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Subject : Anatomy  
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## ASSIGNMENT TOPICS

1. PHARYNX
2. ESOPHAGUS

### 1. PHARYNX:-

#### Introduction:

- Pharynx, (Greek word means "throat" ) cone -shaped wide muscular tube that connects the oral and nasal cavity to larynx and esophagus.
- Pharynx begins with base of skull and ends at inferior border of cricoid cartilage (C6).
- Pharynx continues with esophagus opposite to the sixth cervical vertebra and it also continues with the tympanic cavity via the auditory canal.
- Upper part transmits only air.
- Lower part transmits only food.
- Middle part transmit both air and food.

#### Measurement of pharynx:

- Length: 4\_ 5 inches & 12cm long
- Width: max 3.5 cm & min 1.5 cm

#### Parts of pharynx:

The pharynx is composed of three parts from superior to inferior.

Nasopharynx

Oropharynx

Laryngopharynx

#### 1. Nasopharynx:

The Nasopharynx is present above the soft palate and below the base of skull. It is continuous with the nasal cavity. The **pharyngeal isthmus** is the opening in the floor between the soft palate and the posterior pharyngeal wall. There is a depression in the pharyngeal wall behind the uvula elevation called **Pharyngeal recess**. The posterosuperior part contains the **adenoid tonsils** which enlarge between 3\_8 years of age and then regress.

#### 2. Oropharynx:

The Oropharynx is the middle part of pharynx located between the soft palate and the superior border of the epiglottis.

The Oropharynx involves in the voluntary and involuntary phases of swallowing.

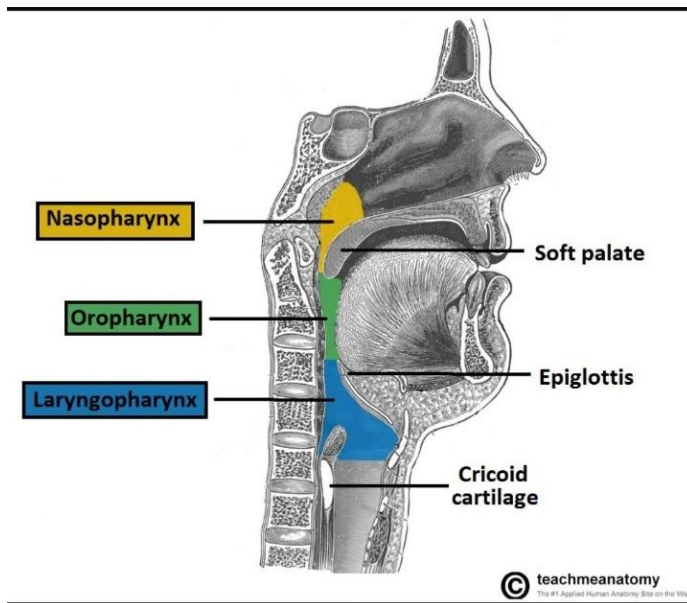
Oropharynx contains the structures below;

- Posterior  $\frac{1}{3}$  of the tongue

- Palatin tonsils: lymphoid tissue located in the tonsillar fossa.
- Lingual tonsils: lymphoid tissue at the base of tongue.
- Superior constrictor muscle.
- **Waldeyer's ring**; Is the ring of lymphoid tissue in the nose and Oropharynx formed by the paired palatine tonsils, adenoid and lingual tonsils.

### 3. Laryngopharynx:

The Most distal part of the pharynx is Laryngopharynx which is located between the superior border of the epiglottis and inferior border of the cricoid cartilage (C6). It continues inferiorly with esophagus. It is found posterior to larynx and communications with it larynx inlet lateral to which one can find the piriform fossae.



### MUSCLES OF PHARYNX:

There are two main groups of pharyngeal muscles ;

- Longitudinal
- Circular

#### **Circular muscles:**

There are three circular pharyngeal constrictor muscle;

- Superior pharyngeal constrictors
- Middle pharyngeal constrictors
- Inferior pharyngeal constrictors

The circular muscles are stacked like glasses.

They contract sequentially from superior to inferior to constrict the lumen and propel the bolus of food inferiorly into the esophagus.

