Gross anatomy of Oesophagus

Objectives

- List the parts of the oesophagus
- State the dimensions of the oesophagus
- State the directions of the oesophagus
- Briefly describe the relations of the oesophagus
- Briefly describe the vasculature of the oesophagus

Case 1

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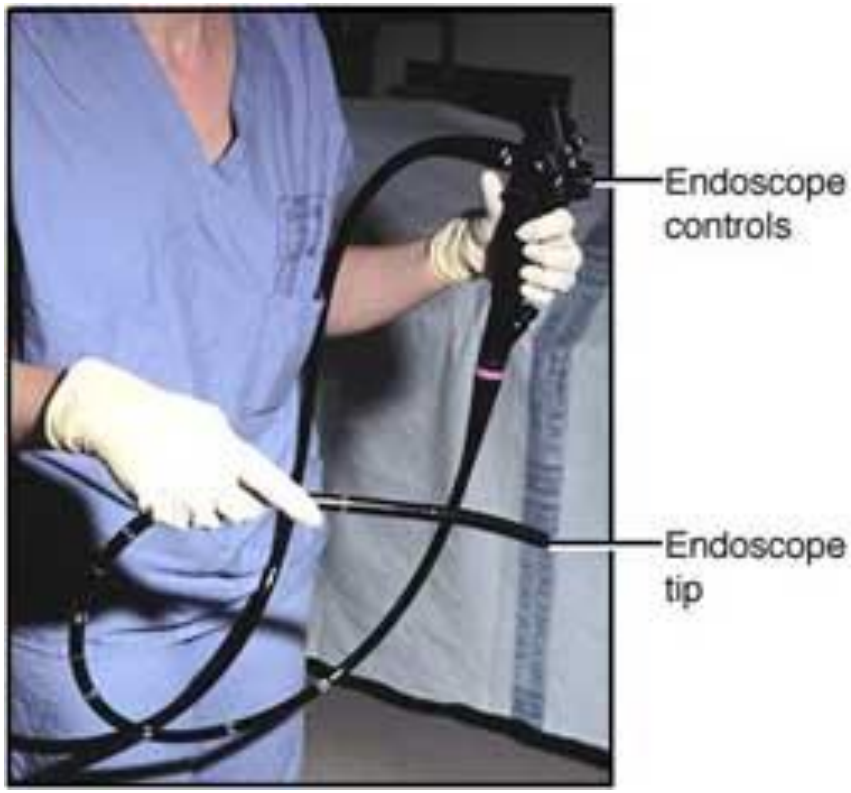
Endoscopy- oesophagoscopy



- Dimensions of the oesophagus …???
- Directions of the oesophagus ..???

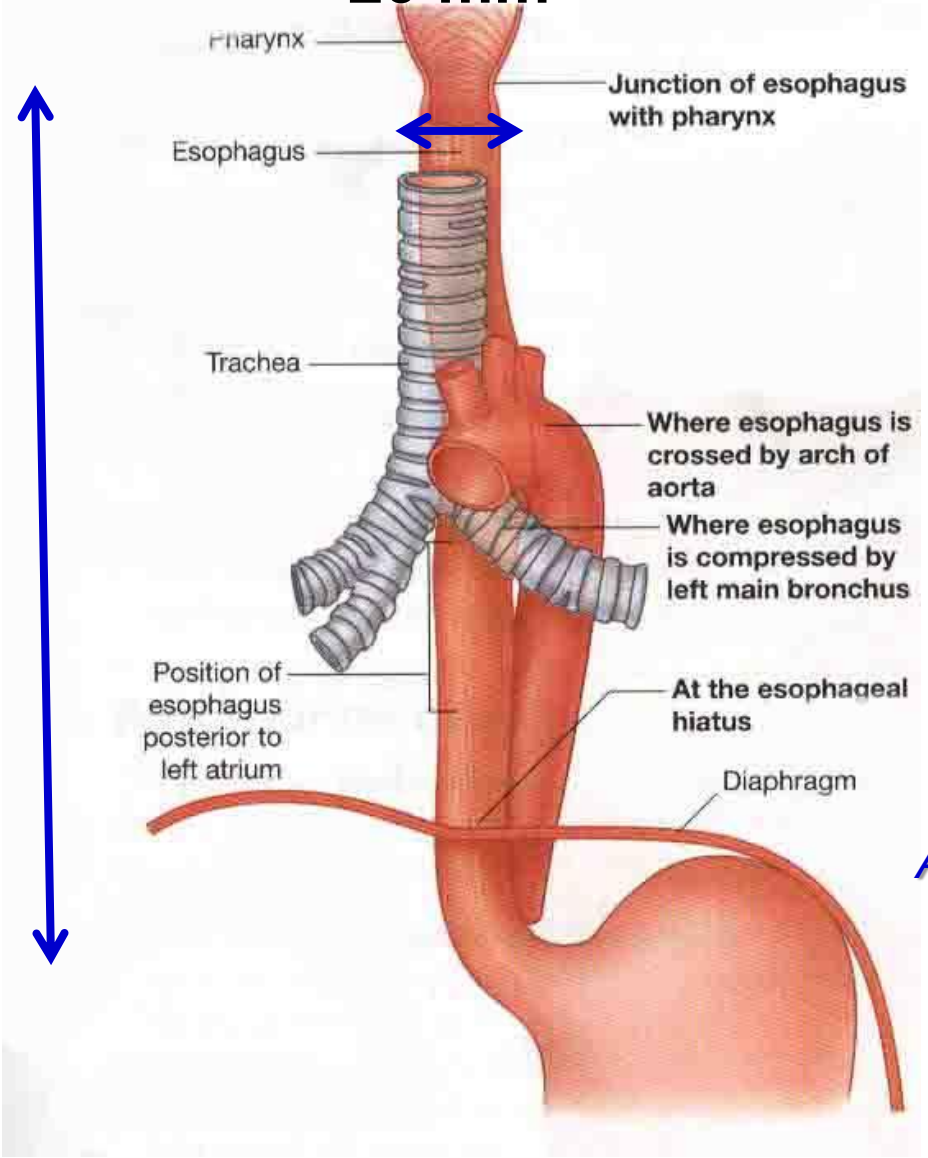
Adult Oesophagus

20 mm

Flat

25 cm

Rounded



C6

cervical oesophagus

Thoracic oesophagus

Abdominal oesophagus

T 11

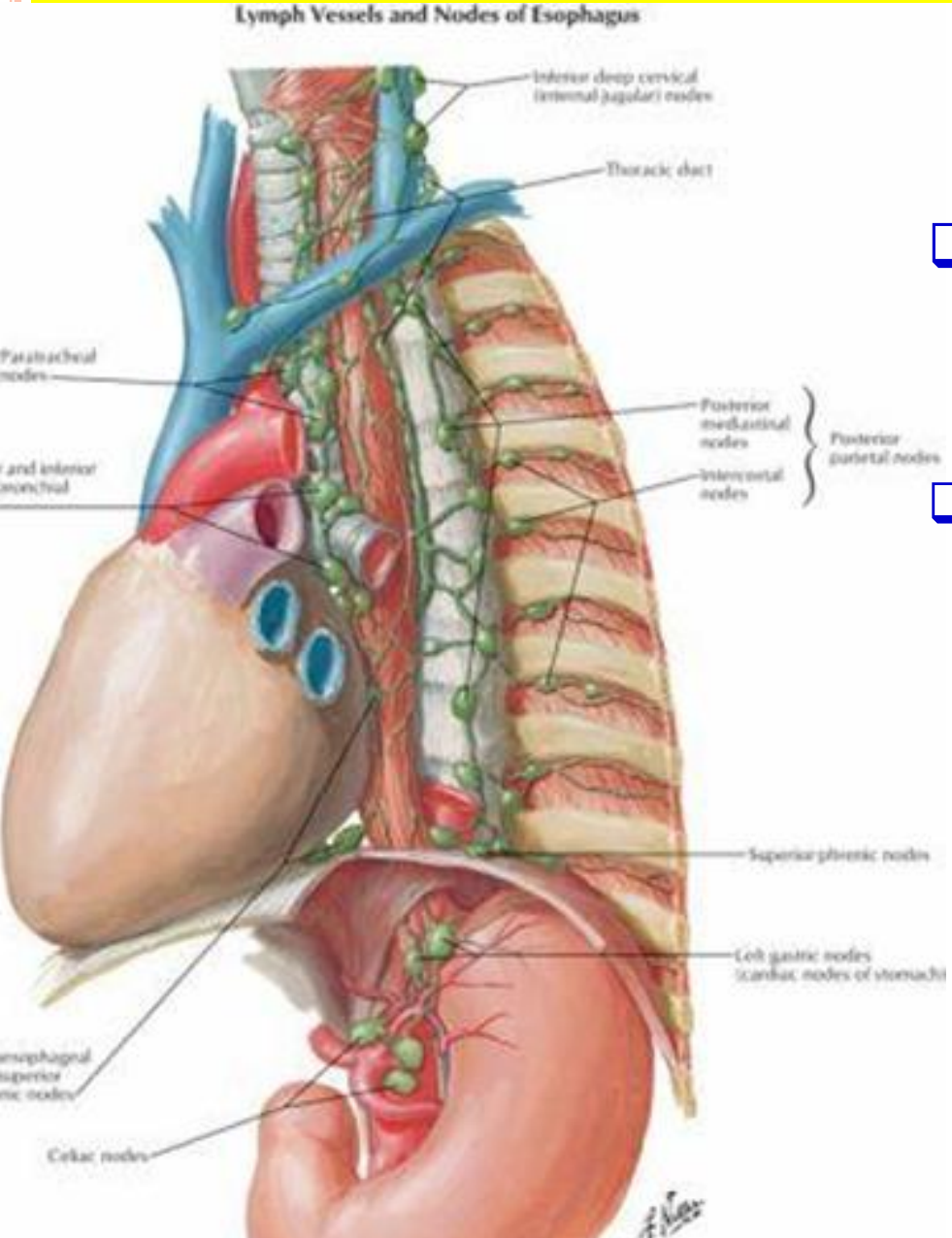
- ***New born baby + sex differences ??***

