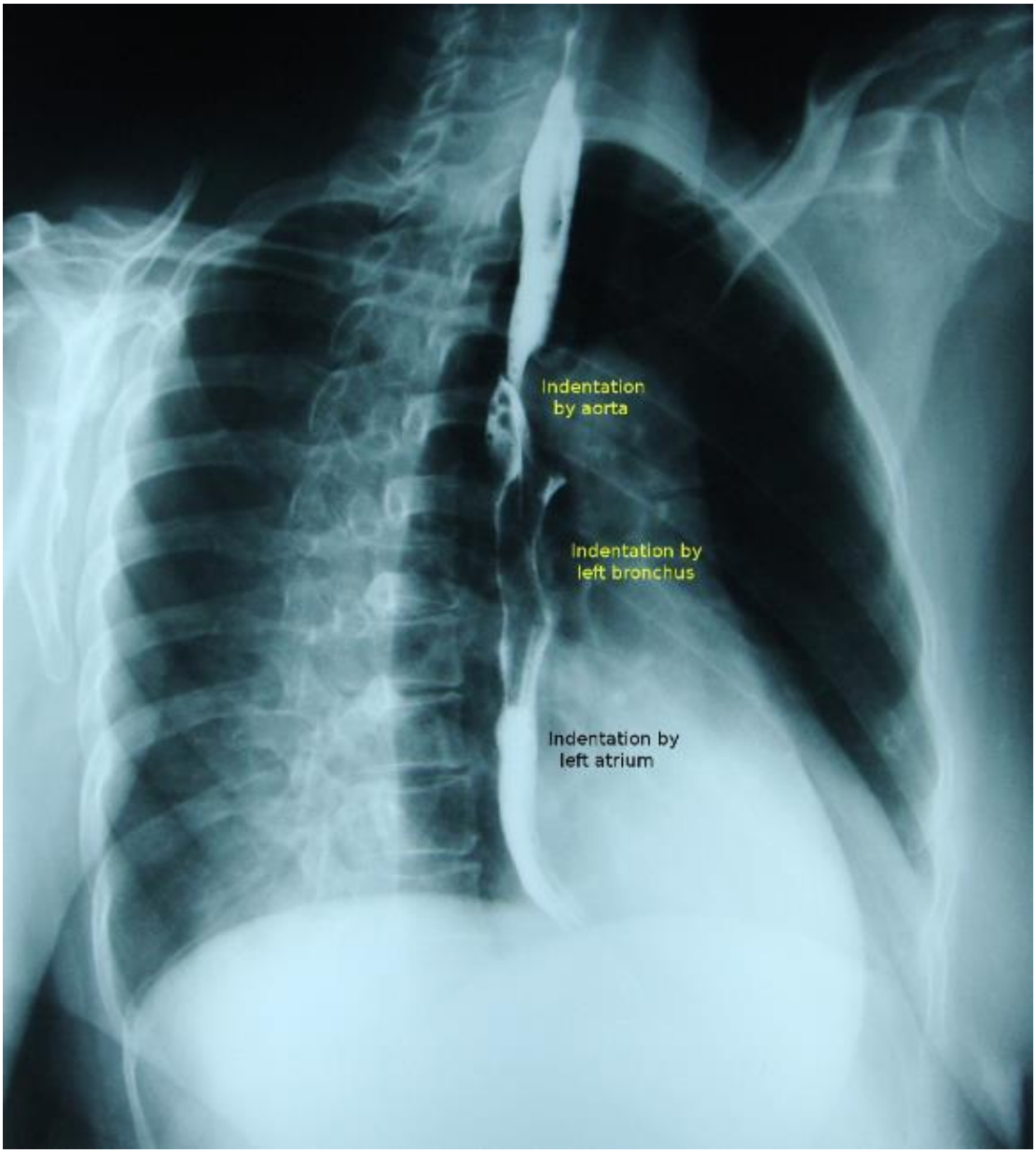


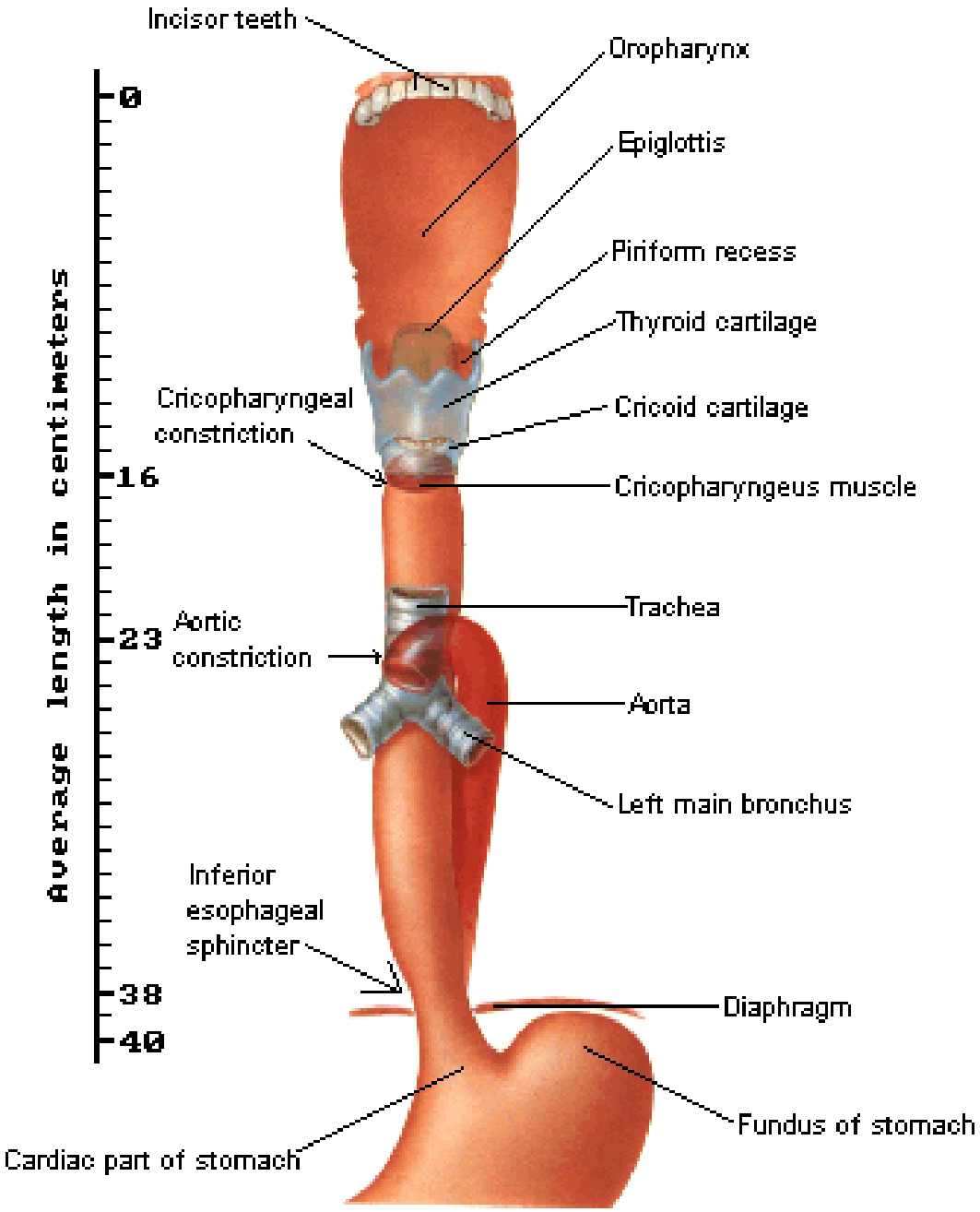
Figure: Barium swallow, right anterior oblique (RAO) radiograph chest x-ray: showing normal indentations of esophagus.

Esophageal Constriction: The esophagus has 3 anatomic constrictions:

