

# **NASAL CAVITY**

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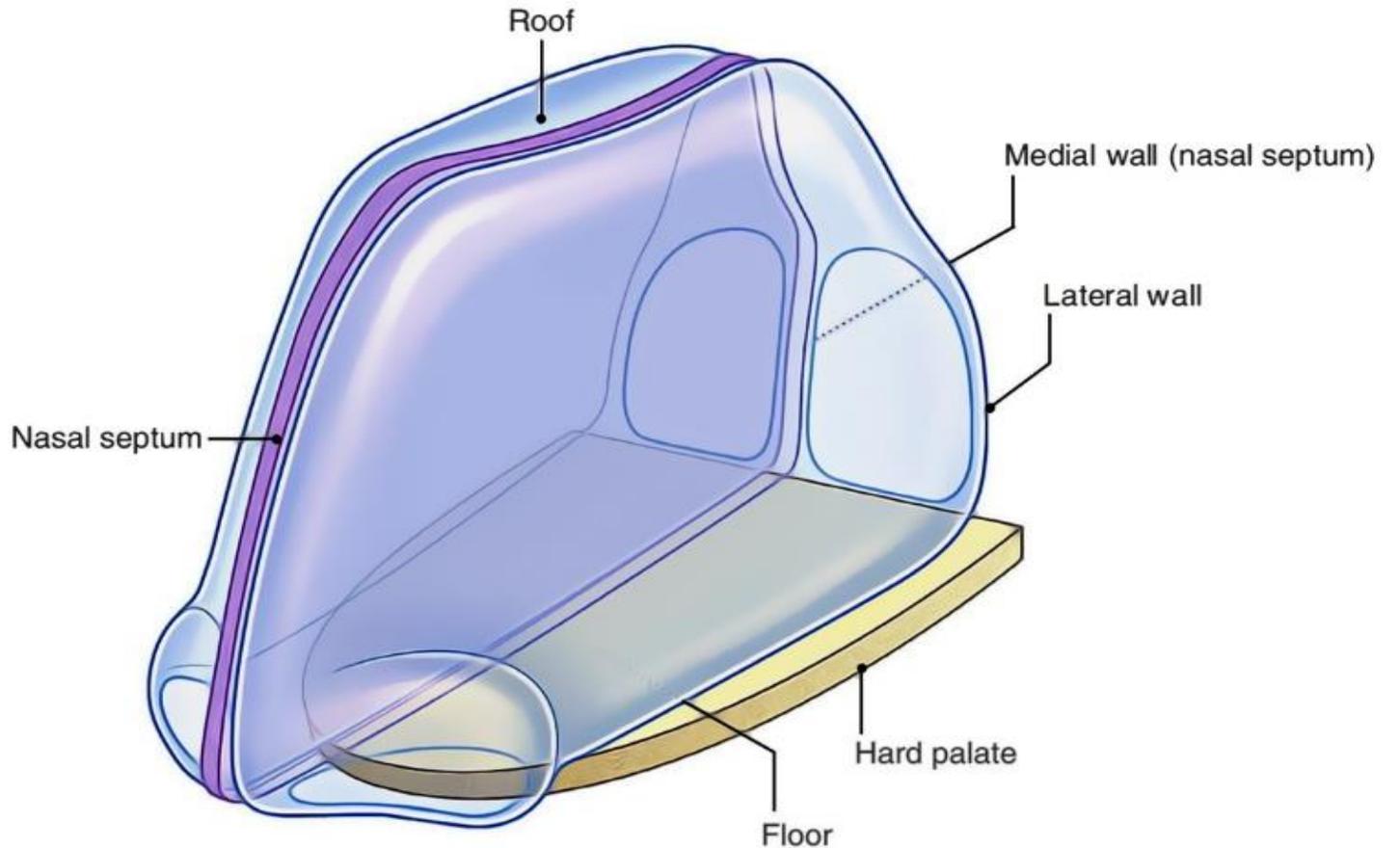
# Lecture ILOS & Objectives:

**By the end of this lecture the student should be able to:**

- **Outline the nasal cavity and its divisions.**
- **Describe the boundaries of the nasal cavity.**
- **Describe the anatomy of paranasal sinuses**
- **Identify the openings in the lateral wall of nasal cavity**
- **Identify the arterial supply of lateral and medial walls of nasal cavity.**
- **Identify the nerve supply of nasal cavity**

# NASAL CAVITY

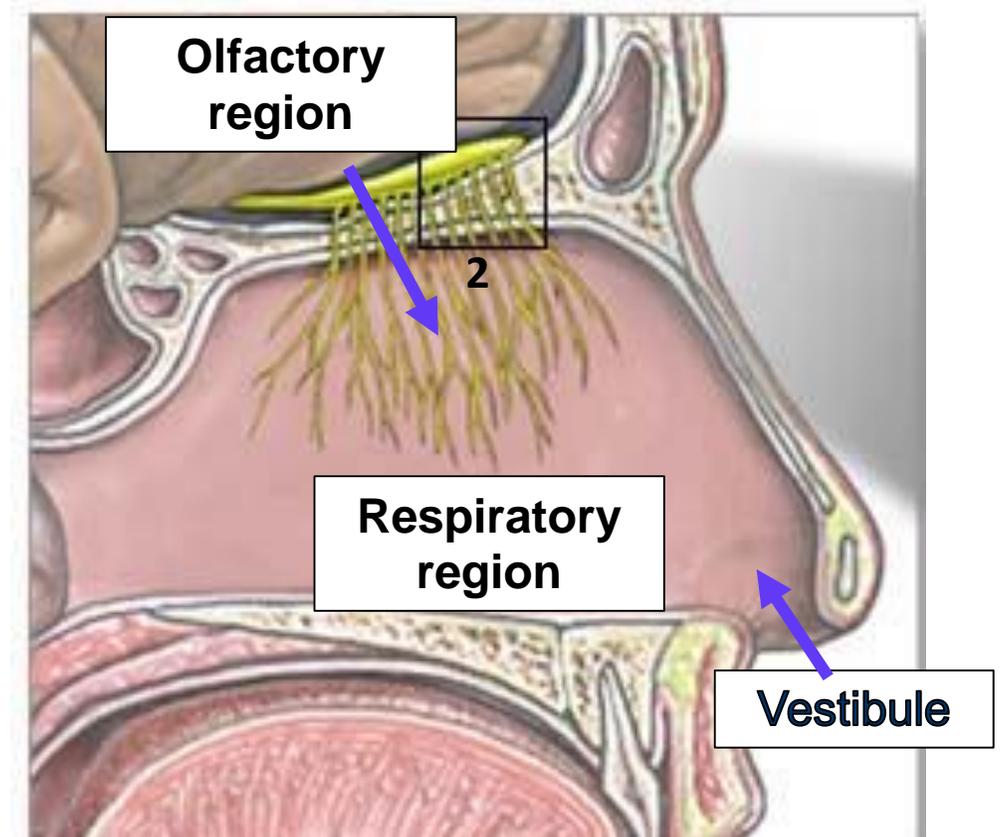
It is pyramidal in shape.  
It is divided into right  
and left halves by nasal  
septum



# NASAL CAVITY

## Divisions:

1. **Vestibule:** it is the dilated part just inside anterior nasal aperture, lined by skin.
2. **Olfactory region:** the upper 1/3 of nasal cavity, lined by yellowish mucosa.
3. **Respiratory region:** lower 2/3 of nasal cavity, lined by thick mucosa.



