



MED439
KING SAUD UNIVERSITY

Anatomy of the nasal cavity and pharynx

Respiratory Block - Lecture 2

Color index:

Important

In male's slides only

In female's slides only

Extra information, explanation

Doctors notes

Objectives:

- Describe the boundaries of the nasal cavity.
- Describe the nasal conchae and meati.
- Demonstrate the openings in each meatus.
- Describe the paranasal sinuses and their functions
- Describe the pharynx and its parts

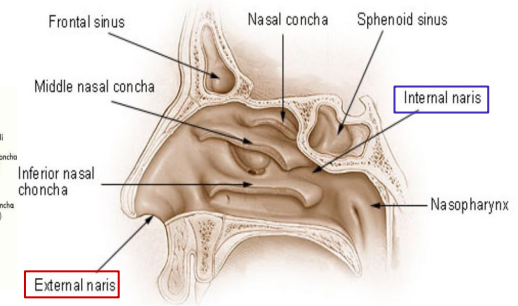
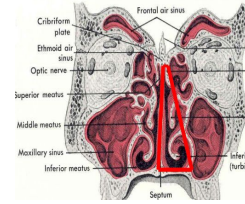
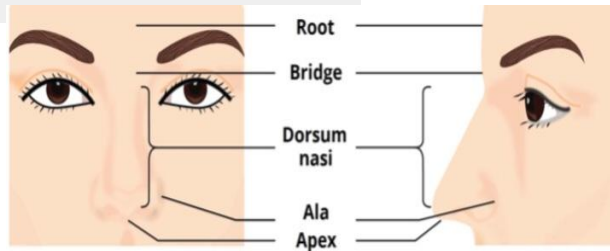
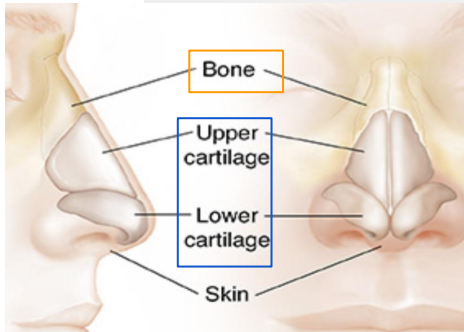
Nose & Nasal cavity

1

Nose:

The external (anterior) **nares** or **nostrils**, lead to the **nasal cavity**.

- Formed above by: **Bony skeleton**.
- Formed below by: **plates of hyaline cartilage**.



2

Nasal Cavity:

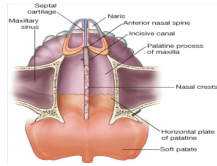
- Extends from the **external (anterior) nares** to the **posterior nares (choanae)**.

- Divided into right & left halves by the **nasal septum**.

- Each half has a:

- 1- **Roof**
- 2- **Lateral wall**
- 3- **Medial wall (septum)**
- 4- **Floor**

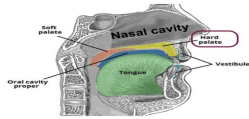
Floor



- Separates it from the oral cavity.
- Formed by the hard (bony) palate.

Formed by:

- Nasal (upper) surface of the hard (bony) palate:
- Palatine process of maxilla, anteriorly.
- Horizontal plate of the palatine bone, posteriorly.

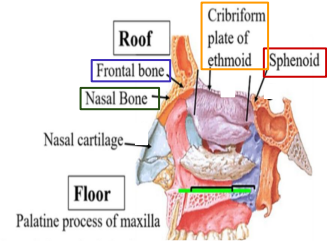


2

Roof

Narrow & formed (from behind forward) by the:

- 1- Body of sphenoid.
- 2- Cribriform plate of ethmoid bone.
- 3- Frontal bone.
- 4- Nasal bone & cartilage.



1

Lateral Wall

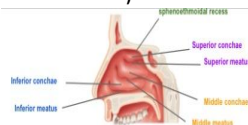
- Shows three horizontal bony projections, the superior, middle & inferior conchae
- The cavity **below** each concha is called a meatus and are named as superior, middle & inferior corresponding to the conchae.

- The small space above the superior concha is the **sphenoethmoidal recess**.

- The conchae **increase the surface area** of the nasal cavity.

- The recess & meati receive the openings of the:

- 1-Paranasal sinuses. 2-Nasolacrimal duct.



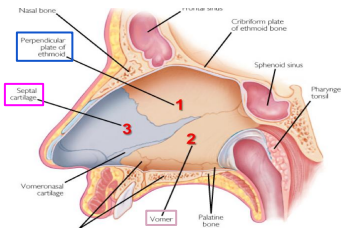
4

Medial Wall (Nasal Septum)

- **Osteocartilaginous** partition.