1.The **first** (**cricopharyngeal constriction**): is at the junction with the pharynx.

2.The **second** (**aortic constriction**): is at the crossing with the aortic arch and the left main bronchus.

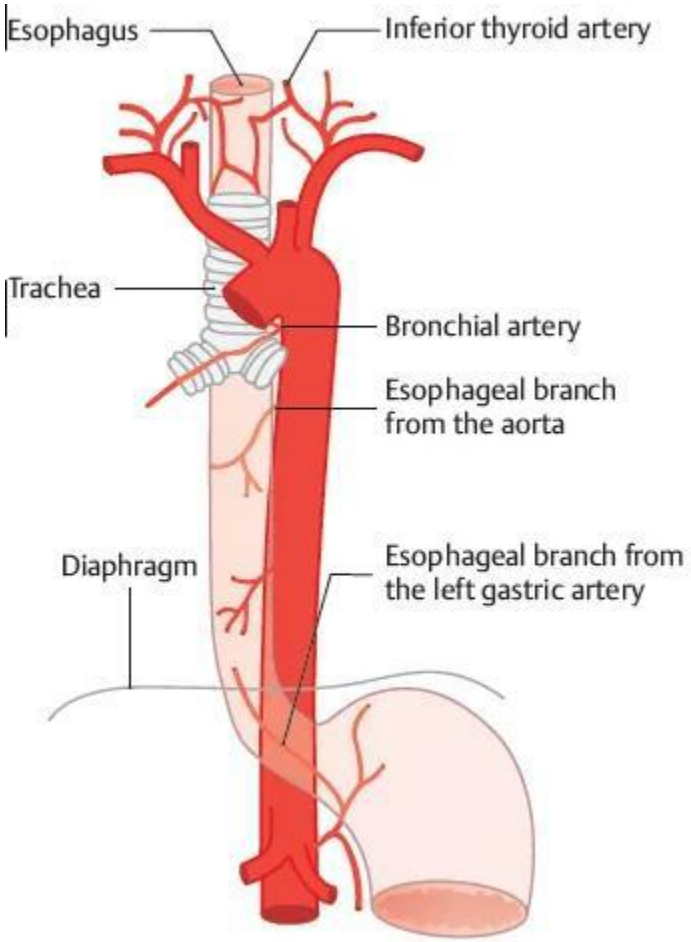
3.The **third** (**inferior esophageal sphincter**): is at the junction with the stomach.



