The PHARYNX

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PHARYNX

- Fibromuscular tube lined with mucous membrane
- Extends from base of skull to lower border of cricoid cartilage (C-6).
- 12-14 cm long
- At the lower border of cricoid cartilage it continues with esophagus
- Passage for Respiratory & Digestive tracts
PHARYNX

• Presents openings of
  – auditory tubes
  – two posterior nares
  – larynx
  – Esophagus

• Contains
  – pharyngeal tonsils
  – palatine tonsils
  – lingual tonsils
  – Tubal tonsils
Bony landmarks

- Choanae (posterior openings of nasal cavities)
- Pterygoid hamulus
- Medial plate of pterygoid process of sphenoid
- Scaphoid fossa on sphenoid bone (for attachment of tensor veli palatini)
- Petrous part of temporal bone
- Roughening on petrous part of temporal bone for attachment of levator veli palatini
- Cartilaginous position of pharyngotympanic tube
- Carotid canal
- Jugular foramen
- External auditory meatus
- Pharyngeal tubercle
- Line of attachment of pharynx
Layers in pharyngeal wall

- **LANDMARKS**
- **LAYERS ARE**
  - Buccopharyngeal fascia
  - Pharyngobasilar fascia
  - Mucosa & submucosa
  - Longitudinal muscles
  - Circular muscles – constrictors
  - Pharyngeal plexus of veins & nerves
- Separated into 2 layers, pharyngeal muscles sandwiched between them
- Thick pharyngobasilar fascia inside
- Thin buccopharyngeal fascia outside
- Reinforces the pharyngeal wall
NASOPHARYNX

- Part of respiratory tract – mucosa?
- Behind the nasal cavity
- Above and behind soft palate.
- Communicates through pharyngeal isthmus with oropharynx.
• Opening of PT tube ½” behind and at the level of INC
• guarded by tubal elevation
• Salpingopharyngeal fold - posterior margin of tubal elevation to side-wall of pharynx downwards.
• Salpingopharyngeus
• Behind salpingopharyngeal fold - pharyngeal recess.
• Under mucous membrane - nasopharyngeal tonsil.
OROPHARYNX

• Behind mouth and tongue.
• common to both respiratory and digestive systems
• Oropharyngeal isthmus
• Posterior wall is smooth
• Lateral walls shows palatine tonsils between palatoglossal and palatopharyngeal arches.
• Behind larynx
• upper part - common to digestive & respiratory tracts
• lower part continues with esophagus
• Anterior & posterior walls approximated except when food is passing
LARYNGOPHARYNX

• Posterior wall and side - walls are smooth.
• Anterior wall from above downwards presents
  – epiglottis
  – aryepiglottic folds
  – Arytenoids & cricoid
  – inlet of larynx
  – piriform fossa
• Anterior wall - back of larynx.
What is Waldeyer’s ring?

The lymphoid tissue in the pharyngeal aponeurosis aggregates in some areas forming tonsils:

1. one **nasopharyngeal** tonsil
2. two **palatine** tonsils
3. two **lingual** tonsils
4. two **tubal** tonsils
Muscles of pharynx

- Differ from rest GIT
- Skeletal muscles
- Longitudinal muscles are placed inside
- Circular muscles (constrictors) are incomplete anteriorly & arranged in three layers overlapping each other
longitudinal muscles

• Stylophryngeus, Salpingopharyngeus and Palatopharyngeus
• Attached to posterior border of thyroid cartilage
• Help in 2\textsuperscript{nd} stage of deglutition by lifting the pharynx
Three constrictor
stylopharyngeus
cricopharyngeus
Constrictors of pharynx

- **Superior constrictor** - attached to pharyngeal tubercle, lowest fibers reach up to level of vocal cords
- **Middle constricctor** arises from stylohyoid ligament, lesser and greater cornu of hyoid, overlap SC and reach up to level of vocal cords.
- **Inferior constrictor** has two parts: thyropharyngeus & cricopharyngeus
  - Thyropharyngeus overlaps MC
  - Cricopharyngeus continues with other side
**PHARYNX - MUSCLES & STRUCTURES ENTERING IT**

**Superior constrictor**

*Between* superior & middle constrictors are:
1. Glossopharyngeal nerve (IX)
2. Stylopharyngeus (IX)
3. Stylohyoid ligament
4. Lingual nerve (Vc)

**Middle constrictor**

*Between* middle & inferior constrictors are:
5. Thyrohyoid membrane pierced by:
6. Internal laryngeal nerve
7. Superior laryngeal vessels

**Inferior constrictor**

(Thyropharyngeus (8) is upper part that behaves like the other constrictors, closing on swallowing. Cricopharyngeus (9) is lower part - a sphincter that opens on swallowing. Between 2 parts is potential pharyngeal pouch (Dehiscence of Killian) (10)