- Formed by:

- 1- Perpendicular plate of ethmoid bone.
- 2- Vomer.
- 3- Septal cartilage.



3

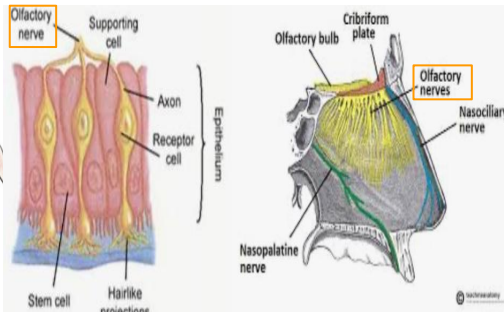
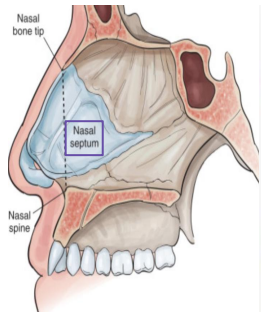
Nasal Mucosa & Respiratory Mucosa

1

NASAL MUCOSA;

Olfactory :

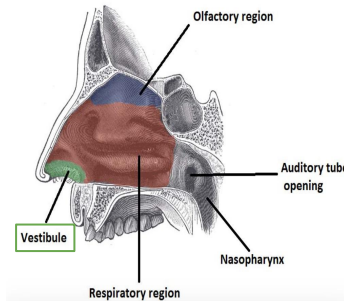
- It is delicate and contains **olfactory nerve cells**.
- It is present in the **upper part of nasal cavity**:
 - 1- **Roof**.
 - 2- **On the lateral wall**, it lines the upper surface of the **superior concha and the sphenoidal recess**.
 - 3- On the medial wall, it lines the **superior part** of the **nasal septum**.



2

RESPIRATORY MUCOSA:

- It is **thick, ciliated, highly vascular** and contains **mucous glands & goblet cells**.
- It lines the **Lower part of the nasal cavity**.
- It functions to **moisten, clean** and **warm** the inspired air.
- The air is **moistened** by the secretion of numerous **serous glands**.
- It is **cleaned** by the removal of the dust particles by the ciliary action of the columnar ciliated epithelium that covers the mucosa.
- The air is **warmed** by a **submucous venous plexus**.
- The Vestibule is lined by **Skin**.



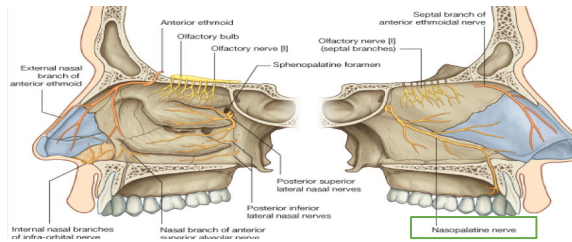
VESTIBULE:

*only in female slides

- It lies above the nostrils
- Bounded laterally by ala of nose
- Lined by **skin** possessing short hairs
- Limited above & behind by a curved elevation "**limen nasi**".

Nasal Mucosa & Respiratory Mucosa

Nerve supply



-The nerves of General Sensation are derived from the **Ophthalmic & Maxillary** divisions of trigeminal nerve.

-The anterior part is supplied by:

Anterior Ethmoidal nerve.

□ **- The posterior part is supplied by:**

□ 1-Nasopalatine

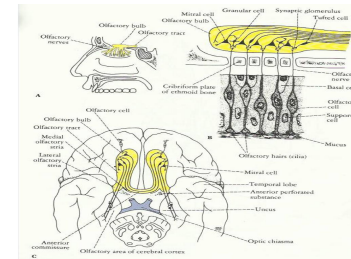
□ 2- Nasal

□ 3- Palatine

branches of the **pterygopalatine ganglion**.

Olfactory nerve

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-It is responsible for Special sensation (**Smell**).

-Olfactory receptors are specialized, **ciliated nerve cells** that lie in the olfactory epithelium.

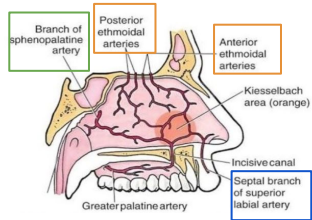
-The axons of these bipolar cells 12-20 fibers form the true olfactory nerves fibers.

-Which pass through the cribriform plate of ethmoid to the brain.