Constriction of the esophagus.

Arterial supply of the esophagus:

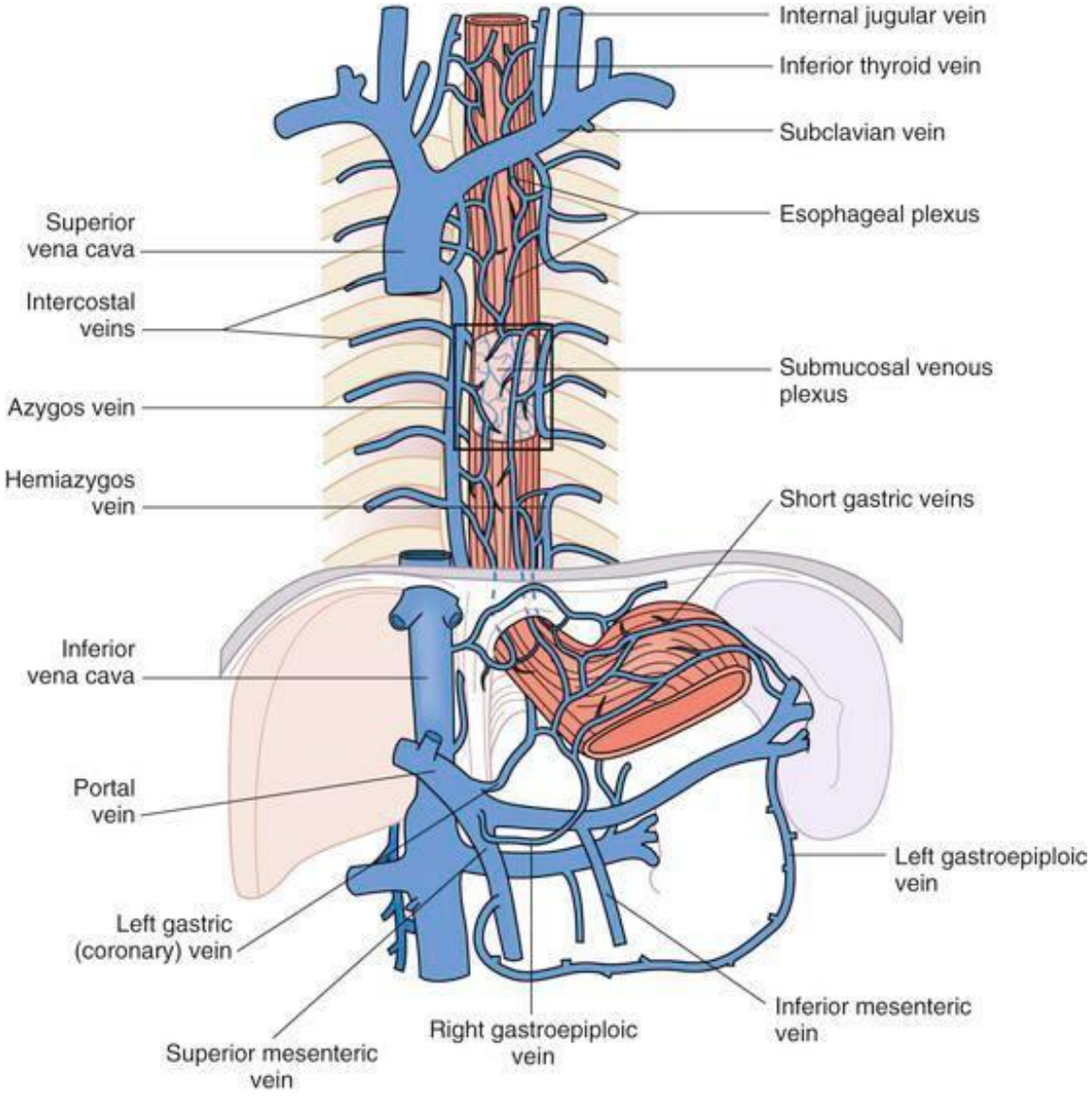
- **Upper third** of the esophagus → from inferior thyroid artery.
- **Middle third** of the esophagus → from descending aorta.
- **Lower third** of the esophagus → from left gastric artery.



Arterial supply of the esophagus

Venous drainage of the esophagus:

- **Upper third**: inferior thyroid veins to the brachiocephalic veins.
- **Middle third**: azygos vein to the superior vena cava (SVC).
- **Lower third**: left gastric vein to the portal vein.