OESOPHAGUS

- A muscular tube; 25 cm in length
  - Collapsed at rest,
  - Flat in upper 2/3 & rounded in lower 1/3
  - Superior – laryngopharynx
  - Inferior - somach
- **Diameter**: Varies whether bolus of food/ fluid passing through or not
  - At rest in adults 20 mm but can stretch up to 30 mm
- Commences at the lower border of the cricoid cartilage.**(C6)**
- Ends at **T11** vertebra level.
- In the newborn: upper limit -C4 / C5 & lower limit -T9

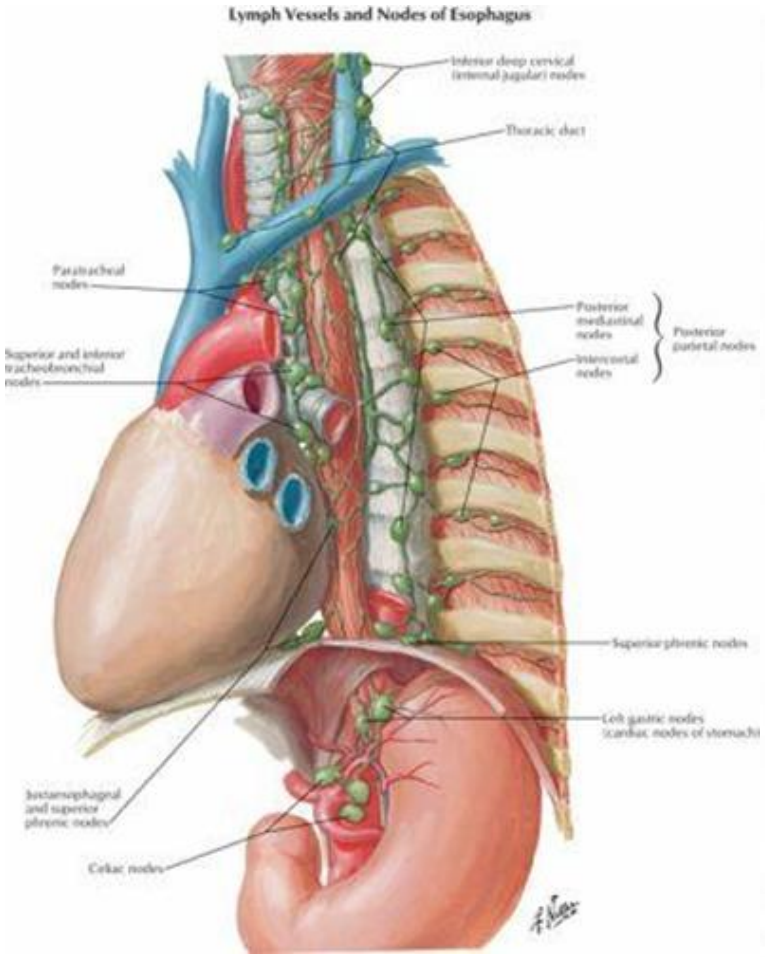
Oesophagus – Pathway

OESOPHAGUS – PATHWAY

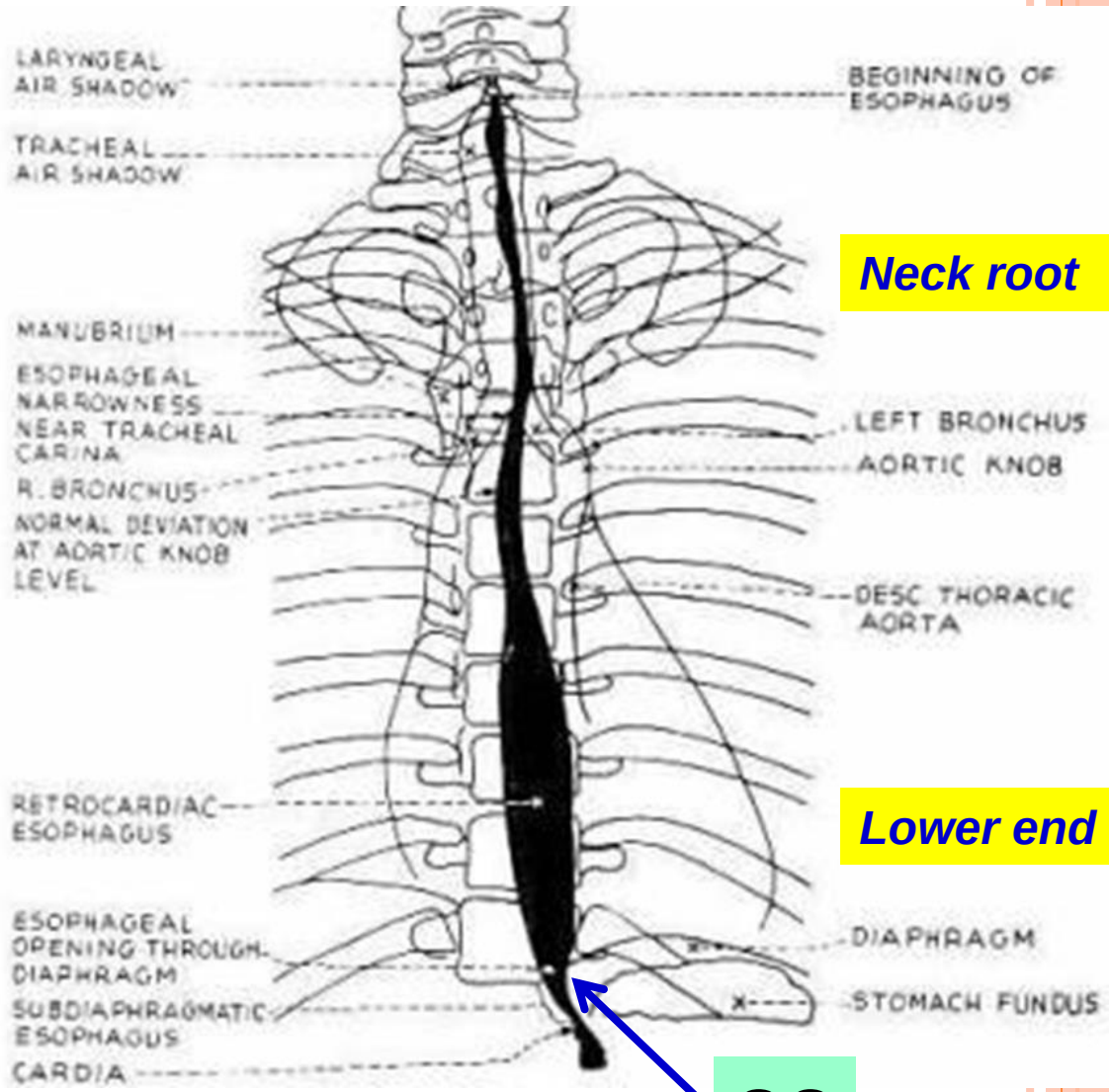


- *3 parts : cervical oesophagus*
  thoracic oesophagus
  abdominal oesophagus
- *Descends along the front of the spine, through the superior & posterior mediastinum, passes through the diaphragm, and, entering the abdomen, terminates at the cardiac orifice of the stomach, opposite the eleventh thoracic vertebra.*