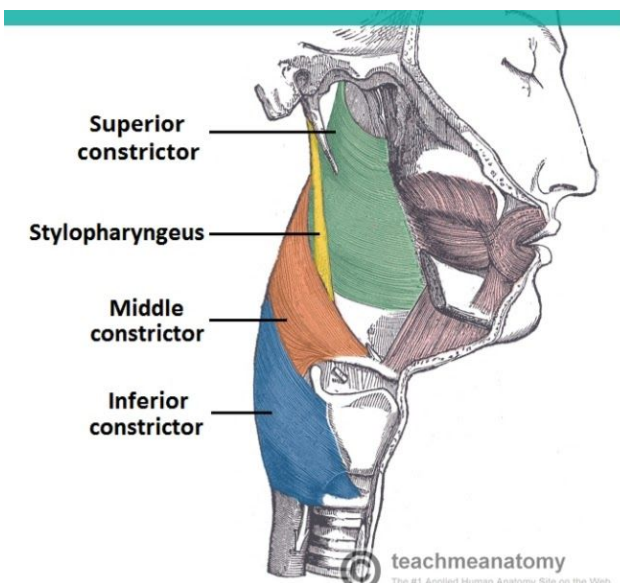
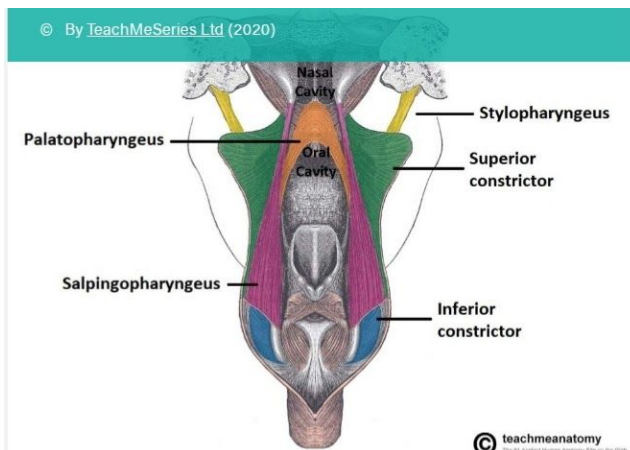
- **Superior pharyngeal constrictors:** is the uppermost pharyngeal constrictor which is located in the Oropharynx.
  - It originates from the pterygmandibular ligament alveolar process of mandible and medial pterygoid plate and pterygoid hamules of the sphenoid bone.
  - It inserts posteriorly into the pharyngeal tubercle of the occipital and the median pharyngeal raphe.
- **Middle pharyngeal constrictors:** is located in Laryngopharynx.

- It originates from stylohyoid ligament and the horns of the hyoid bone.
- It inserts posteriorly into pharyngeal raphe.
- **Inferior pharyngeal constrictors:** is located in the Laryngopharynx and having two compartments.
  - Superior components has oblique fibers that attach to the thyroid cartilage.
  - Inferior component has horizontal fibers that attach to the cricoid cartilage.

**Longitudinal muscles:**

The longitudinal muscles are the stylopharyngeus, palatopharyngeus and salpingopharyngeus. They act to shorten and widen the pharynx and elevate the larynx during swallowing.

- **Stylopharyngeus** it arises from the styloid process of the temporal bone and inserts into the pharynx.
  - It is innervated by glossopharyngeal nerve.
- **Palatopharyngeus** arises from hard palate of the oral cavity and inserts into pharynx.
  - Innervated by the vagus nerve.
- **Salpingopharyngeus** arises from the Eustachian tube and inserts into pharynx.
  - It is innervated by vagus nerve.



**Invertebrates;** also have a pharynx including tardigrades, priapulids, annelids and arthropods.

**Vertebrates;** All vertebrates have a pharynx used in both feeding and respiration.

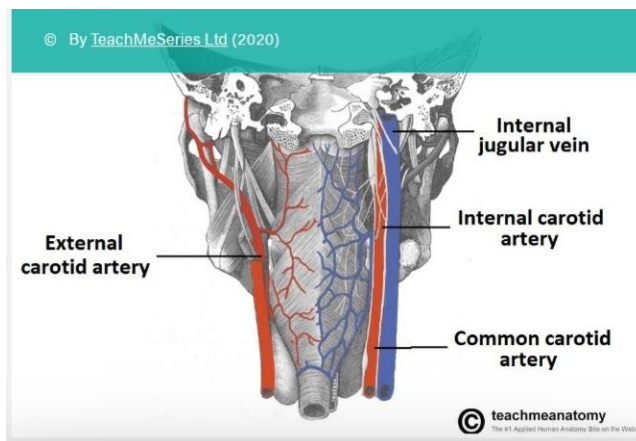
**Function of pharynx:**

- It is a part of both respiratory and digestive systems.
- For digestive system its muscular walls function is swallowing of food to esophagus.
- For respiratory system its function is to regulate the passage of air to lungs.
- During speech the pharynx function as a resonating chamber changing size, shape to alter sounds.