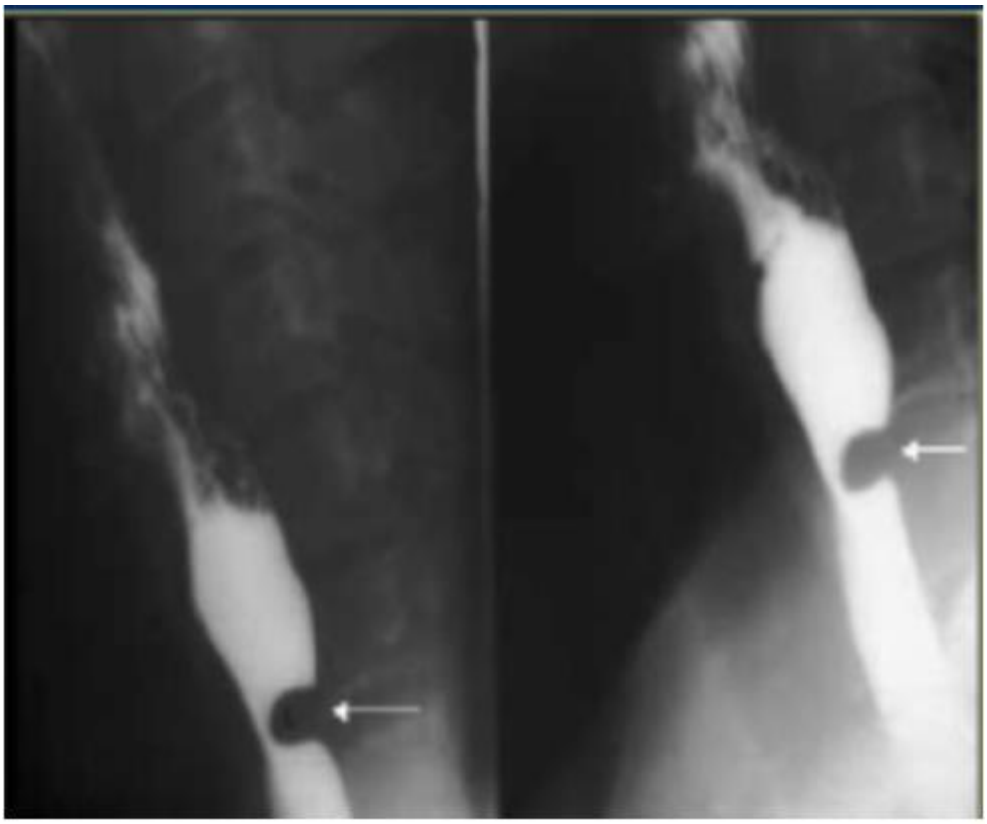
Venous drainage of the esophagus.

Imaging of the esophagus:

Barium swallow:

Is dedicated test of the pharynx, esophagus, and proximal stomach and may be performed as a single or double contrast study.

- **Double contrast barium swallow**, is the preferred mode of examination.
- **Frontal**, **left** and **right anterior oblique views** are taken.
- A **posterior indentation** caused by contraction of the **cricopharyngeus muscle** indicates the commencement of the **cervical esophagus**.
- The **thoracic esophagus** is best demonstrated in the **right anterior oblique position**.



Esophagus, the posterior indentation caused by contraction of the cricopharyngeus muscle.