-Olfactory mucosa supplied by olfactory nerves.

Nasal Mucosa & Respiratory Mucosa

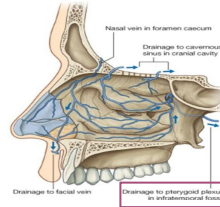
Arterial supply



- Sphenopalatine artery (Maxillary) - □
- Ethmoidal anterior and posterior (Ophthalmic).
- Superior labial (Facial).
- **Applied anatomy** : □
 - The rich arterial anastomosis on anterior & inferior part of nasal septum (**Little's area**) (region of the vestibule) is the commonest site for Epistaxis (ز. عاف).

Venous drainage

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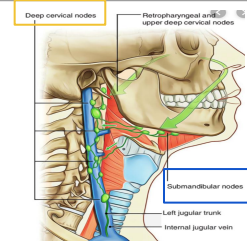


(Submucosal plexus by) veins accompany the corresponding arteries, they drain into **pterygoid venous plexus** & cavernous sinus.

1. An emissary vein passes through the foramen caecum and joins the superior sagittal sinus.
2. It can be a route of transmission of infection from the nasal cavity to the cranial cavity.

-Note: pterygoid venous plexus = facial, ophthalmic and sphenopalatine veins. (as in males' slides)

Lymphatic Drainage



The lymphatics from the:

- Vestibule drains into the submandibular lymph nodes.
- Rest of the cavity drains into the **upper deep cervical** lymph nodes.

Paranasal sinuses

1

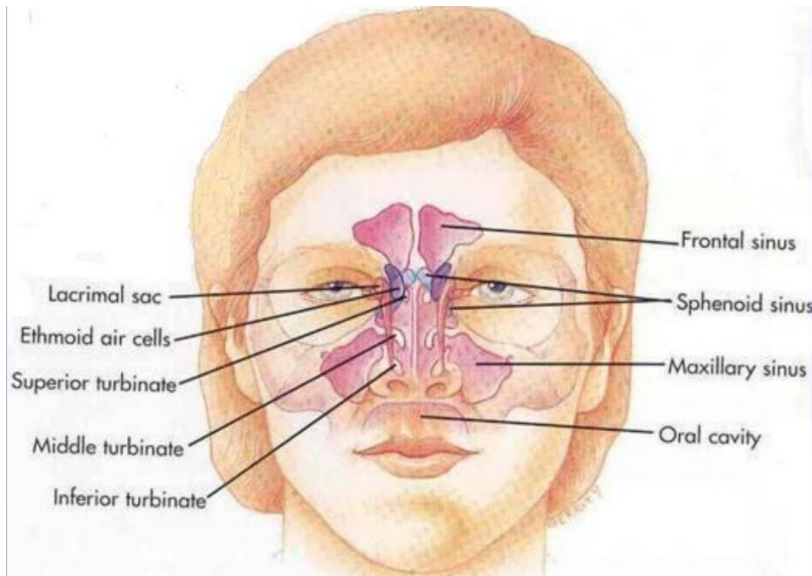
Air filled cavities located in the bones around the nasal cavity: **Ethmoid**, **Sphenoid**, **Frontal bones** & **Maxillae**(the largest sinus).

2

Lined by respiratory mucosa which is continuous with the mucosa of the nasal cavity.

3

Drain into the nasal cavity.



Functions

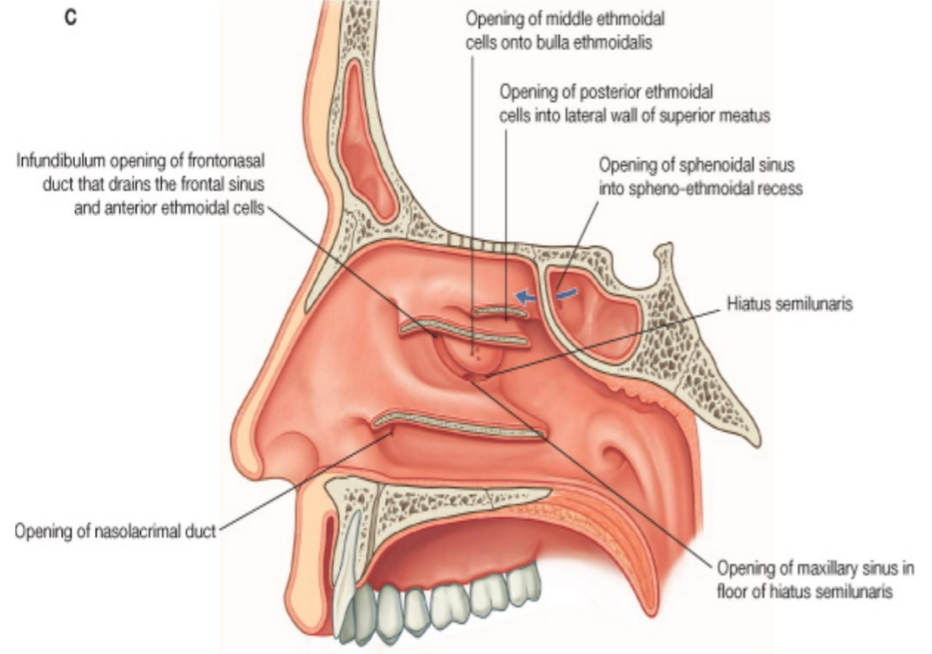
1- Air conditioning:
The respiratory mucosal lining helps in warming, cleaning and moistening the incoming air.

