The pharynx extend from the base of skull to the upper end of the esophagus at the level of the 6th cervical vertebra. It is fibromuscular structure consisting of the following layers from without inwards:

1. Outer layer of buccopharyngeal fascia
2. Muscular layer
3. Faryngobasilla fascia
4. Mucosa

The pharynx is divided in to three parts: 1-nasopharynx 2-oropharynx 3-laryngopharynx (hypopharynx)

**Nasopharynx**

The part of pharynx which lies above the soft palate and behind the nasal cavityis called the nasopharynx, basisphenoid and basiocciput from the roof of the nasppharynx.the upper part of the posterior wall is formed by the posterior arch of atlas .ont eh lateral wall are the pharyngeal opening of the Eustachian tubes about 1.25cm behind the posterior end of the inferior turbinate.above and behind the tubal opening is a deep recess which is commonly a site for carcinoma and is called fossa of Rosenmuller.

**Nasopharyngeal tonsil**

It is a collection of lymphoid tissue under the mucosa of the nasopharynx situated at the junction of the roof and posterior wall of the nasopharynx. The collection disappear as the child starts growing. Hypertrophy of this lymphoid tissue is termed as adenoids. The lymphoid collection has no capsule. In the center of the lymphoid mass is a depression called pharyngeal bursa. Thornwaldt’s cysts. Develops from the bursa.

**Oropharynx**

This is that part of the pharynx which extends from the level of the soft palate to the level of the laryngeal inlet, below an imaginary horizontal line drawn at the level of the hyoid bone.

Anteriorly the oropharynx opens at the buccal cavity at the oropharyngeal isthmus formed by the faucial pillars.

**Tonsils**

Tonsils are organized lymphoid structures situated between the faucial pillars. The tonsillar fossa is formed by the palatoglossal and palate pharyngeal folds and posterior part of the side of the tongue a fold of mucous membrane, plica semilunaris connects the palatoglossal and palatopharyngeal folds superiorly. The plica triangularis is another fold of mucous membrane which connects the palatoglossal and palatopharyngeal folds at the lower pole of the tonsil.

The tonsil is covered by stratified squamous epithelium. The medial surface of the tonsil shows a number of crypts. An intratonsillar cleft is seen at the upper part of the tonsil and is a remnant of the second pharyngeal pouch.

The lateral surface of the tonsil is covered by a fibrous capsule attached loosely to the tonsillar bed.
Tonsillar bed: It is formed by loose areolar tissue, pharyngobasilar fascia, superior constrictor and buccopharyngeal fascia. The internal carotid artery lies one inch lateral to the tonsil.

Blood supply of tonsil: Tonsillar branch of the facial artery is the main artery of supply. Branches of the following arteries also supply the tonsils.

- i. Ascending pharyngeal artery
- ii. Descending palatine artery
- iii. Dorsalis linguae artery
- iv. Ascending palatine branch of facial artery.

Veins: Veins emerge on the lateral surface and lower pole of the tonsil. Paratonsillar vein emerges on the lateral surface and pierces the superior constrictor muscle to end in the common facial vein and pharyngeal plexus of veins.

Lymphatic drainage: The efferent lymphatics emerge from the lateral aspect and end in the jugulodigastric group of deep cervical nodes. There are no afferent lymphatics.

Waldeyer's Ring

The lymphatic tissues of the pharynx and oral cavity are arranged in a ring-like manner around the oropharyngeal inlet. The inner ring consists mainly of the nasopharyngeal tonsil, peri-tubal lymphoid tissues, faucial tonsil and lingual tonsil. The efferents from this ring drain to lymph nodes situated around the neck forming the outer ring. The lymphoid tissues have a protective function.

Laryngopharynx (Hypopharynx)

This part of the pharynx lies behind the larynx and partly surrounds the larynx. Superiorly, it communicates with the oropharynx and starts at the level of hyoid bone. Inferiorly it extends up to the upper end of the oesophagus at the lower border of the cricoid cartilage. It is divided into three parts: (i) Pyriform sinus, (ii) postcricoid region, and (iii) posterior pharyngeal wall.

Pyriform Fossa

The pyriform fossa is a recess on each side of the larynx. It is bounded medially by the aryepiglottic fold, laterally by the thyrohyoid membrane in the upper part and medial surface of the thyroid cartilage in the lower part. Superiorly the fossa is separated from the vallecula by the pharyngeopiglottic fold.

The fossa communicates below with the upper end of the oesophagus.

Postcricoid Region

The postcricoid region is the lower part of the laryngopharynx and is formed by mucosa extending from the upper to lower border of the cricoid cartilage.

Posterior Pharyngeal Wall

This part of the hypopharynx extends from the level of the hyoid bone down up to the upper end of the oesophagus. The rest of the mucosa is included into the lateral pharyngeal wall.
Muscles of Pharynx

Two layers of muscles form the pharyngeal wall. The circular layer is formed by the superior, middle and inferior constrictors which form the side and posterior wall of the pharynx. The longitudinal muscle layer is formed by the palatopharyngeus and stylopharyngeus muscles. The pharyngeal muscles help in deglutition. While the longitudinal muscles elevate the pharynx, the circular group help in propelling the bolus downwards.

Nerve Supply

Pharynx is supplied through pharyngeal plexus which lies mainly on the middle constrictor muscle. This is formed by the pharyngeal branches of the vagus and glossopharyngeal nerves and sympathetic fibres around the vessels. The vagus supplies the motor fibres through its cranial accessory nerve. The glossopharyngeal is the main sensory nerve but supplies motor fibres to stylopharyngeus. The recurrent laryngeal nerve sends a branch to the inferior constrictor.