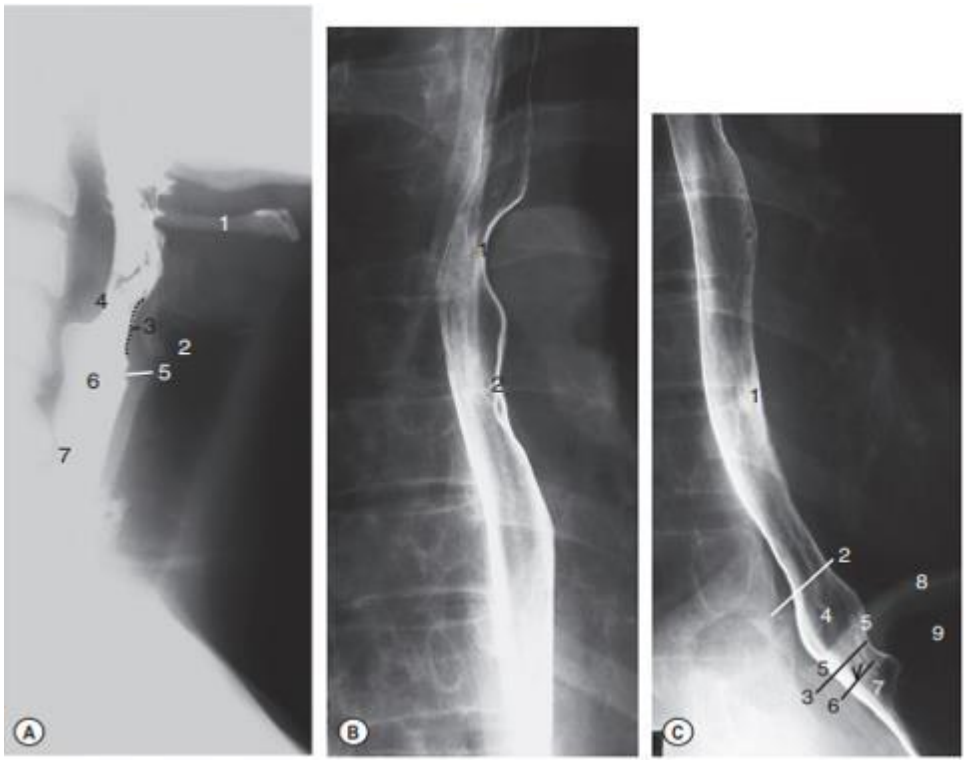
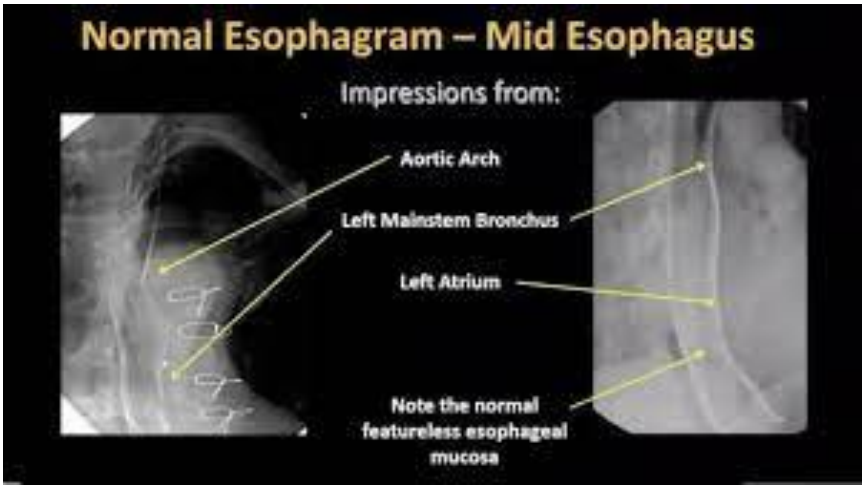


Figure 10: Barium-swallow technique showing the esophagus: (A) upper esophagus and oropharynx, lateral view; (B) mid esophagus, right anterior oblique radiograph; (C) distal esophagus.

(A)
1. Hyoid bone
2. Cricoid cartilage
3. Cricoid impression
4. Cricopharyngeus muscle impression
5. Postcricoid venous plexus
6. Oesophagus
7. Impression caused by osteophytes

(B)
1. Impression of aortic arch
2. Impression of left main bronchus

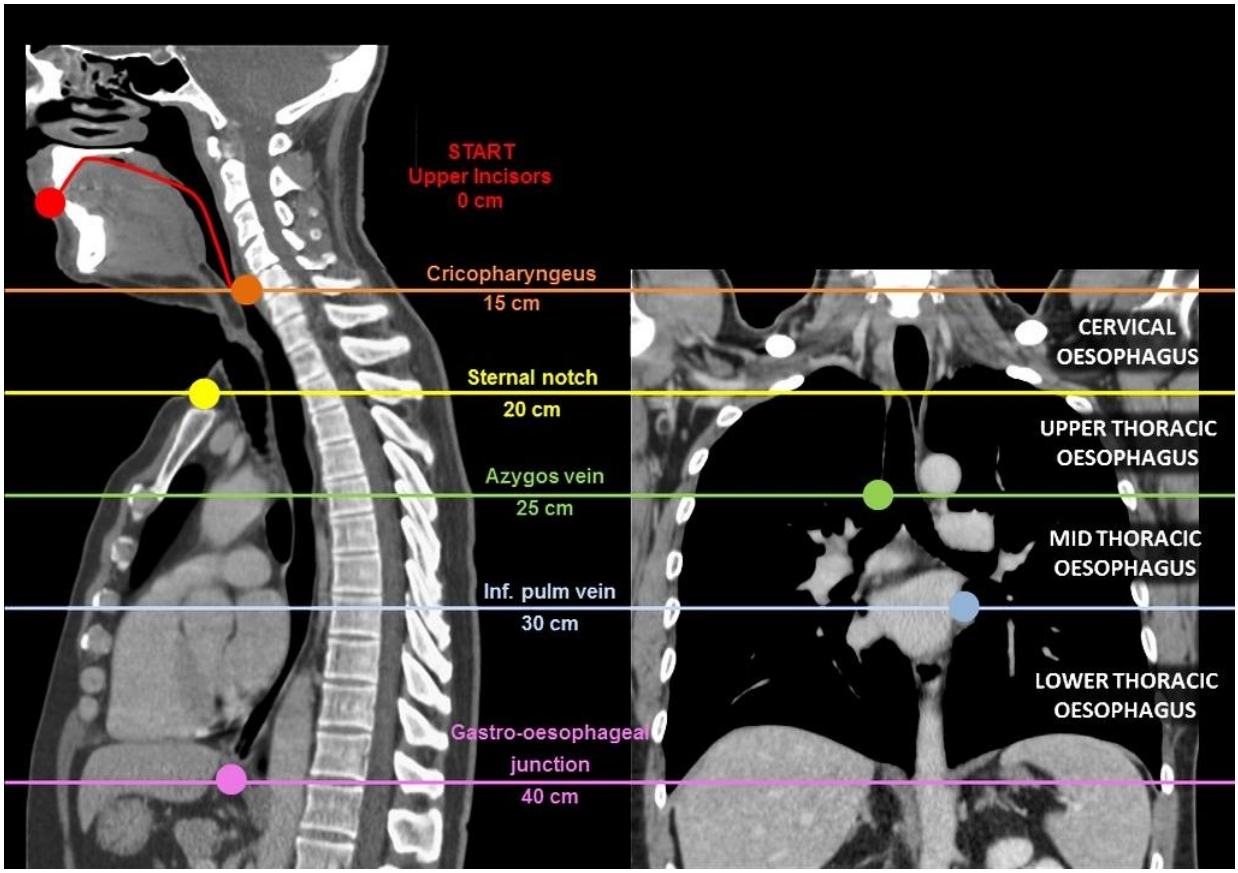
(C)
1. Cardiac impression (mainly left atrium)
2. A ring: upper limit of ampulla (vestibule)
3. B ring (Schatzki ring): lower limit of ampulla
4. Ampulla (oesophageal vestibule)
5. Diaphragmatic hiatus
6. Oesophageal mucosal folds
7. Oesophagogastric junction (Z-line)
8. Diaphragm
9. Air in fundus of stomach