**Vasculature of pharynx:**

Arterial supply to pharynx is via the branches of the external carotid artery.

- Ascending pharyngeal artery
- Branches of the facial artery
- Branches of the lingual and maxillary arteries.



**Innervation of pharynx:**

Motor and sensory Innervation of the majority pharynx is ocured achieved by pharyngeal plexus.

- Pharyngeal branches from the glossopharyngeal nerve.
- Pharyngeal branches of the vagus nerve.
- Branches from external laryngeal nerve.
- Sympathetic fibers from the superior cervical ganglion.

**Sensory;**

Pharynx receives sensory Innervation from glossopharyngeal nerve.

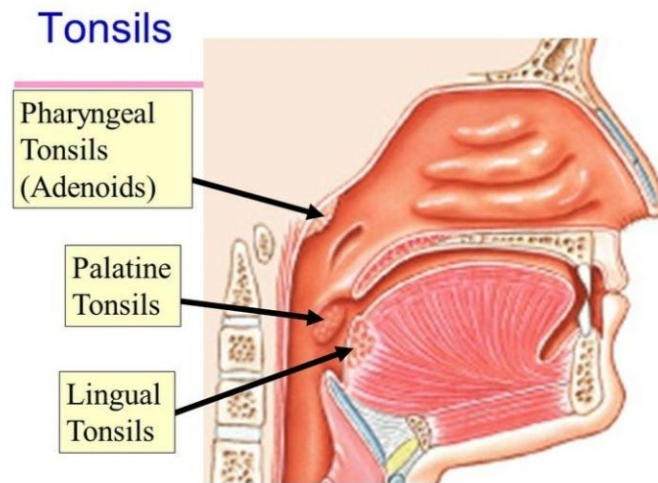
**Motor;**

All muscles of pharynx are innervated by vagus nerve except for the stylopharyngeus which is innervated by the the glossopharyngeal nerve( CN IX).

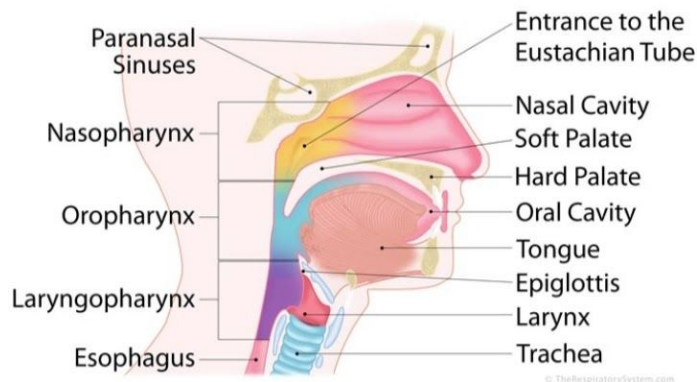
**Clinical relevance:**

- **Inflammation:** Pharyngitis if the painful inflammation of pharynx.
- **Pharyngeal cancer:** it is a cancer that

- originates in the neck or throat and can cause serious clinical problems.
- **Waldeyer's tonsillar ring:** is an anatomical term collectively describing the annular arrangement of lymphoid tissue in the pharynx. It's circumscribe the naso and Oropharynx with some of its tonsillar tissues located above and some below the soft palate. It believed that waldeyer's ring prevents the invasion of microorganisms from going into the air and food .