# Boundaries of the nasal cavity

## \* Roof :

*Formed from behind forwards by :*

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

## \* Floor :

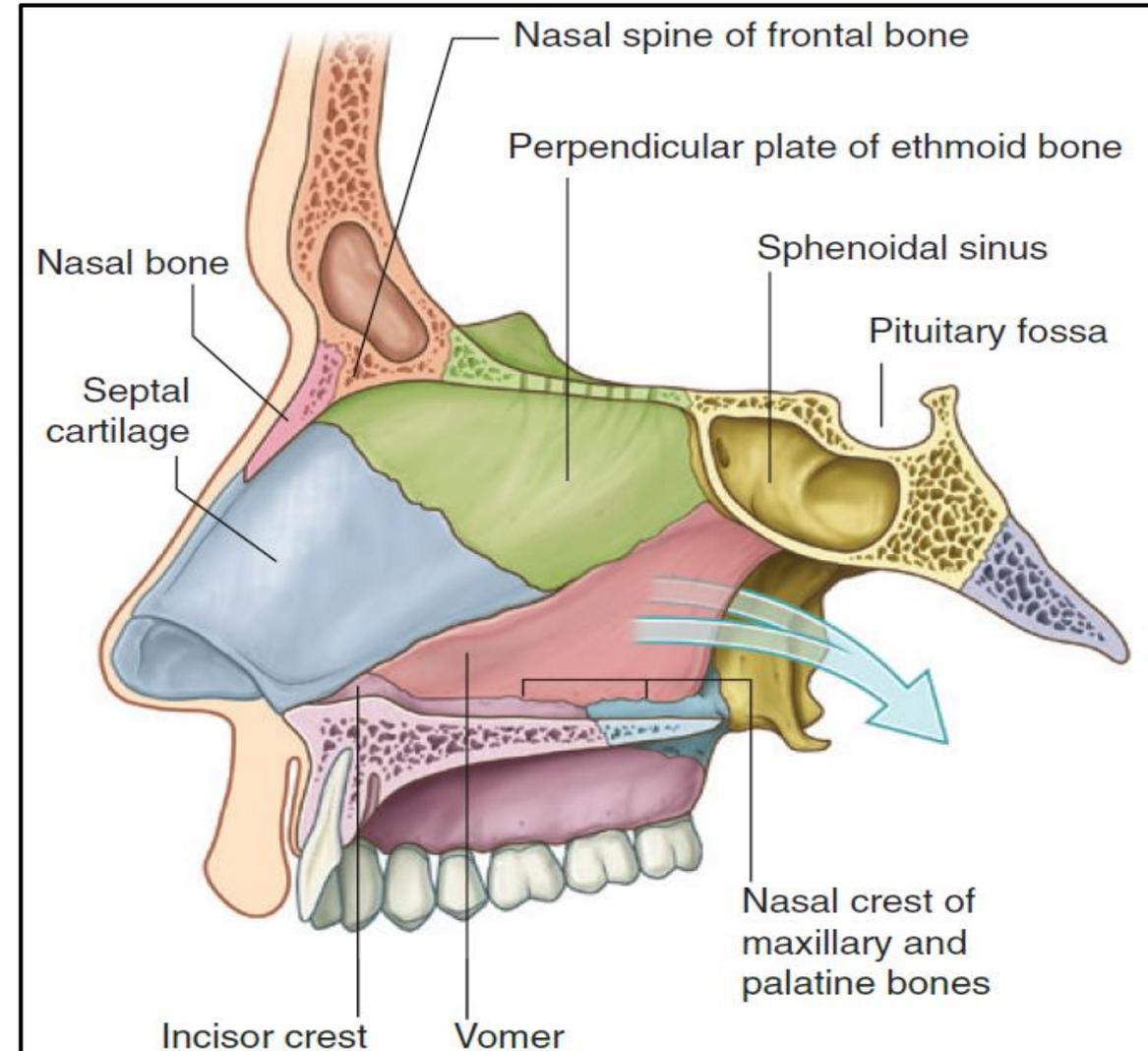
*Formed by :*

1. Palatine process of maxilla
2. Horizontal plate of palatine bone