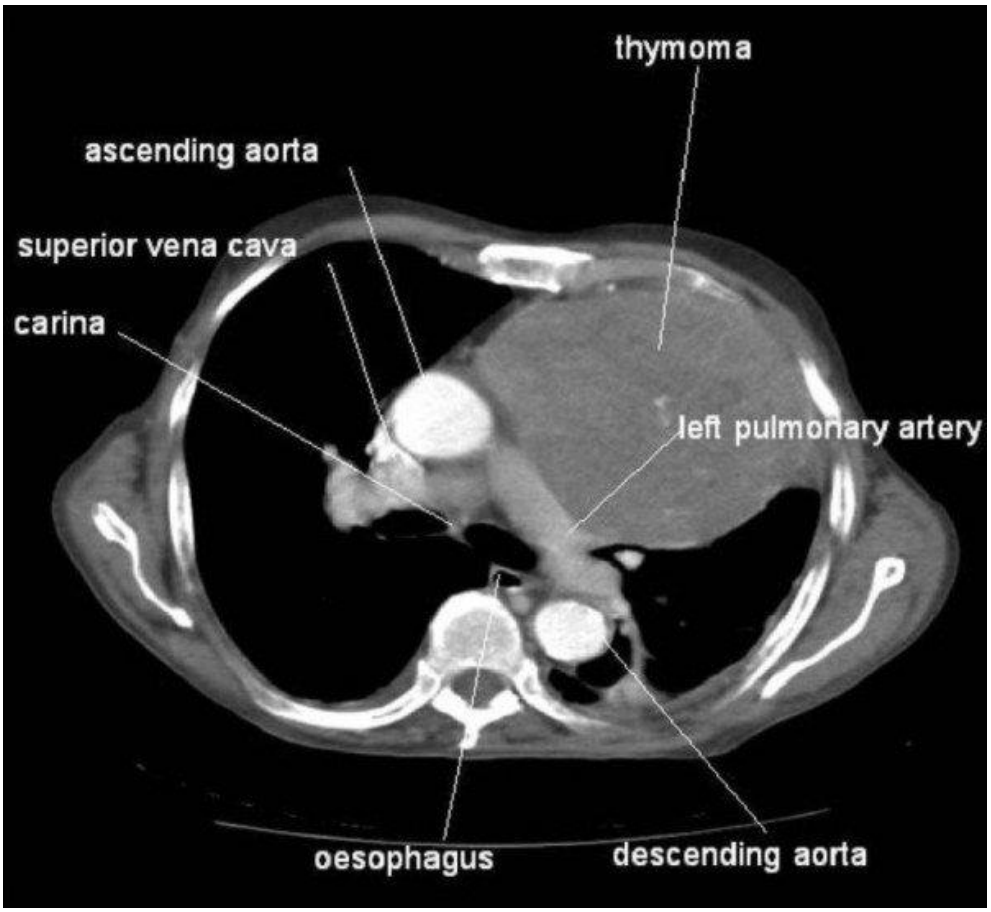


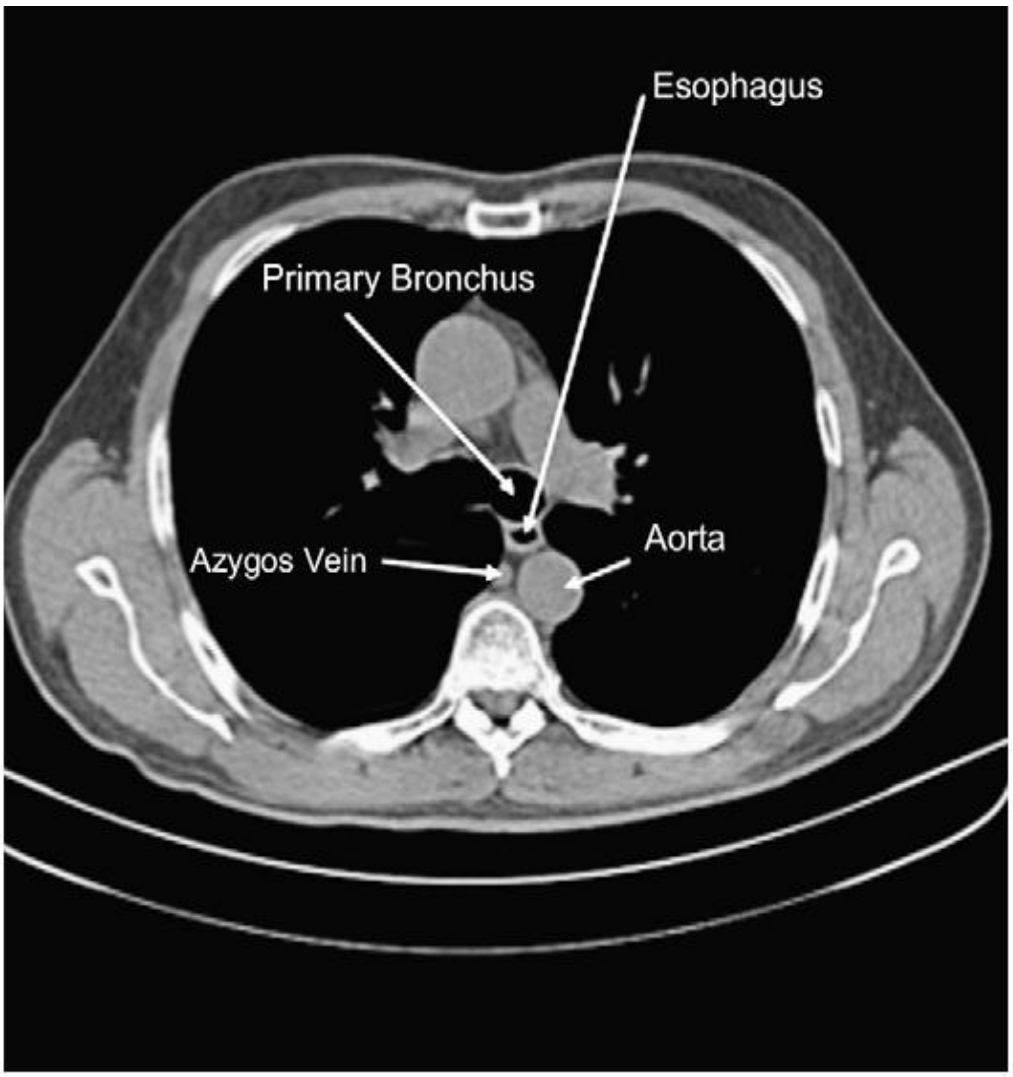
Computed Tomography (CT):

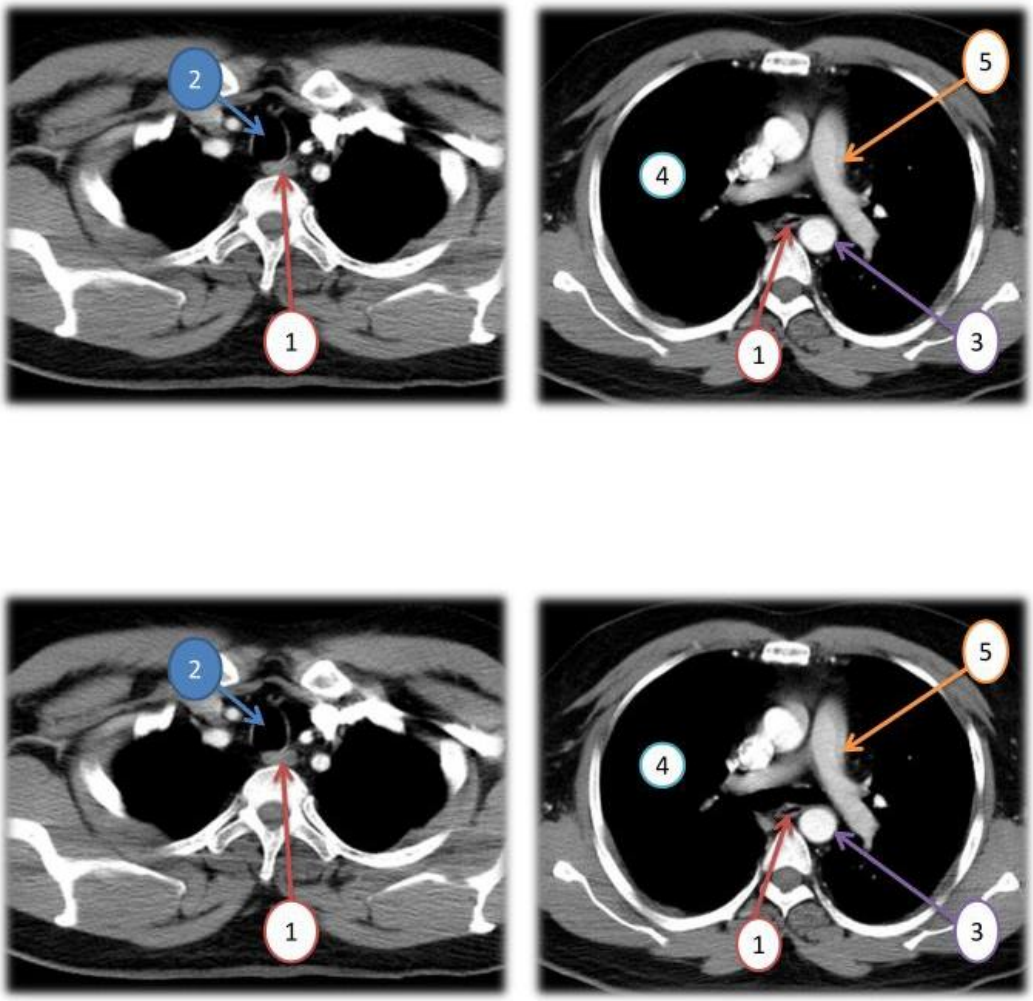
To evaluate the esophagus, particularly in the situation of esophageal trauma and potential perforation. It has been developed partly as an alternative to fluoroscopic barium swallow evaluation in this situation.