SOFT PALATE

It is a fibromuscular structure attached to the posterior edge of the hard palate by the palatine aponeurosis, which is formed by the expanded tendons of the tensor palate muscles. Other muscles which take part in its formation are levator palati, palatoglossus, palatopharyngeus, and musculus uvulae.

Laterally the soft palate is attached to the pharynx. Posteriorly it is free.

Nerve Supply

All the muscles of the soft palate except tensor palati are supplies by the cranial root of the accessory through the vagus. Tensor palati is supplied by the mandibular division of the trigeminal nerve.

The soft palate plays an important role in closure of the nasopharyngeal isthmus and, therefore, helps in deglutition and speech.

Passavant's Ridge or Bar

This is a rounded ridge that appears on the posterior pharyngeal wall during the closure of the nasopharyngeal isthmus. The posterior free border of the soft palate comes in contact with this ridge to close the nasopharynx during deglutition. The ridge is raised by the contraction of upper fibres of the superior constrictor and the palatopharyngeus muscle.

PHYSIOLOGY OF THE PHARYNX

The pharynx serves the following purposes.

1. It serves as an air and food passage.
2. Lymphoid aggregation in the nasopharynx and oropharyngeal isthmus have a protective role.
3. Pharyngeal muscles are important for deglutition.
4. The pharynx plays an important role in speech. It acts as a resonator of the voice. Besides, the pharynx is a site for various reflexes and is related to the opening of the eustachian tubes.

Functions of the Pharyngeal Lymphoid Tissues

The exact functions of the subepithelial lymphoid tissues are not very clear. These probably play a defensive role. The strategic location of the faucial tonsils and nasopharyngeal lymphoid tissues suggest that these structures are concerned with sampling of air and food and thus constantly monitor the bacterial flora. Antibodies are formed against these microorganisms and thus help in the body defence mechanism. Since these lymphoid structures atrophy with the growth it appears that this defence mechanism is mainly active during childhood.
DEGLUTITION

Deglutition is the process by which food passes from the oral cavity into the stomach through the oesophagus. This process involves three stages.

- **First stage (voluntary):** after the food is masticated and made into a bolus, the posterior part of the tongue propels the food into the oropharynx. The soft palate rises and closes the nasopharynx.
- **Second Stage (pharyngeal stage):** in this stage food passes from the oropharynx into the oesophagus. During this stage, the larynx is raised and laryngeal inlet gets closed to prevent food from going into the trachea. Retroversion of the epiglottis helps to close the approach to the laryngeal inlet. Breathing momentarily stops and the nasopharyngeal isthmus remains closed. The pharynx is elevated and the pharyngooesophageal junction opens to receive the bolus which is pushed down by contraction of the circular muscle of the pharynx.
- **Third Stage (oesophageal stage):** this stage consists of passage of food down the oesophagus. Once the cricopharynx opens the food passes into the oesophagus. It is carried down by peristaltic waves. The cardiac sphincter opens in response to the peristaltic waves and food thus enters the stomach.

In addition deglutition also serves the following functions.

i. Disposal of dust and bacteria-laden mucus conveyed by ciliary action to the pharynx from nasal passages, sinuses, tympanic cavities, larynx and tracheobronchial tree.
ii. Opening of the pharyngeal ostia of pharyngotympanic tubes, to establish equalisation of pressure on the outer and inner surfaces of the tympanic membranes.

The resting intrapharyngeal pressure is equal to the atmospheric pressure. During swallowing, there is a transitory rise of about 40 mmHg pressure at the pharyngo-oesophageal junction. There occurs a region of raised pressure about 3 cm in length. During swallowing this pressure falls abruptly just before the pharyngeal peristaltic wave reaches this zone. This indicates a relaxation of the sphincter. Immediately after the bolus has passed, the sphincter contracts strongly with a rise of pressure to 50-100 mmHg. This abrupt closure coincides with the arrival of the pharyngeal peristaltic wave and has the function of preventing reflux while peristalsis is occurring in the upper oesophagus. When the bolus has passed further down the oesophagus, the pressure in the pharyngooesophageal zone returns to normal, i.e. the sphincter returns to the normal state of tonic contraction.

**Sounds during Deglutition**

2 sounds can be heard on auscultation over oesophagus during swallowing. They can be recorded electronically.

1. The first sound occurs immediately after the commencement of the act and is probably due to the fluids impinging on the posterior pharyngeal wall.
2. The second sound resembles a bubbling or trickling noise and occurs at a variable interval of 4-10 seconds after the first sound and persists for 2-3 seconds. It is heard more clearly over the epigastrium.

**Thirst Sensation**

The sensation of thirst is composed of two components.

1. The first is a pharyngeal sensory element. This is due to dehydration causing decreased salivary secretion and drying of the pharyngeal mucosa with consequent stimulation of the special sensory receptors. Impulses from those receptors are conducted along fibres in the ninth and tenth nerves. This pharyngeal component can be abolished by stimulating salivary secretions or by local anaesthesia of the pharyngeal mucous membrane.
2. The extrapharyngeal component or "thirst drive" is supposed to be the central component (not agreed by all). It seems to be related to intracellular osmolarity. Intravenous hypertonic saline or a high intake of salt with low water intake, causing intracellular dehydration and a rise in intracellular crystalloid osmotic pressure produces thirst. This osmotic effect acts on the osmoreceptor neurons in the hypothalamus.