2- Act as resonant chambers for speech.

3- Lighten the skull.

Cont. Paranasal sinuses

sinus	drains through
sphenoidal	Sphenoethmoidal recess
posterior ethmoidal	Superior meatus
middle ethmoidal	Middle meatus
maxillary	
frontal	
anterior ethmoidal	
nasolacrimal duct	Inferior meatus



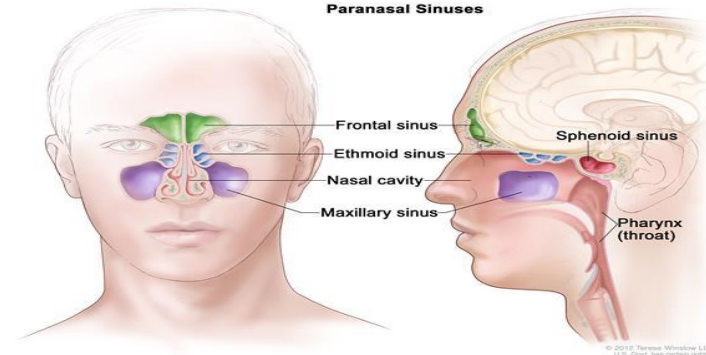
1- Maxillary sinus:

- Its floor is formed by the alveolar process of maxilla.
- The roots of upper premolars & molars project into it.
- Infection of teeth can produce **sinusitis** or Extraction of a tooth may result in a **fistula**

Clinical importance

2- Ethmoidal air sinus:

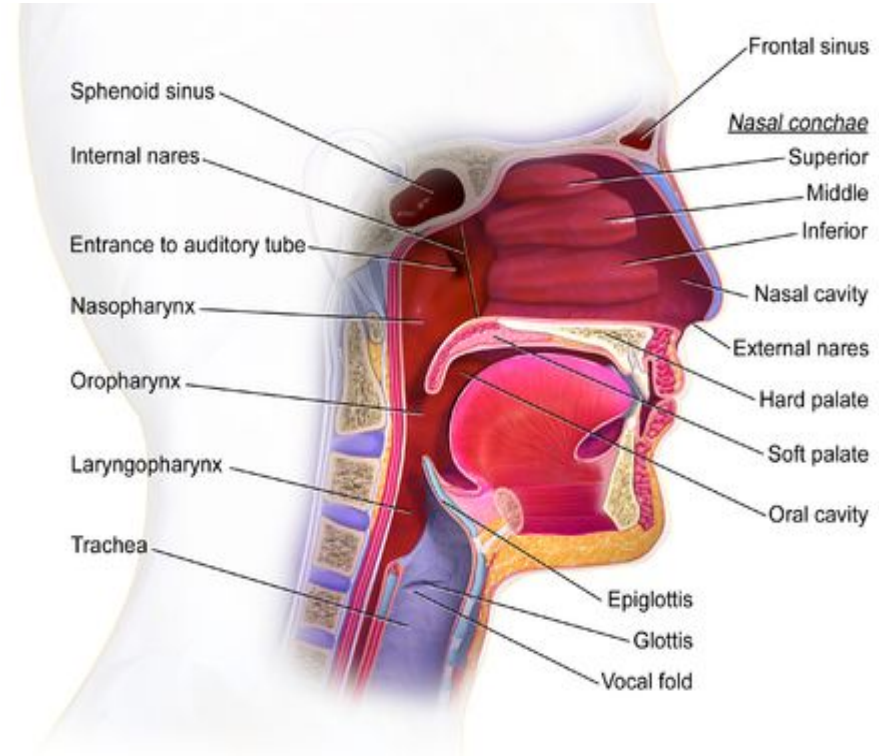
- Its infection can spread to the orbit and cause orbital cellulitis. (similar to preorbital cellulitis which we learned in Micro of MSK block).