## Anatomy of the Pharynx



## 2. ESOPHAGUS:

### Introduction:

- Esophagus is tubular structure commonly known as food pipe or gullet by which food passes from pharynx to stomach.
- It is about 10-inches long and joins pharynx to stomach.
- It is 2 cm in diameter.
- Esophagus development begins in 3rd week of gestation.
- Having epiglottis which prevent food from moving backward.
- It passes through the esophageal hiatus of the diaphragm at level of T10 to join stomach.
- **Location;** *IN NECK* esophagus lies in front of vertebral column, laterally relates with lobes of thyroid gland , anteriorly in contact of trachea.

*IN THORAX* \_ it passes downward and to left through superior and posterior mediastinum .At the level of sternl angle aortic arch pushes the esophagus over midline.

- **Relations of esophagus:**
  - Anteriorly;
    - Trachea
    - Left recurrent laryngeal nerve
    - Left principal bronchus
  - Posteriorly;
    - Thoracic vertebrae
    - Thoracic duct
    - Azygos vein
    - Right posterior intercostal arteries
    - Descending aorta.
  - Right side;
    - Mediastinal pleura
    - Terminal part of azygos vein
  - Left side;
    - Left subclavian artery
    - Aortic arch
    - Thoracic duct
    - Mediastinal pleura.

#### **Histology of esophagus:**

Having 4 layer

- Mucosa\_\_  
stratified squamous epithelium
- Submucosa\_  
Containing brenners galnd
- Musculais propria\_  
inner circular and outer
- Adventitial layer\_

#### **Anatomical division:**

##### **1. Cervical part:**

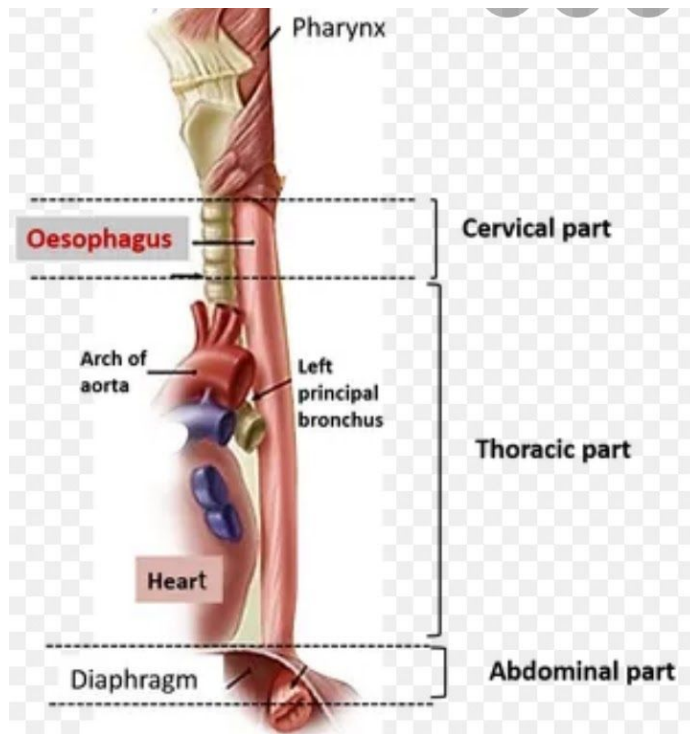
- Beings at lower end of pharynx and extend to thoracic inlet, 18 inches from incisors.

##### **2. Thoracic part:**

- *Upper thoracic*; from thoracic inlet to level of tracheal bifurcation( 18\_23 cm) .
- *Middle thoracic*; from tracheal bifurcation midway to gastroesophageal junction(24\_32cm).
- *Lower thoracic*; from midway between tracheal bifurcation and gastroesophageal junction to GE junction (32\_40cm).

##### **3. Abdominal part:**

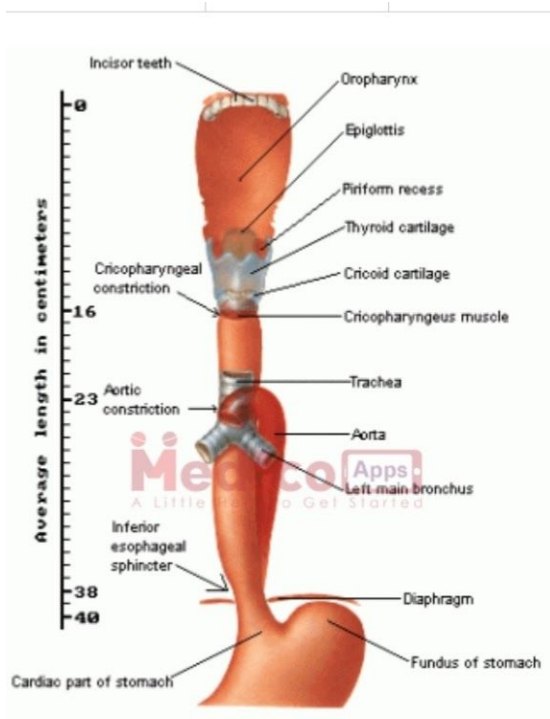
- Considered part of lower thoracic esophagus 32\_ 40cm.