Oesophagus – Pathway & curvatures

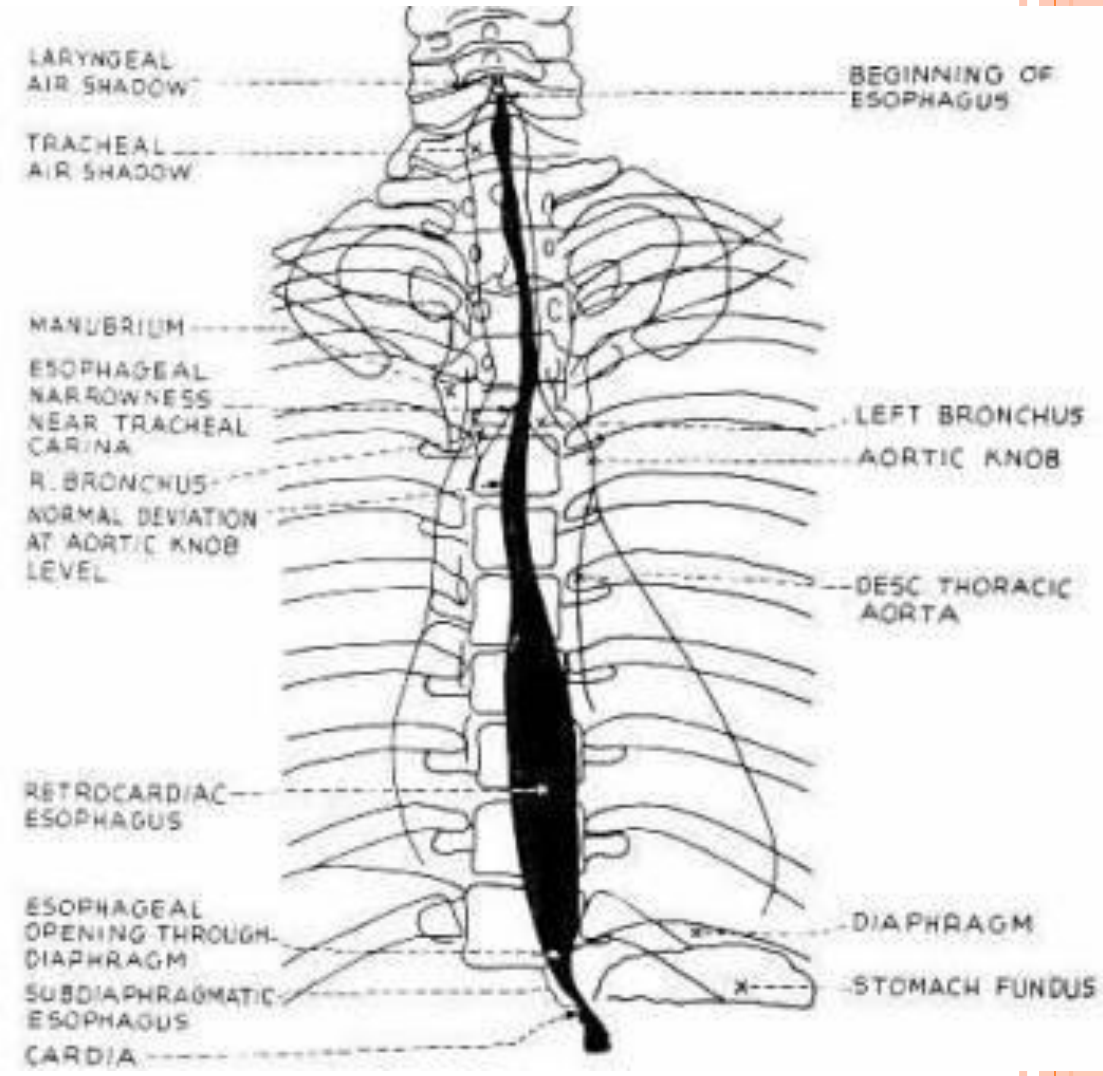


Antero-posterior curvatures



General direction of the oesophagus is vertical

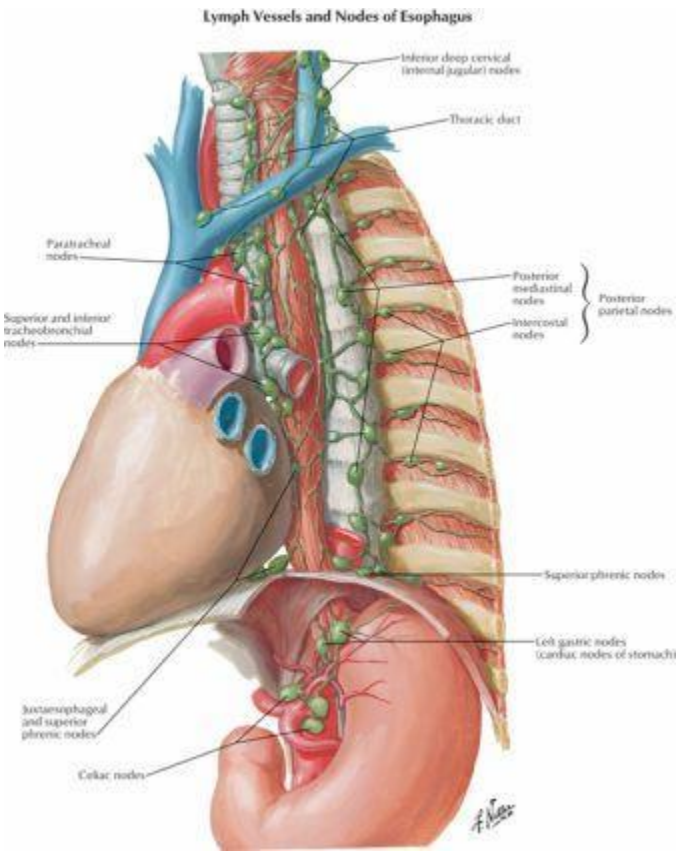
- Presents two slight curvatures
- At commencement, in the median line
- Inclines to the left side at the root of the neck
- Gradually passes to the middle line
- Again deviates to the left at the lower end



General direction of the oesophagus is vertical

- The oesophagus also presents an **antero-posterior flexure**, corresponding to the curvature of the cervical and thoracic portions of the spine.

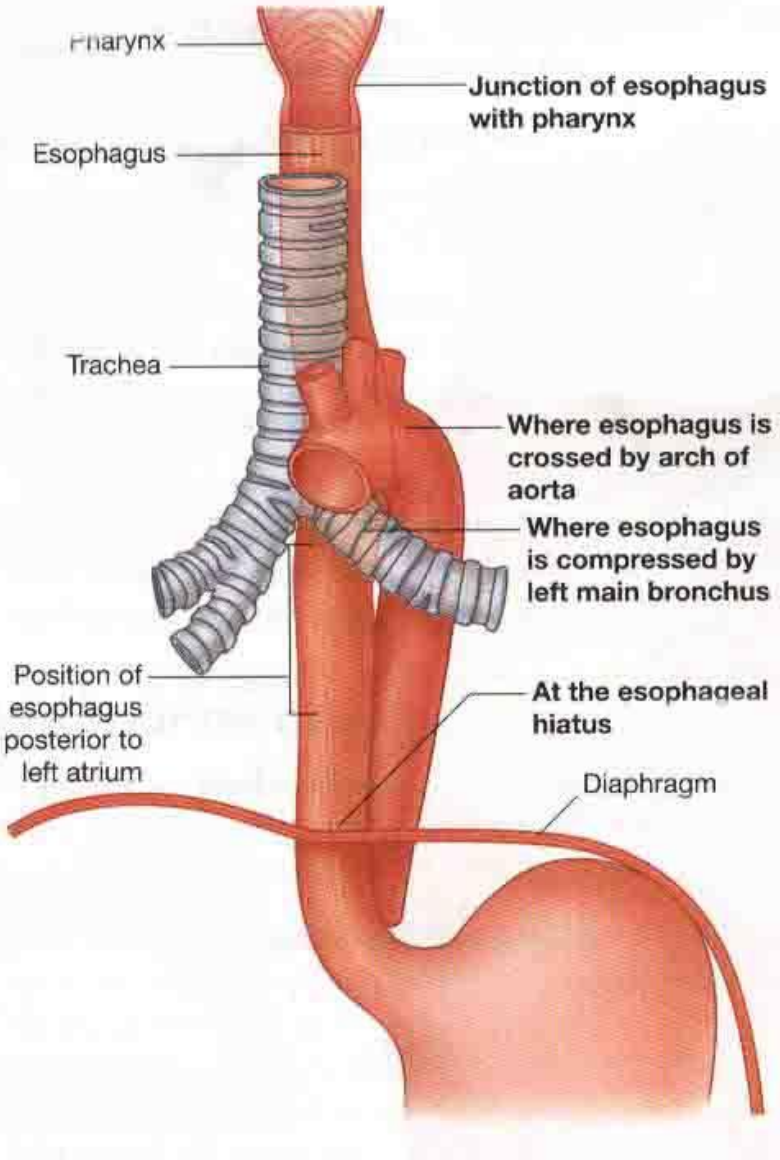
- It is the narrowest part of the alimentary canal except appendix, being most contracted at its commencement, and at the point where it passes through the Diaphragm.