Found in females' slides only

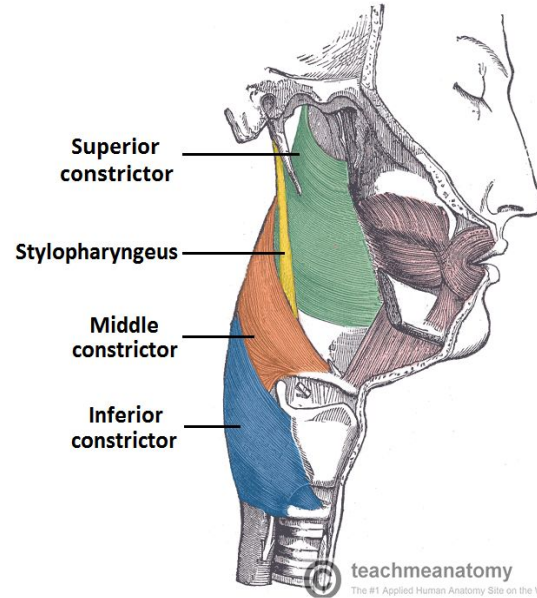
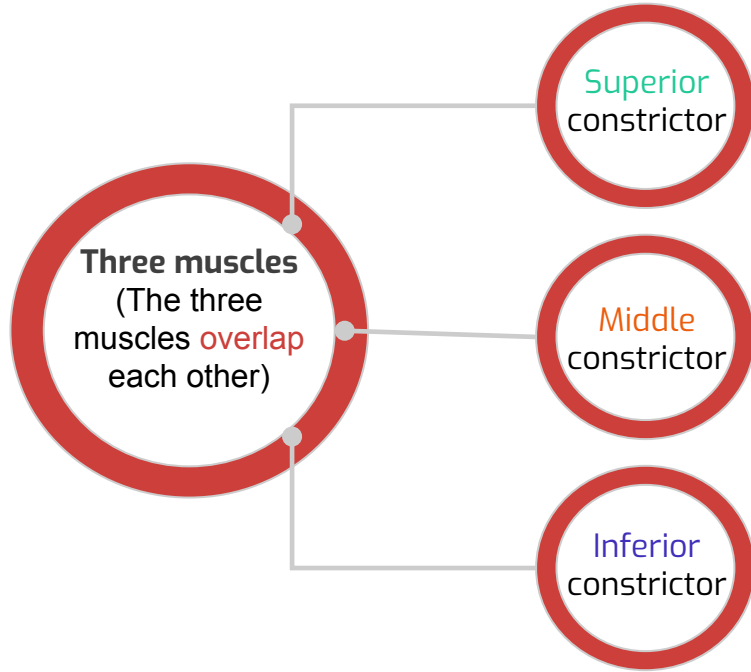
Pharynx

- **Muscular tube** lying **behind** the nose, oral cavity & larynx.
- Extends from the **base of the skull** to level of the **6th** cervical vertebra, where it is continuous with the **esophagus**
- The anterior wall is deficient and shows (from above downward):
 1. **Posterior nasal apertures.**
 2. **Opening of the oral cavity.**
 3. **Laryngeal inlet.**
- The muscles arranged in **circular** and **longitudinal** layers



The Upper Respiratory System

Circular (Constrictor) Muscles



Functions:

-Propel the bolus of food down into the esophagus.

-lower fibers of the inferior constrictor (Cricopharyngeus) act as a sphincter, preventing the entry of air into the esophagus between the acts of swallowing.