### Constrictions of esophagus:

Esophagus has three constrictions.

- At the start of the esophagus where Laryngopharynx joins the esophagus.
- Behind the cricoid cartilage where it crossed on the front by aortic arch, arch in superior mediastinum.
- Where the esophagus is compressed by left main brochus in the posterior mediastinum or where oesophagus passes the diaphragm into stomach.



### **Sphincters of esophagus:**

The esophagus is surrounded at the top and bottom by two rings called as the upper and lower esophageal sphincters.

These sphincters act to close the esophagus when food is swallowed.

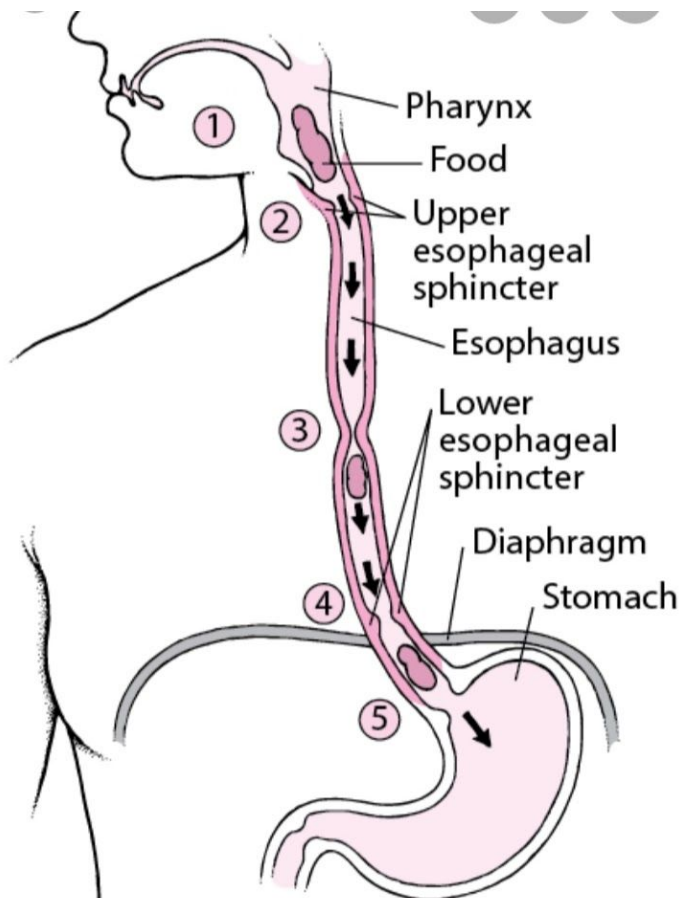
**Upper sphincter;** is anatomical sphincter formed by lower portion of inferior pharyngeal constrictor . It surrounds the upper part of esophagus.

- 3cm long
- Normally remains close, open with swallowing
- Present at C5\_ C6 level

**Lower sphincter;** is surrounds the lower part of esophagus. It is not anatomical sphincter.

- 3\_5 cm long
- Relax with swallowing
- Prevent gastroesophageal reflux





### Function of esophagus:

#### 1. Swallowing:

- Food is ingested by mouth and after swallowing pass it to pharynx then esophagus and then enter to stomach.
- Epiglottis prevent back flow of food and entry of food to trachea.
- At the same time upper esophageal sphincter relax allows the bolus of food tp enter.
- Peristaltic contractions push food down the esophagus.
- Along with peristalsis lower sphincter relaxes.