*80% will contain gas allowing for appreciation of the wall if there is enough surrounding mediastinal fat
*if collapsed will appear as round or ovoid




thymoma
ascending aorta
superior vena cava
carina
left pulmonary artery
oesophagus
descending aorta


Esophagus
Primary Bronchus
Azygos Vein
Aorta



1. **Esophagus**
2. **Trachea**
3. **Aorta**
4. **Lung**
5. **Pulmonary artery**

Fluoroscopy:

The double-contrast phase optimizes the ability to detect inflammatory or neoplastic diseases.

The single-contrast phase optimizes the ability to detect hiatal hernias and lower esophageal rings or strictures.

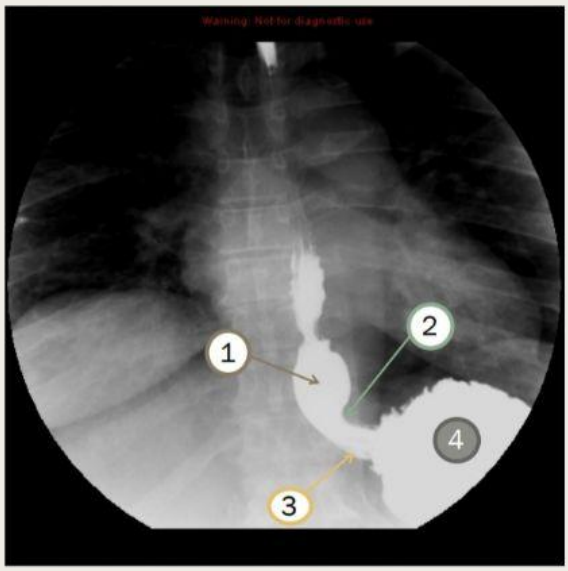
Fluoroscopic examination of the esophagus is also important for assessing motility disorders such as:

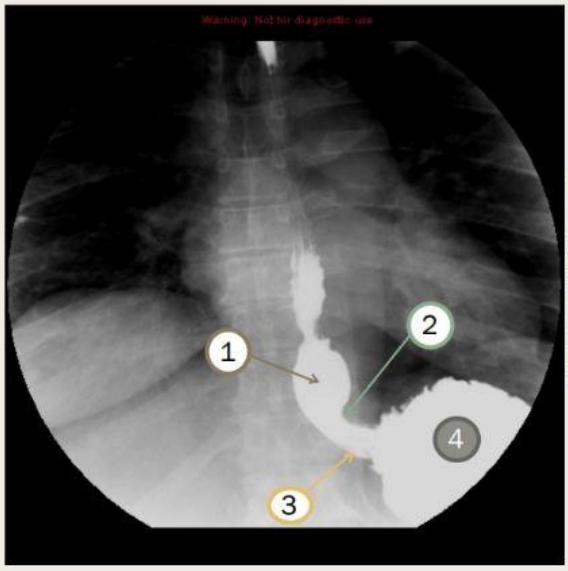
1. achalasia and diffuse esophageal spasm. 2. gastro-esophageal reflux disease.

3. esophagitis. 4. benign and malignant esophageal tumors.

5. varices. 6. lower esophageal rings.

7. diverticula. 8. esophageal motility disorders.





1-Esophageal vestibule (ampulla).
2- B ring.
3- Gastroesophageal junction.
4- Stomach (gastric fundus).