There are 3 longitudinal muscles

Stylopharyngeus

arises from the styloid process of the temporal bone

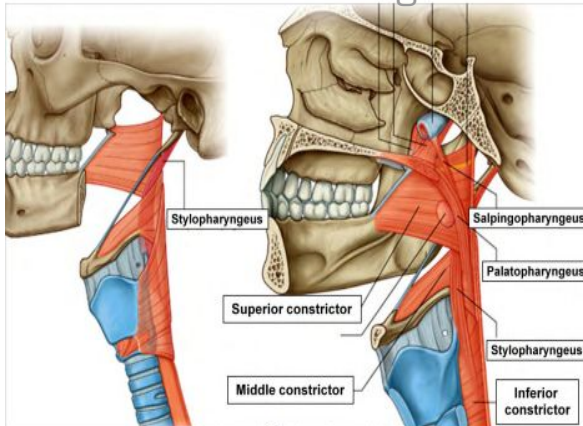
Salpingopharyngeus

Palatopharyngeus

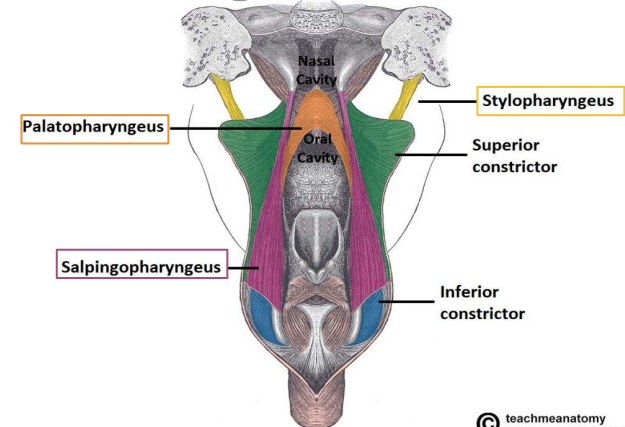
arises from hard palate

Function:

Elevate the larynx & pharynx during swallowing alongside the constrictors, and can contribute to talking too.



Deba et al 2011 Arthro. Figure 9 101



Pharynx is divided into three parts:

Nasopharynx

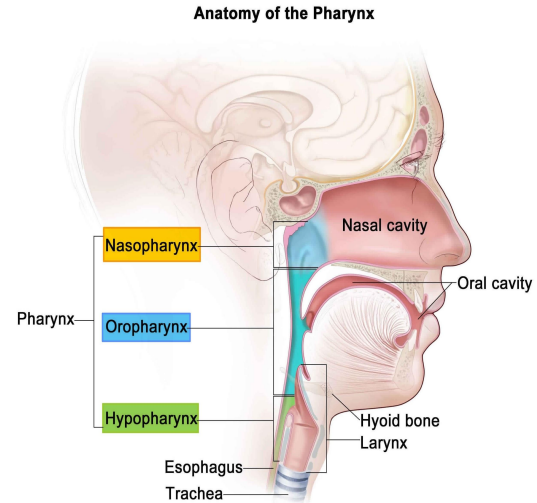
- Extends from the **base of skull** Nasopharynx to the soft palate.
- communicates with the nasal cavity through **posterior** nasal apertures
- Pharyngeal tonsils (Adenoides) present in the **submucosa** covering the Roof.

Oropharynx

Laryngopharynx

Lateral wall shows:

1. Opening of **auditory tube**.
2. **Tubal elevation** (produced by posterior margin of the auditory tube).
3. **Tubal tonsil**.
4. **Pharyngeal recess**.
5. **Salpingopharyngeal fold** (raised by salpingo-pharyngeus muscle)



Oropharynx

Lies behind the mouth,

Oropharynx communicates with the oral cavity through **the oropharyngeal isthmus**

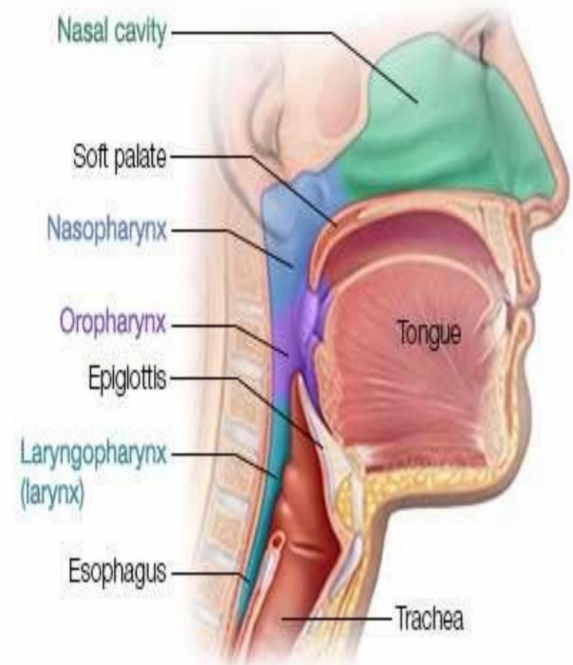
Extends from soft palate to upper border of epiglottis.