OESOPHAGUS – CONSTRICTIONS

15 cm

Incisor teeth



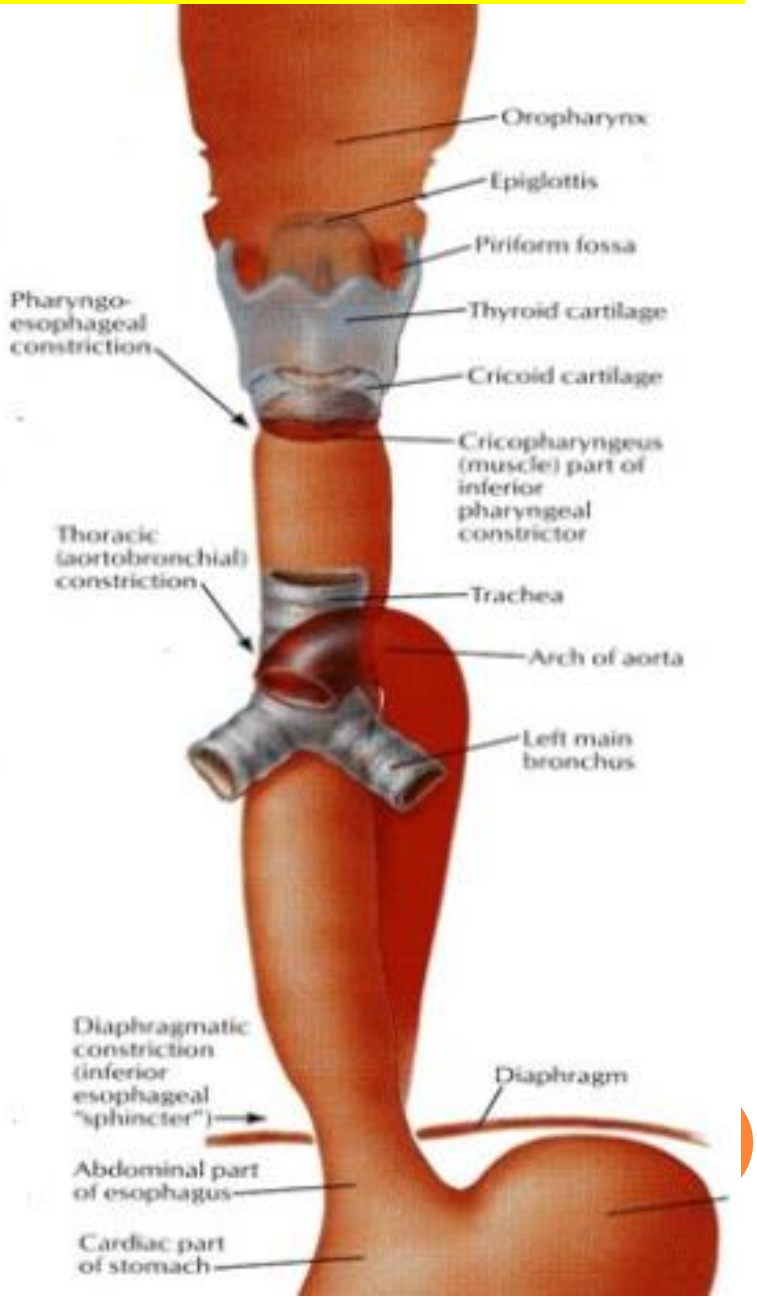
22.5 cm

27.5 cm

37.5 cm

OESOPHAGUS – CONSTRICTIONS

- The first is at the junction with the pharynx(pharyngeoesophageal junction). 15 cm from incisor teeth.
- The second is at the crossing with the aortic arch (22.5 cm) and the left main bronchus (27.5 cm)
- The third is at the junction with the stomach (37.5cm).
- They have a considerable clinical importance.



The areas where most oesophageal foreign bodies become entrapped.

- The cricopharyngeus sling at C6 is also at this level and may "catch" a foreign body.
- About 70% of blunt foreign bodies that lodge in the oesophagus do so at this location.
- Another 15% become lodged at the **mid oesophagus**, in the region where the aortic arch and carina overlap the oesophagus on chest radiograph.
- The remaining 15% become lodged at the lower oesophageal sphincter **(LES)** at the gastroesophageal junction.

RELATIONS OF THE OESOPHAGUS
SURGICAL ANATOMY

- The relations of the oesophagus are of considerable practical interest to the surgeon, as he is frequently required, in cases of stricture of this tube to dilate the canal by a bougie

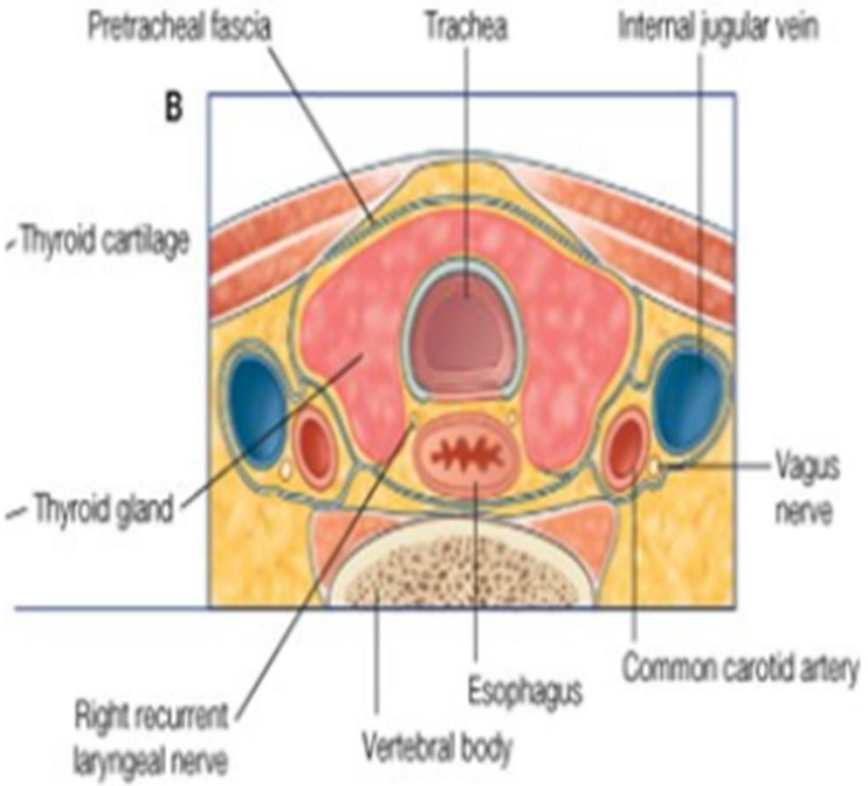
- In cases of malignant disease of the oesophagus,, the greatest care is requisite in directing the bougie through the strictured part, as a false passage may easily be made, and the instrument may pass into the mediastinum, or into one or the other pleural cavity, or even into the pericardium

OESOPHAGUS - SPHINCTERS

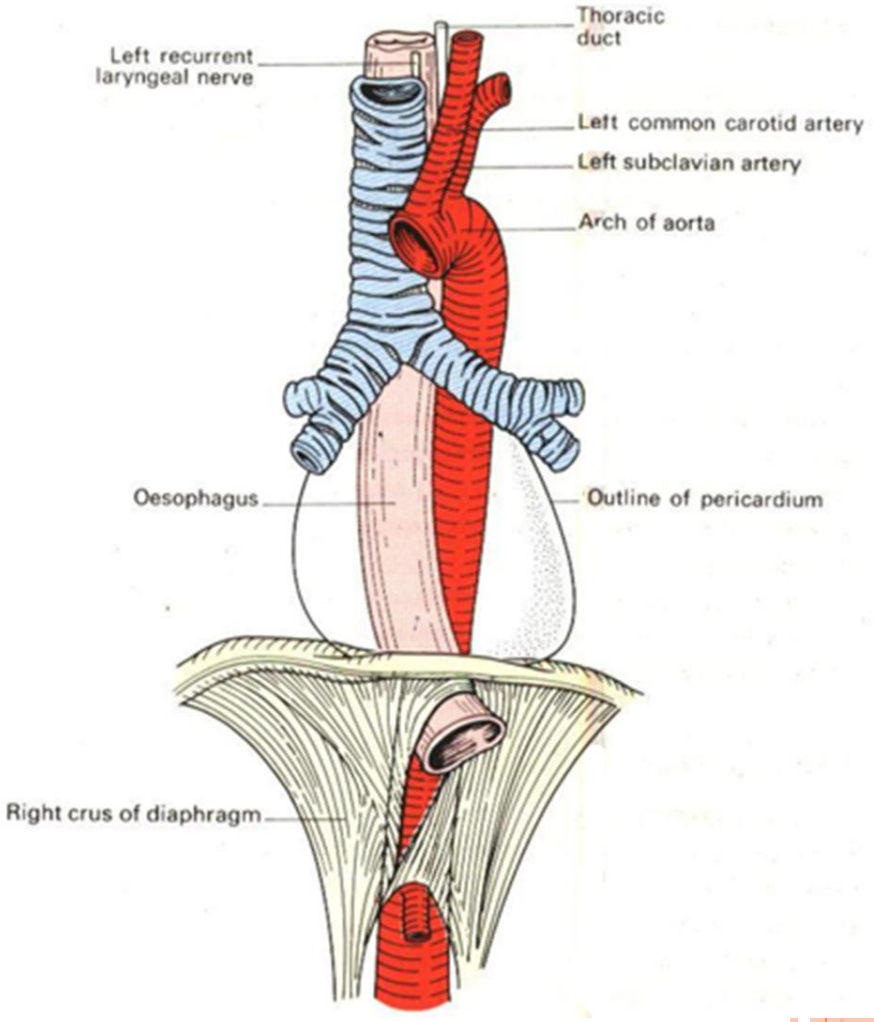
- Upper Oesophageal Sphincter: It is a 2-3 mm zone of elevated pressure between pharynx & oesophagus. It relates to cricopharyngeal muscle
- Lower Oesophageal Sphincter: The LES is located at the junction between the esophagus and stomach, usually localized at or just below the diaphragmatic hiatus. Despite its distinct physiological function, it is not easily distinguished anatomically.

CERVICAL OESOPHAGUS -RELATIONS

- **Anterior : trachea & thyroid gland**
  recurrent laryngeal nerve
- **Posteriorr : 6th & 7th cervical vertebrae**
  prevertebral fascia
  Longus colli
- **Either side: common carotid arteries**
  posterior part of thyroid
- **Left : subclavian artery & terminal part of the throracic duct**