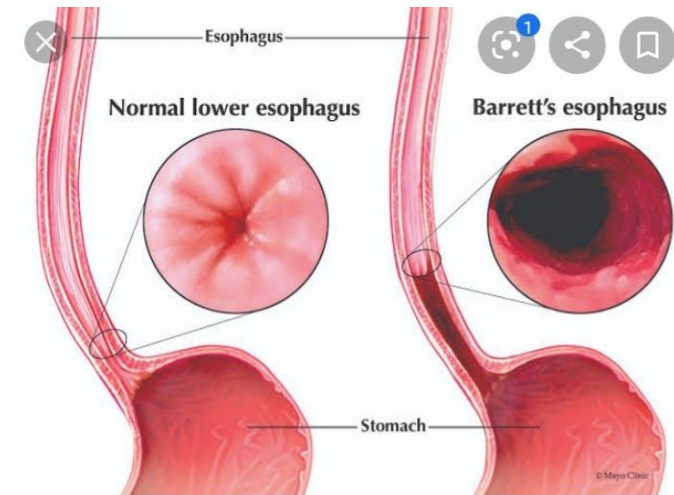
#### 2. Reducing gastric reflux:

- Stomach produces gastric acid contain HCL , K<sup>+</sup> and sodium salts to enable food digestion.
- Constrictions of upper and lower esophageal sphincters help to prevet reflux of gastric contents and acid into the esophagus protecting the esophageal mucosa.

### Clinical relevance :

- **Inflammation:** Esophagitis is the inflammation of esophagus.
- **Cancer:** main two types of cancer occurs.
  - Squamous cell carcinoma
  - Adenocarcinoma
- **Varices:** esophagus varices are swallow twisted branches of the azygos vein in the lower third of oesophagus.

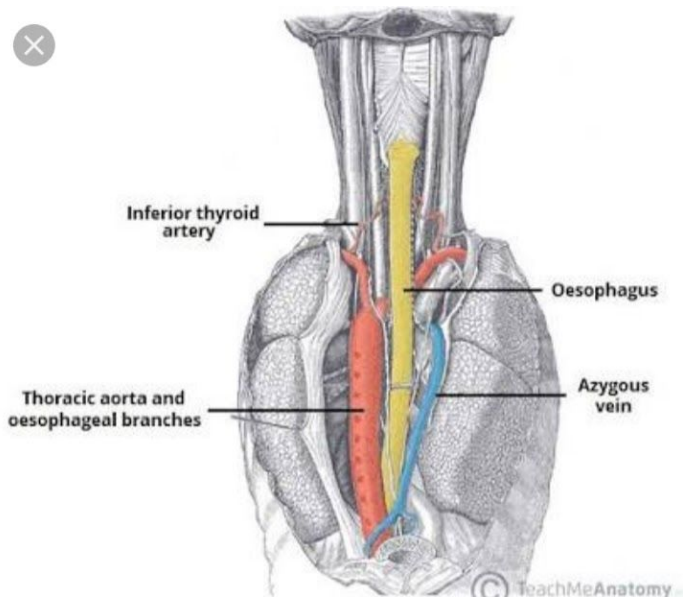
- **Barrett's esophagus:** prolonged esophagus particularly from gastric reflux is one factor to plays role in development of barrett's syndrome of esophagus.
  - **Berret's esophagus** is condition in which there is an abnormal changes in the mucosal lining of lower portion of the esophagus,from normal stratified squamous epithelium to simple columnar epithelium with interspersed globet cells that are normally present only in the small intestine and large.



- **Mortality disorder:** Several disorders affect mortality of food as it travels down the esophagus. This can cause a difficult swallowing called **dysphagia** or painful swallowing called **odynophagia**.
- **Malformation:** Two common congenital malformations affecting the esophagus are an ;
  - Esophageal atresia
  - Esophageal fistula

#### Blood supply to esophagus:

- **Inferior thyroid artery**\_ supply to upper third
- **Esophageal branches from decending aorta**\_ supply to middle third
- **Left gastric artery** \_ supply to lower third.



**Venous supply to esophagus:**

- **Inferior thyroid vein**\_\_ drains upper third of esophagus
- **Azygos vein** \_ drains middle third of esophagus
- **Left gastric vein**\_ drains Lower third of esophagus .

**Nerve supply:**

- Esophagus is supplied by parasympathetic and sympathetic fibers via the vagi and sympathetic trunks.
- In the lower part of its thoracic course the esophagus is surrounded by the esophageal nerve plexus.