Lateral wall shows:

- **Palatopharyngeal fold.**
- **Palatoglossal fold.**
- **Palatine tonsil**, located between them in a depression called the **tonsillar fossa**

Laryngopharynx

- Lies **behind** the laryngeal inlet & the **posterior** surface of larynx.
- communicates with the larynx through the laryngeal inlet
- **Extends from upper border of epiglottis to lower border of cricoid cartilage**(it end at the C6 level)
- A small depression situated on either side of the laryngeal inlet is called '**Piriform Fossa**'.
- It is a common site for the **lodging of foreign bodies**.
- Branches of **internal laryngeal** & **recurrent laryngeal** nerves lie deep to the mucous membrane of the fossa and are vulnerable to injury during removal of a foreign body.



Nerve supply

Sensory

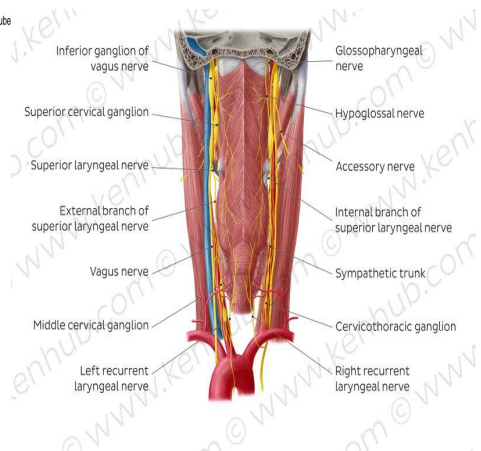
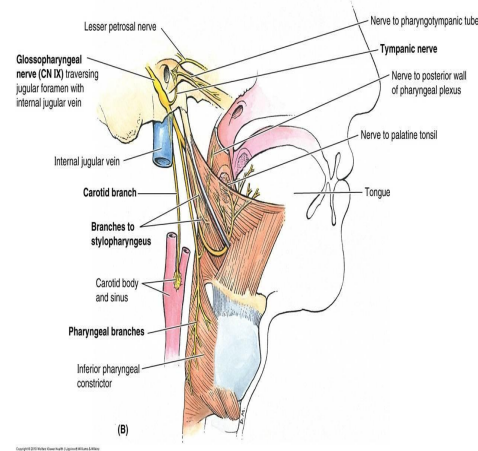
Nasopharynx:
Maxillary nerve

Oropharynx:
Glossopharyngeal nerve

Laryngopharynx:
Vagus nerve

Motor

All the muscles of pharynx are supplied by the **pharyngeal plexus**.
Except: the **Stylopharyngeus** is supplied by the **glossopharyngeal nerve**



Arterial Supply

- Ascending pharyngeal
- Ascending palatine
- Facial
- Maxillary
- Lingual

Venous Drainage

pharyngeal venous plexus, which drains into the internal jugular vein

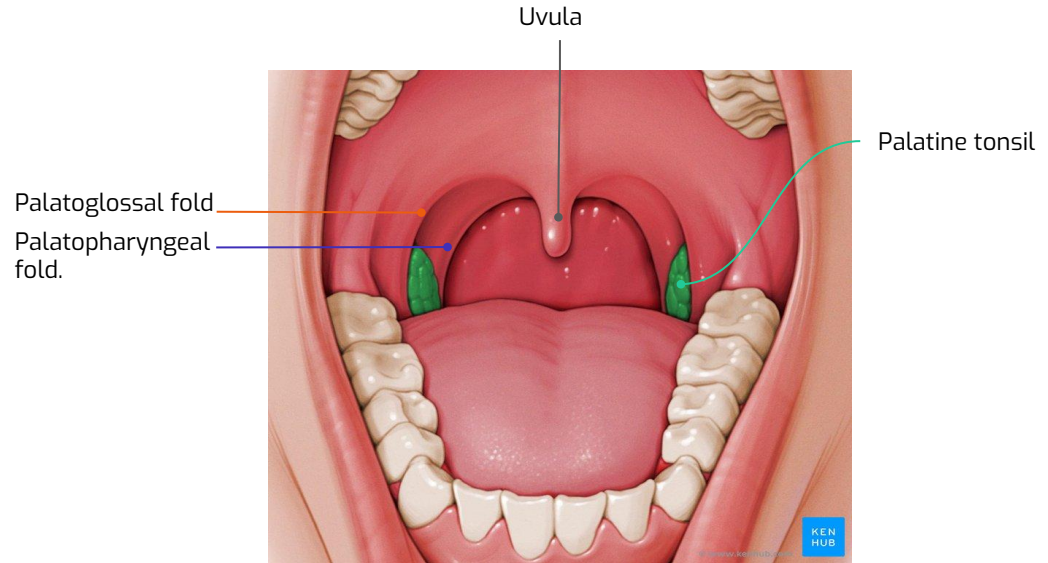
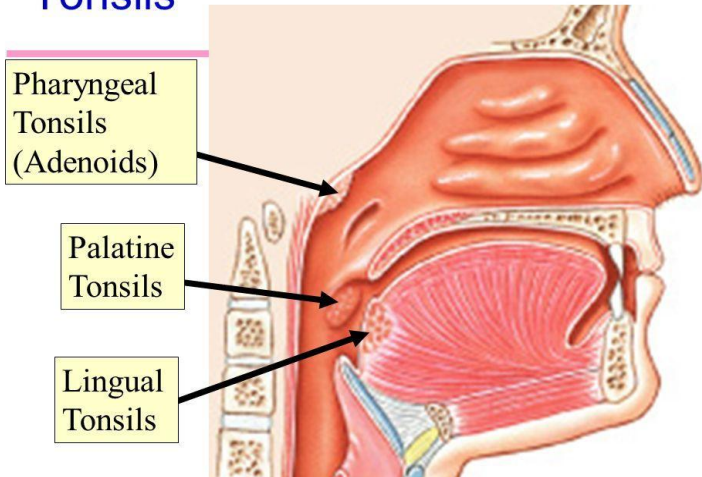
Lymph Drainage