THORACIC OESOPHAGUS - RELATIONS

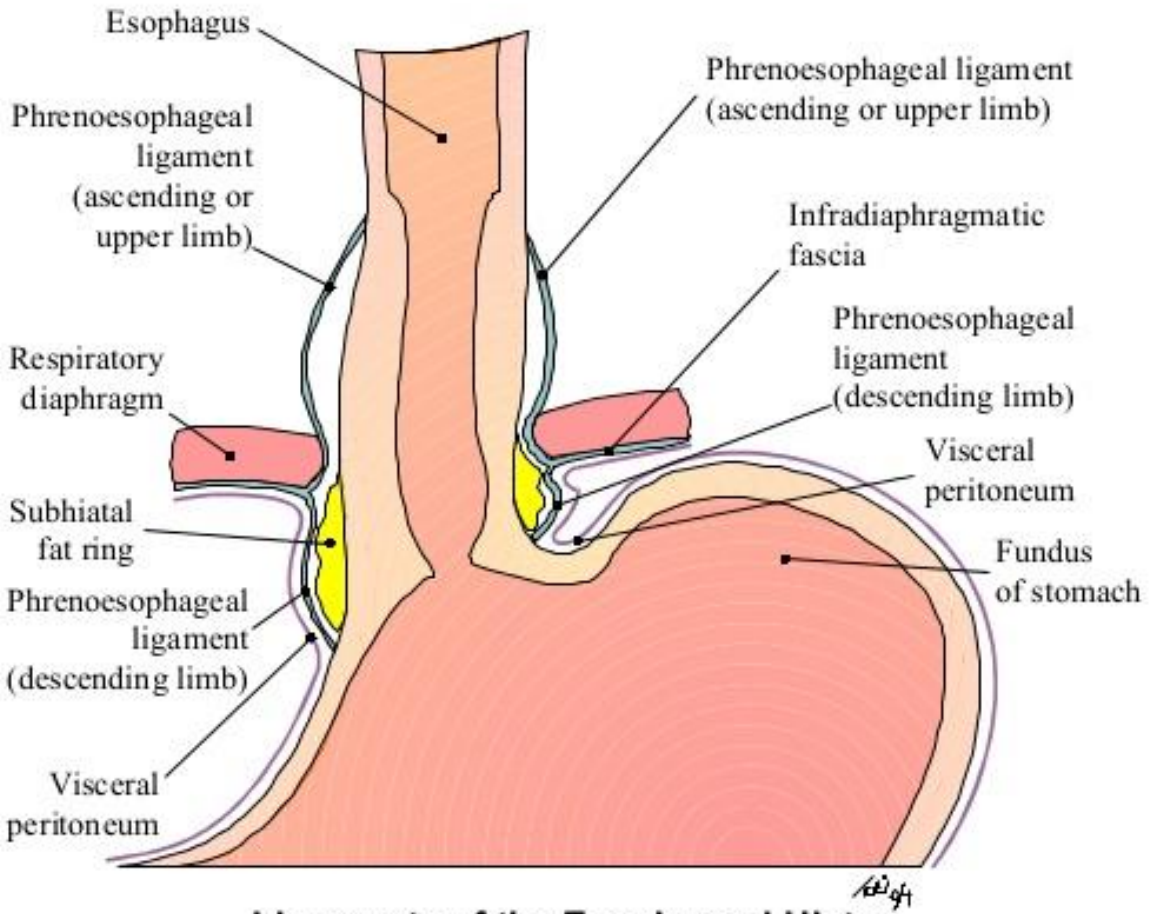


- **Anterior :** trachea, left bronchus, pericardium, diaphragm
- **Posterior:** throracic vertebrae thoracic duct, azygos vein, descending aorta
- **Left side :** left subclavian artery, left recurrent laryngeal nerve, thoracic duct, left pleura terminal part of aortic arch, descending aorta
- **Right side :** pleura , azygos vein

Abdominal oesophagus - Relations

- **Anterior to the part of left crus of diaphragm, left inferior phrenic vessels**
- **Posterior to the left lobe of liver**
- **Its surface is covered by a thin layer of vatissue & peritoneum that contain the anterior & posterior vagi nerve as well as the left gastric vessels.**
- **Anterior vegus : closely applied to anterior outer surface of the longitudinal muscle coat of the oesopgagus**
- **Posteior vegus : usually lies within lose connective tissue posterior and righ to the oesopgagus**
- ***These relations are important in identification of vagi during surgery***

ABDOMINAL OESOPHAGUS - RELATIONS



Ligaments of the Esophageal Hiatus (anterior view)

The fat pad beneath the peritoneum over the anterior surface of gastrooesophageal junction is a useful surgical marker

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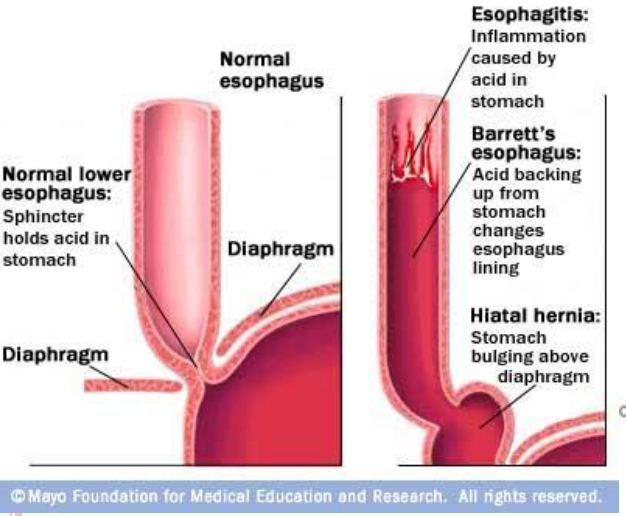
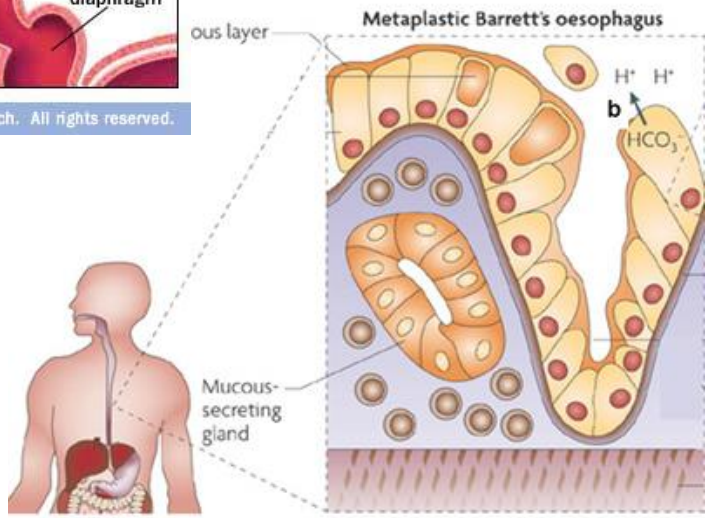
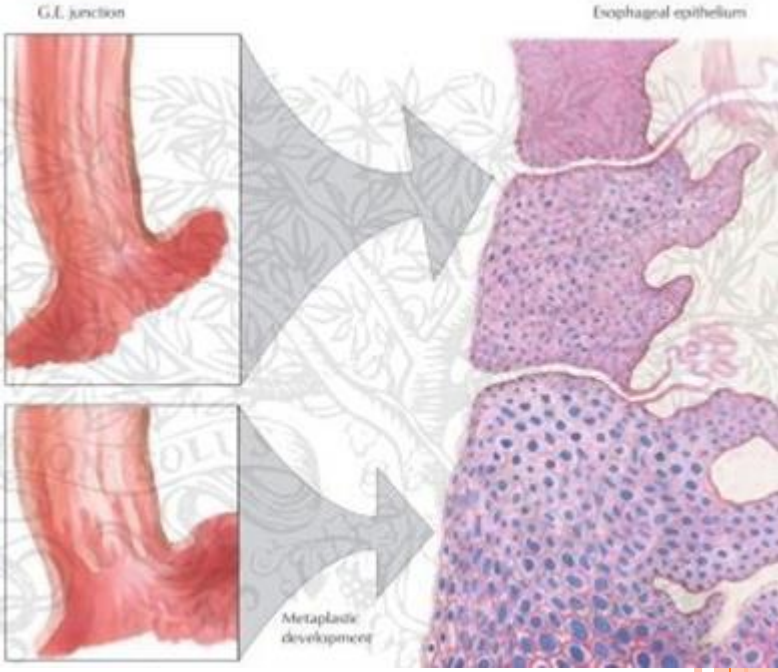
BARRETT'S OESOPHAGUS

- *Characterized by metaplasia of oesophageal epithelium from non-keratinized stratified squamous type to simple columnar type of intestinal epithelium in the lower oesophagus.*

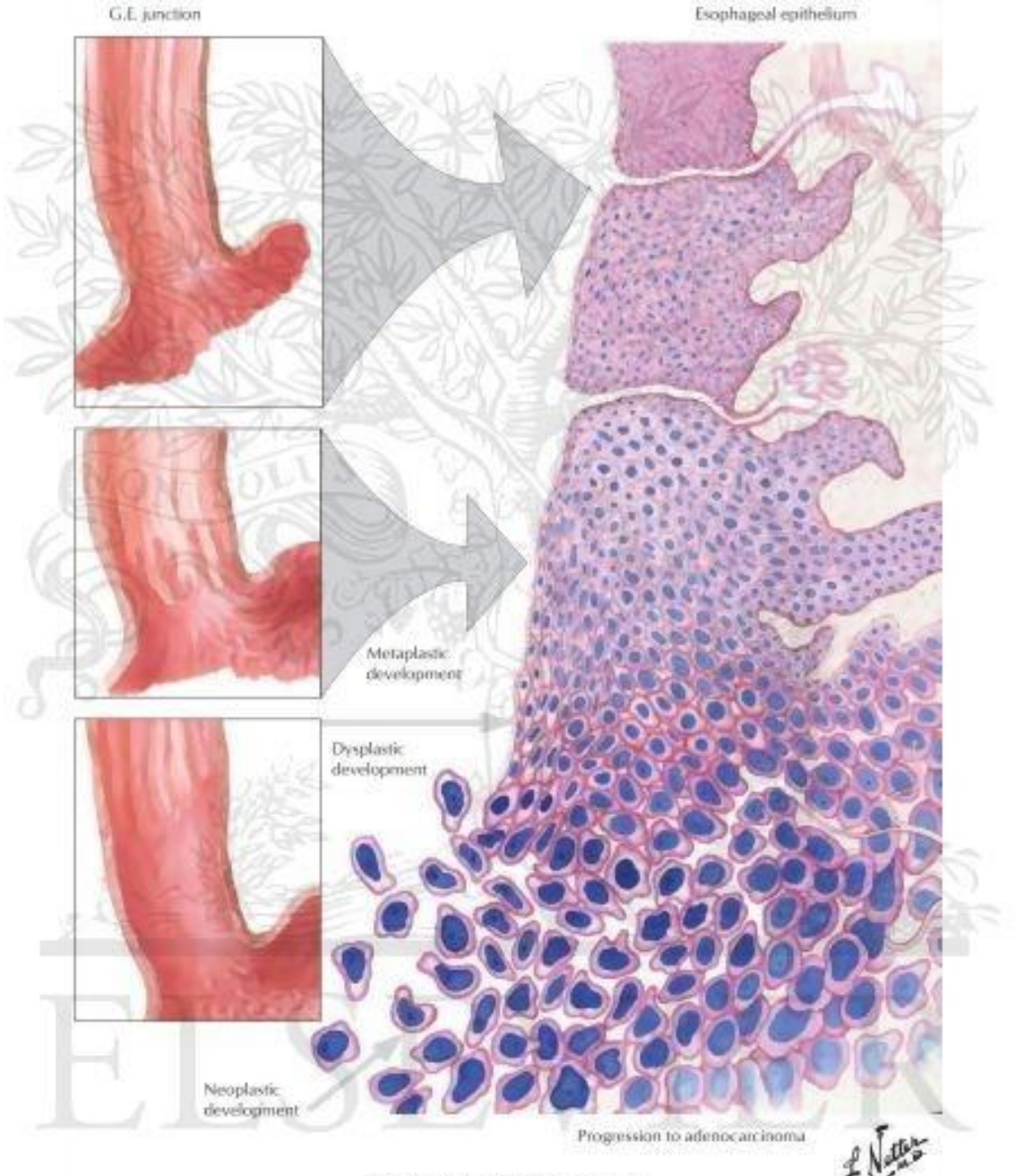
  Complication of gastroesophageal reflux disease.