*Below* inferior constrictor and passing upwards are:
11. Recurrent laryngeal nerve
12. Inferior laryngeal vessels

Blood supply

- Ascending pharyngeal A
- Ascending palatine and tonsillar branches of facial A
- Maxillary & lingual A
Veins

- Superiorly: pterygoid plexus in infratemporal fossa
- Inferiorly: facial and IJV
**Esophagus**

- The esophagus serves as a conduit between the pharynx and the stomach.
- It begins at the cricopharyngeus (C5-C6).
- Passes through the diaphragm to join the cardia of stomach.
- Length 23-37 cms correlates with individual's height and it is usually longer in men than in women.
• Anatomically divided into three parts
  – Cervical (jn to notch)
  – 4-5cms
  – Thoracic (notch to hiatus)
  – abdominal
• Functionally divided into
  – upper esophageal sphincter
  – esophageal body
  – lower esophageal sphincter
Course & Relations

- At the thoracic inlet, it lies slightly to the left of midline.
- At the mid chest, closely apposes the left mainstem bronchus and the pericardium of the left atrium.
- Distally lies anterior to the descending aorta to the left of midline as it enters its diaphragmatic hiatus.
UPPER OESOPHAGEAL SPHINCTER

• Between pharynx and the cervical oesophagus.
• Located at C5-C6 level.
• The UES is a musculocartilaginous structure.
• Composed of mainly three muscles: cricopharyngeus, thyropharyngeus, cranial cervical oesophagus.
• The lower esophageal sphincter is a high-pressure zone located where the esophagus merges with the stomach.
• Mean pressure here is approx. 8mm Hg.
Anatomy – Blood Supply

- Cervical – inferior thyroid arteries
- Thoracic – 4-6 aortic esophageal arteries and branches of left bronchial arteries
- Abdominal – left gastric artery and inferior phrenic artery
- Rich interconnecting submucosal arterial plexus - runs longitudinally
Venous Drainage

- Subepithelial channels
- Periesophageal plexus
- Cervical drainage – inferior thyroid veins
- Thoracic drainage – azygos/hemiazygos veins
- Abdominal drainage – left gastric vein
Anatomy
Innervation
Afferents:

Visceral sensory pain fibers from the esophagus terminate without synapses in segments 1-4 of the thoracic cord.

Follows both sympathetic and vagal pathways.

* Vagal fibers from the heart also travel in the same pathway, explaining the similarity of symptoms in many esophageal and cardiac diseases.
Histology:

- The wall of the oesophagus comprises four layers
  1. The outer fibrous coat (Adventitia)
  2. Muscle layer with outer longitudinal and inner circular fibers
  3. Sub mucosa

- The mucosal lining of the oesophagus is stratified squamous epithelium throughout its length, changing to columnar epithelium only at the gastro-oesophageal junction

- Unlike the remainder of the GI tract, the esophagus does not have a serosal layer, thus permitting rapid dissemination of infection and tumor
• Striated muscle predominates in the upper esophagus, with smooth muscle in the lower two thirds of the esophagus.

• The transition from striated to smooth muscle varies but usually occurs at the level of the aortic arch.
MUSCULATURE

• The muscular coat consists
  - external layer → longitudinal fibers
  - internal layer → circular fibers.

• The longitudinal fibers are arranged proximally in three fasciculi.
  - A ventral fasciculus
  - two lateral fasciculi that are continuous with muscle fibers of the pharynx.
• LONGITUDINAL FIBRES: form a uniform layer that covers the outer surface of the esophagus.

• CIRCULAR FIBRES: provides the sequential peristaltic contraction that propels food toward the stomach.

• The circular fibers are continuous with the inferior constrictor muscle of the hypopharynx.

  They run transversely ➔ in cranial & caudal regions.

  obliquely ➔ body of the esophagus.
• ESOPHAGUS  
  Stained with H&E  
  1 - tunica mucosa  
  2 - tunica submucosa  
  3 - tunica muscularis propria  
  5 - epithelium of the mucosa  
  6 - lamina propria of the mucosa  
  9 - glands in the submucosa  
  stratified squamous epithelium  
  squamous (plate-like) cells  
  basal cell layer
• The oesophagus has a stratified squamous epithelial lining (SE) which protects the oesophagus from trauma;
• the submucosa (SM) secretes mucus from mucous glands (MG).
• The lumen of the oesophagus is surrounded by layers of muscle (M).
Gastro-oesophageal junction

- Gastric glands
- Submucosa
- Oesophageal glands
- Inner oblique
- Non ker. St. sq. epith.