Deep Cervical lymph nodes either directly, or indirectly via the Retropharyngeal **or** Paratracheal lymph nodes

Palatine tonsils

Two masses of **lymphoid tissue** located in the **lateral** wall of the oropharynx in the tonsillar fossa, Each one is covered by **mucous membrane** and laterally by fibrous tissue (**capsule**). It reaches a **maximum** size during childhood, after puberty it **diminishes** in size .

Tonsils



MCQ

Q1: The nose is formed above by:

- A.** Plates of hyaline cartilage.
- B.** Bony skeletal.
- C.** Elastic cartilage.
- D.** A&B.

Q4: The floor of the nose is formed by:

- A.** Hard palate.
- B.** Vomer.
- C.** Septal cartilage.
- D.** Nasal bone.

Q2: The vestibule is lined by:

- A.** Skin.
- B.** cartilage.
- C.** nerves
- D.** A&B

Q5: The nasal cavity divided into right & left halves by:

- A.** Hyaline cartilage.
- B.** Nasal septum.
- C.** Bone.
- D.** Elastic cartilage.

Q3: The anterior part of the nose is supplied by which nerve:

- A.** Nasal.
- B.** Palatine.
- C.** Ethmoidal.
- D.** Sphenopalatine.

Q6: The nasal mucosa contains

- A.** vagus nerve cells
- B.** olfactory nerve cells
- C.** glossopharyngeal nerve cells
- D.** hypoglossal nerve cells

6:B
5:B
4:A
3:C
2:A
1:B
answer key:

MCQ

Q7: Where does the Posterior ethmoidal sinus drain through?

- A. Sphenoethmoidal recess
- B. Superior meatus
- C. Middle meatus
- D. Inferior meatus

Q10: Nasopharynx part is innervated by nerve as sensory nerve.

- A. Glossopharyngeal
- B. Vagus
- C. Axillary
- D. Maxillary

Q8: Which of the following pharyngeal muscles is called Cricopharyngeus?

- A. Superior constrictor
- B. Inferior constrictor
- C. Stylopharyngeus
- D. Salpingopharyngeus

Q11: Which nerve does supply the Stylopharyngeus muscle as motor nerve?

- A. Glossopharyngeal
- B. Vagus
- C. Axillary
- D. Maxillary

Q9: Tonsillar fossa is a depression located between:

- A. Palatopharyngeal & palatoglossal folds
- B. Stylopharyngeus & cricopharyngeus
- C. Epiglottis & Thyroid
- D. Thyroid & Cricoid

Q12: The artery(ies) that supply the pharynx:

- A. Facial
- B. Maxillary
- C. Brachial
- D. A & B

12: D
11: A
10: D
9: A
8: B
7: B
answer key:

SAQ :

1 :The roof of the nose is formed by?

2 : The posterior part of the nose is supplied by?

3 : List the sensory nerve supply of the pharynx.

SAQ Answers

1 : -Body of sphenoid.

-Cribriform plate of ethmoid bone.

-Frontal bone.

-Nasal bone & cartilage.

2 : 1-Nasopalatine, 2- Nasal, 3- Palatine.

3 : Maxillary nerve, Glossopharyngeal nerve, Vagus nerve

Team leaders

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Abeer Awwad

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- Shaden Alsaiedan
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- Joud alnujaidi
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