OESOPHAGUS MALIGNANCY.



Metaplastic changes are consider to be premalignant stage.

Strong association between Barrett's oesophagus and adenocarcinoma of oesophagus.

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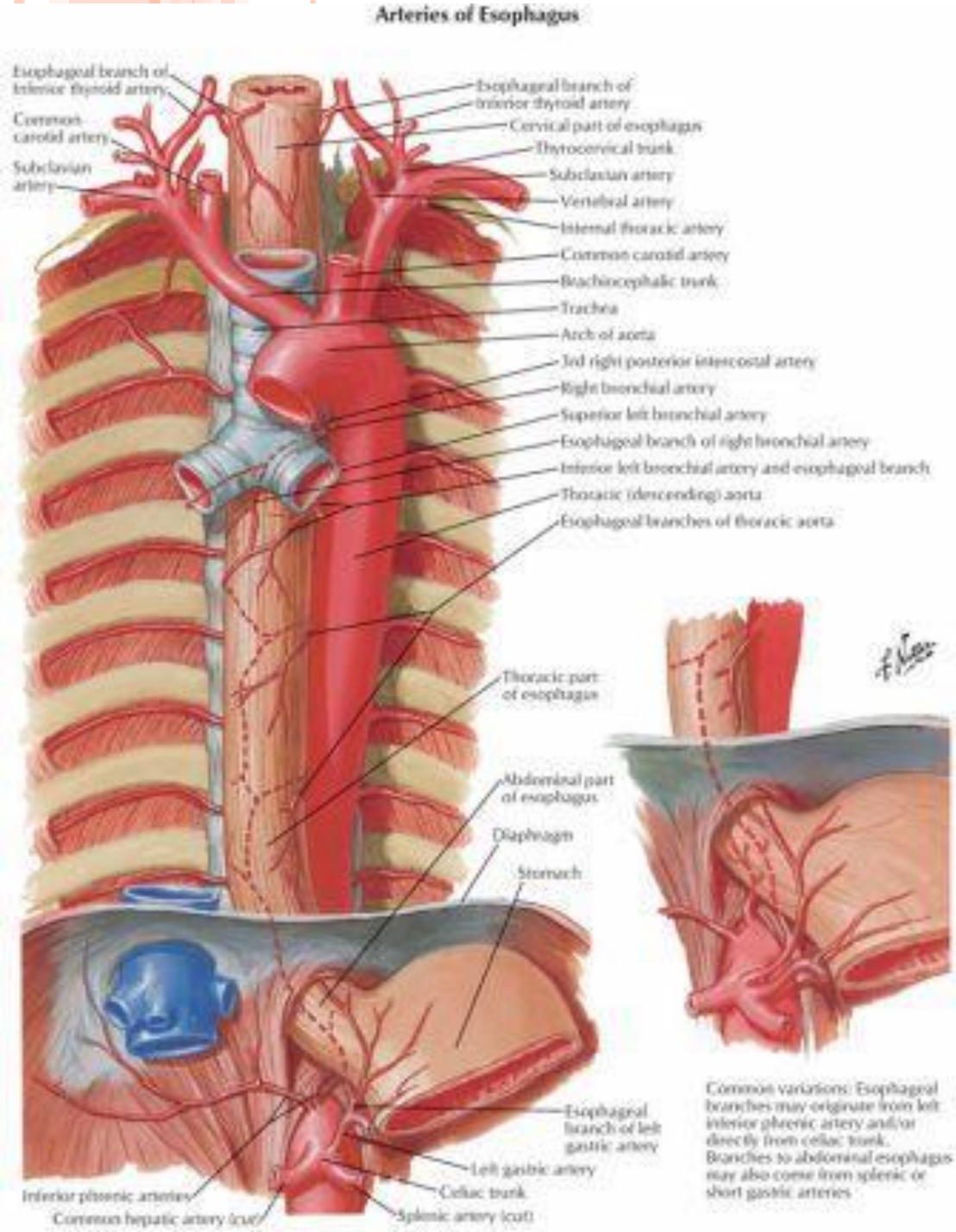
Spread of Cancer

- Lymph pathway
- Tissue pathways
- Vasular / hematogenous pathway

ARTERIAL SUPPLY



Cervical Oesophagus:
inferior thyroid arteries

Thoracic Oesophagus:
thoracic aorta

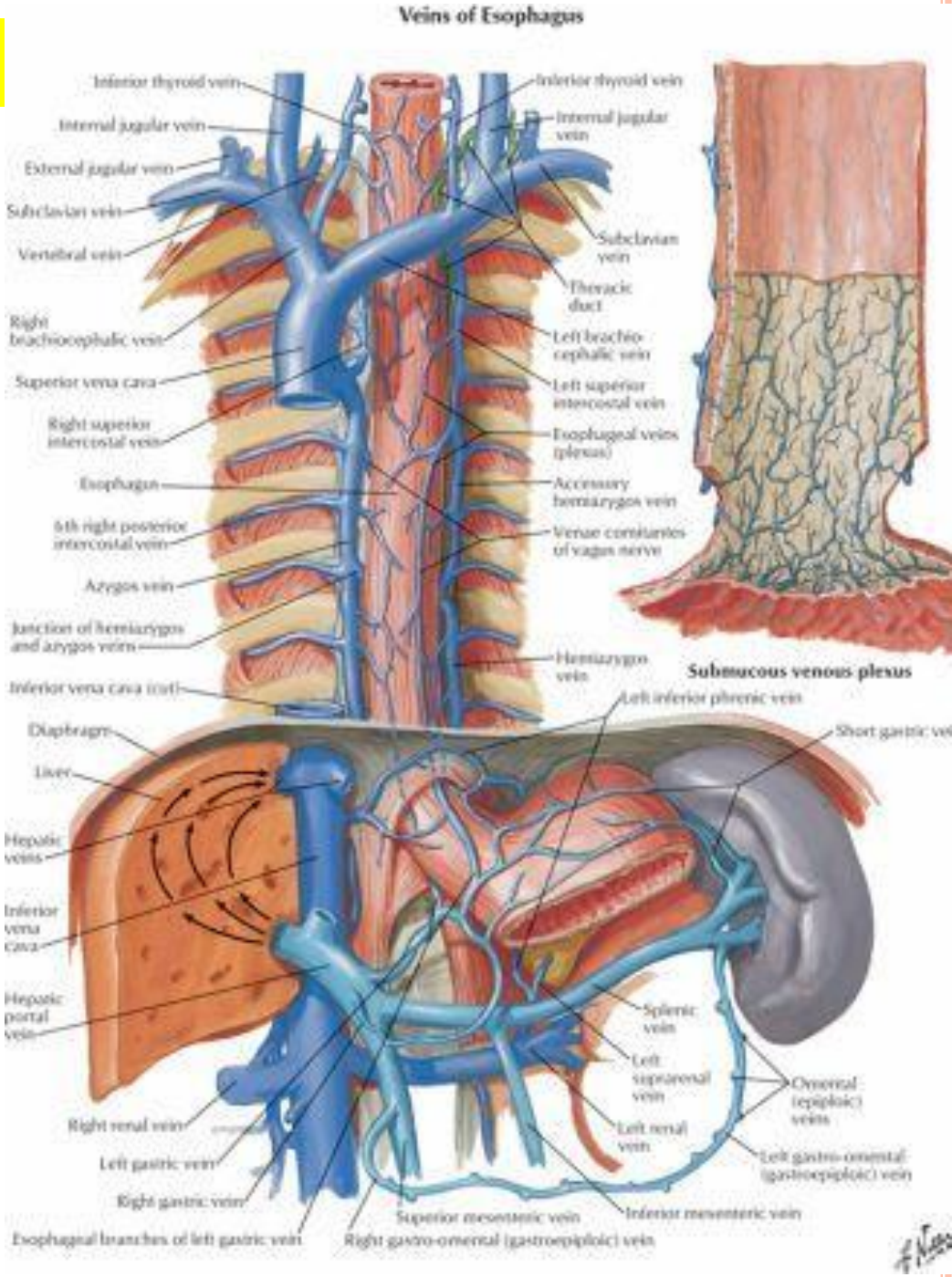
Abdominal Oesophagus
Left gastric artery

VENOUS DRAINAGE

Upper Oesophagus:
inferior thyroid veins

Middle Oesophagus:
azygos vein

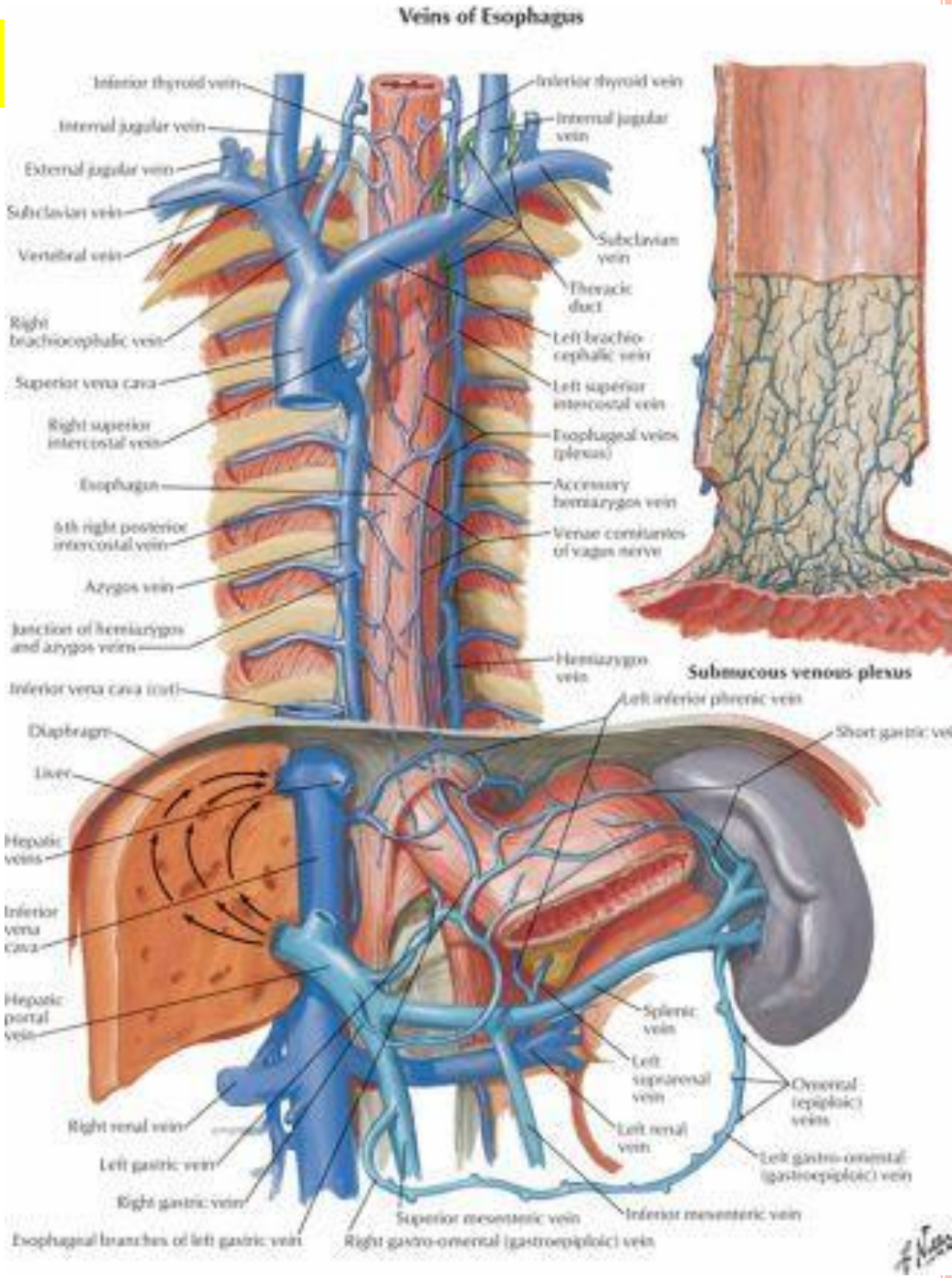
Lower Oesophagus
azygos vein & left gastric vein



VENOUS DRAINAGE

- The submucosal connections between the portal and systemic venous systems in the distal esophagus form esophageal varices in portal hypertension.

- These submucosal varices are sources of major hemorrhage in conditions such as cirrhosis.



Spread of Cancer

- Lymph pathway ****
- Tissue pathways
- Vasular pathway / hematogenous pathway

TUMOUR SPREAD VIA TISSUE PATHWAY

The direct spread through the wall of the oesophagus can lead to involvement of lung , bronchi and aorta.

Spread of Cancer

- Lymph pathway ****
- Tissue pathways
- Vasular pathway / hematogenous pathway

Lymph drainage

- In the proximal third of the esophagus, lymphatics drain into the deep cervical lymph nodes
- In the middle third, drainage is into the posterior mediastinal nodes.
- The distal-third lymphatics follow the left gastric artery to the gastric and coeliac lymph nodes

Lymph drainage

- There is considerable interconnection among these three drainage regions.
  - Poorly understood
  - Important for tumour spread
  - Bi-directional spread

- Surgical Interest
  - Submucosal lymphatics explain why tumours may extend long distance before obstructing lumen
  - High recurrence rates
  - Bidirectional lymph flow may explain retrograde tumour seeding

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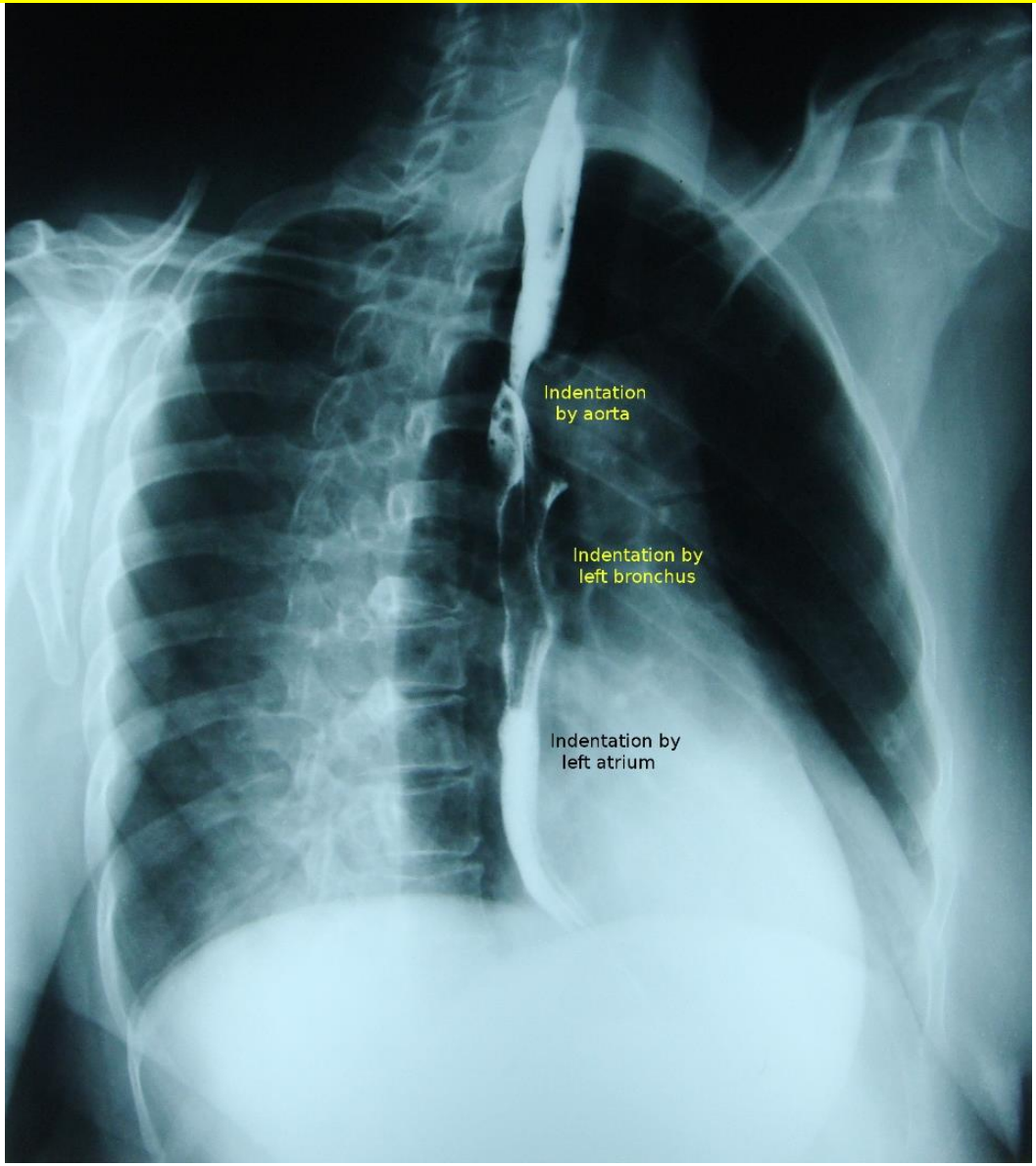
Barium swallow X-ray



Right anterior oblique view showing normal indentations of esophagus

Nerve Supply

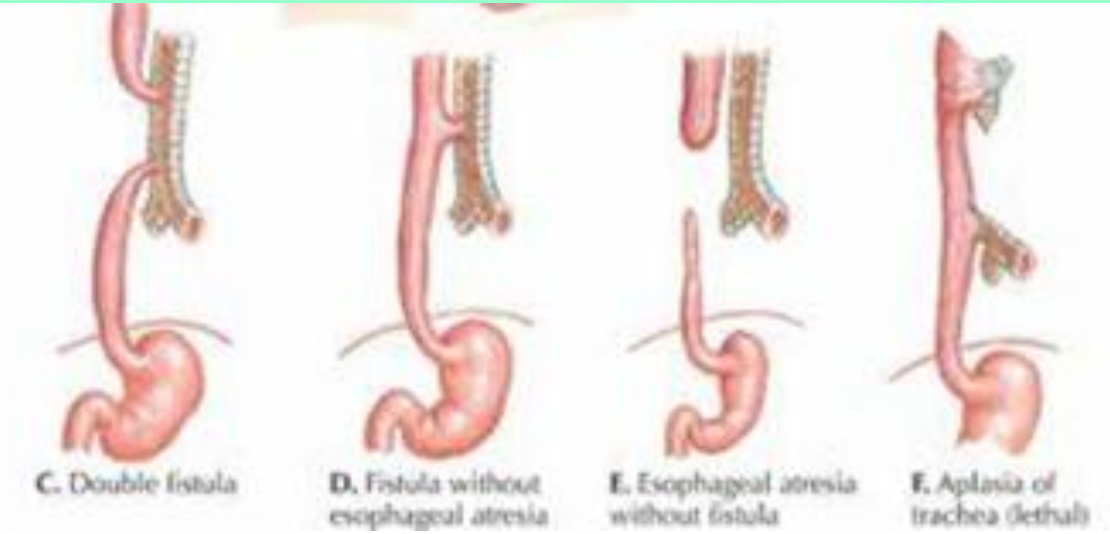
- Parasympathetic
  - Upper part : recurrent laryngeal nerve
  - Lower part : oesophageal plexus formed by 2 Vagi
  - motor to muscular coats & secretomotor to glands
- Sympathetic
  - Upper part : fibres from middle cervical ganglion
  - Lower part : upper four thoracic ganglia
  - They are vasomotor

Lower part : vagal fibres form anterior & posterior gastric nerves

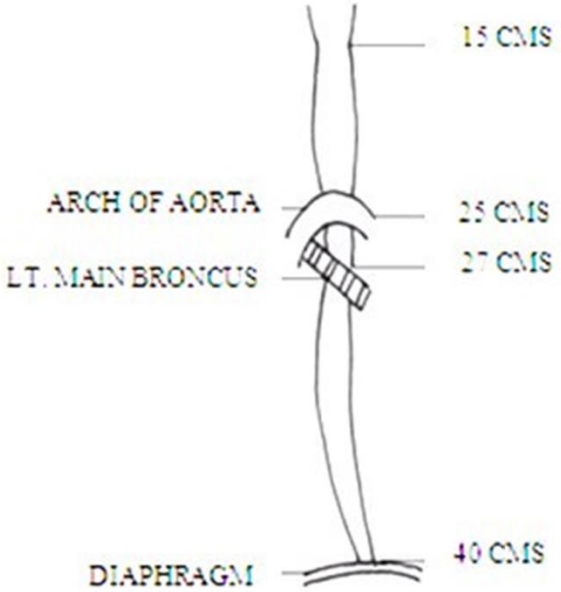
- Intramural
  - Combination of all innervation form plexuses & ganglia
  - In muscular layers (myenteric or Auerbach's plexus)
  - In submucosa (Meissner plexus)

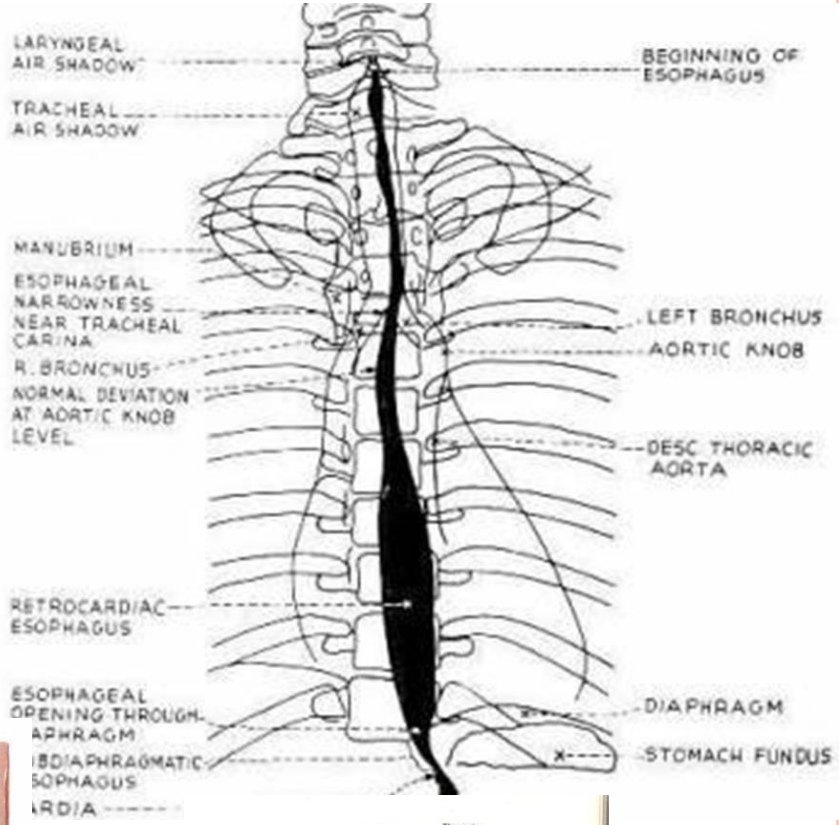
Applied Anatomy

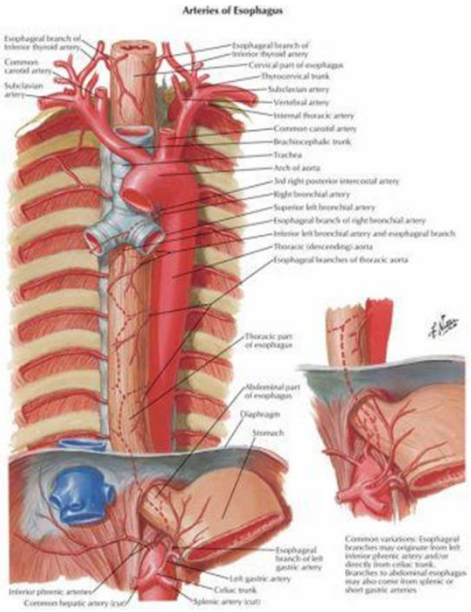
- In left artrial enlargement oesophagus is compressed. (Barium swallow)
- In mediastinal syndrome, oesophagus is compressed.
- Oesophago-tracheal fistula

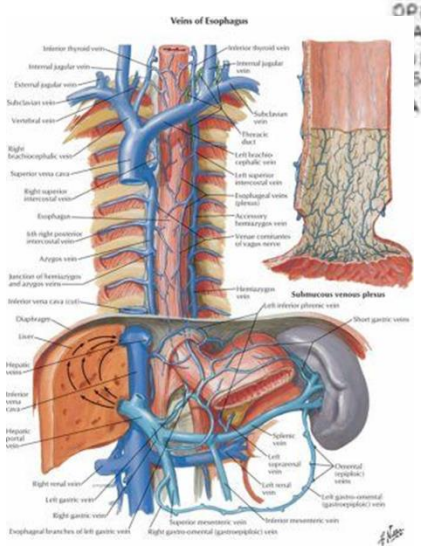


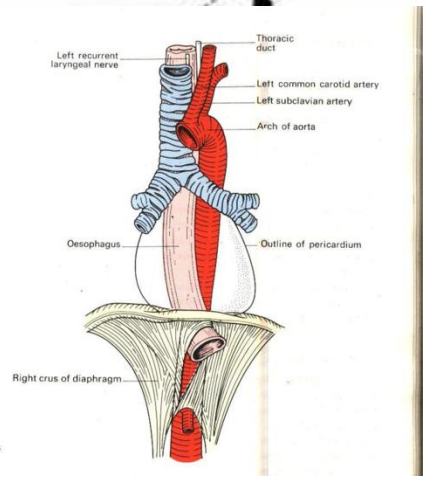
SUMMARY


15 CMS
ARCH OF AORTA
25 CMS
27 CMS
LT. MAIN BRONCUS
40 CMS
DIAPHRAGM


LARYNGEAL AIR SHADOW
BEGINNING OF ESOPHAGUS
TRACHEAL AIR SHADOW
MANUBRIUM
ESOPHAGEAL NARROWNESS NEAR TRACHEAL CARINA
LEFT BRONCHUS
AORTIC KNOB
R. BRONCHUS
NORMAL DEVIATION AT AORTIC KNOB LEVEL
DESC. THORACIC AORTA
RETROCARDIAC ESOPHAGUS
ESOPHAGEAL OPENING THROUGH DIAPHRAGM
DIAPHRAGM
DIAPHRAGMATIC ESOPHAGUS
STOMACH FUNDUS
CARDIA


Arteries of Esophagus


Veins of Esophagus
Submucous venous plexus


Thoracic duct
Left recurrent laryngeal nerve
Left common carotid artery
Left subclavian artery
Arch of aorta
Oesophagus
Outline of pericardium
Right crus of diaphragm

References

Chaurasia's Human Anatomy

Last's Anatomy

Grants Anatomy