## \* Medial wall :

*Formed by the nasal septum which is formed by:*

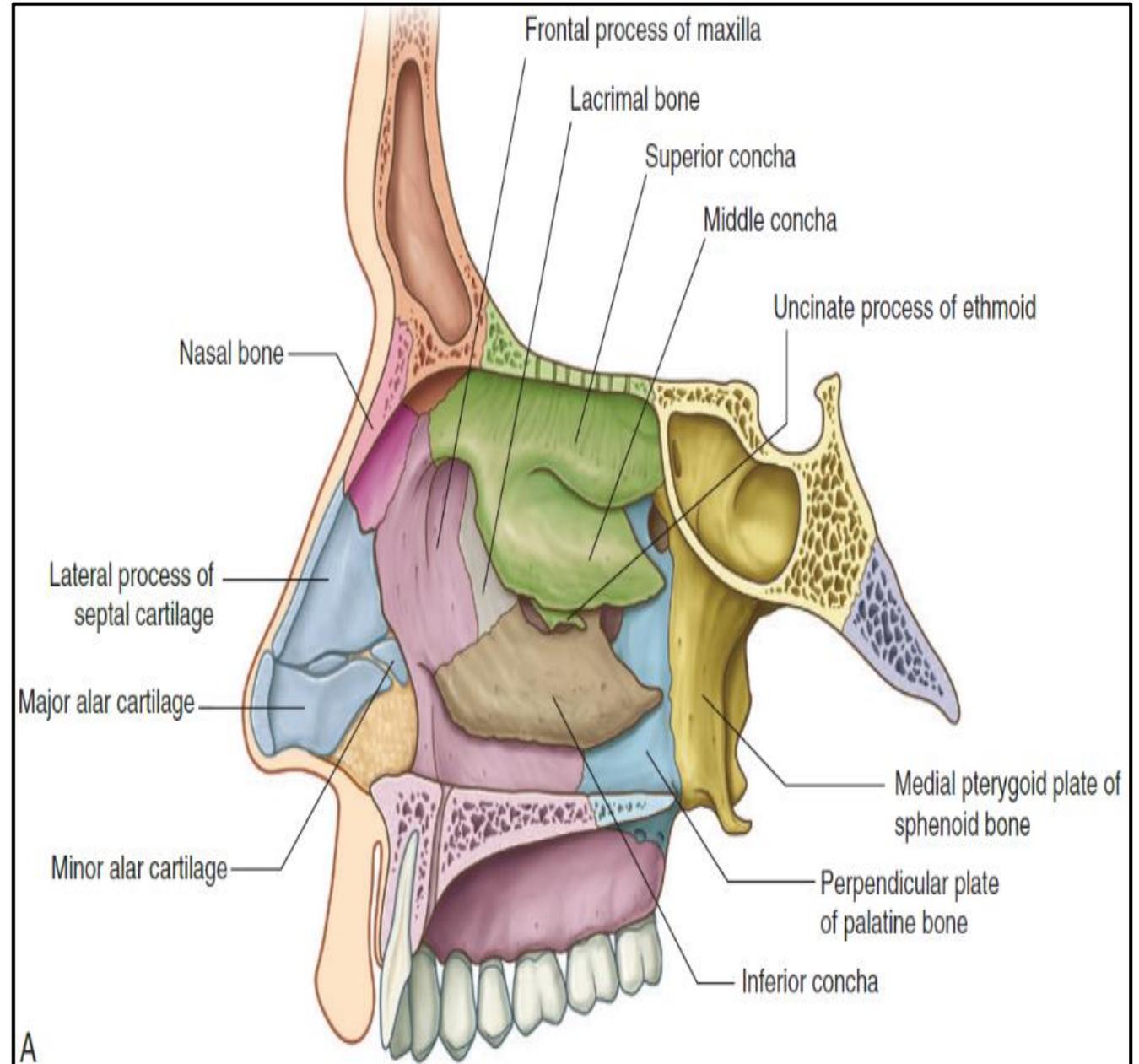
1. *Superiorly* : The vertical plate of ethmoid.
2. *Anteriorly* : Septal cartilage.
3. *Posteriorly* : The vomer.



# NASAL CAVITY

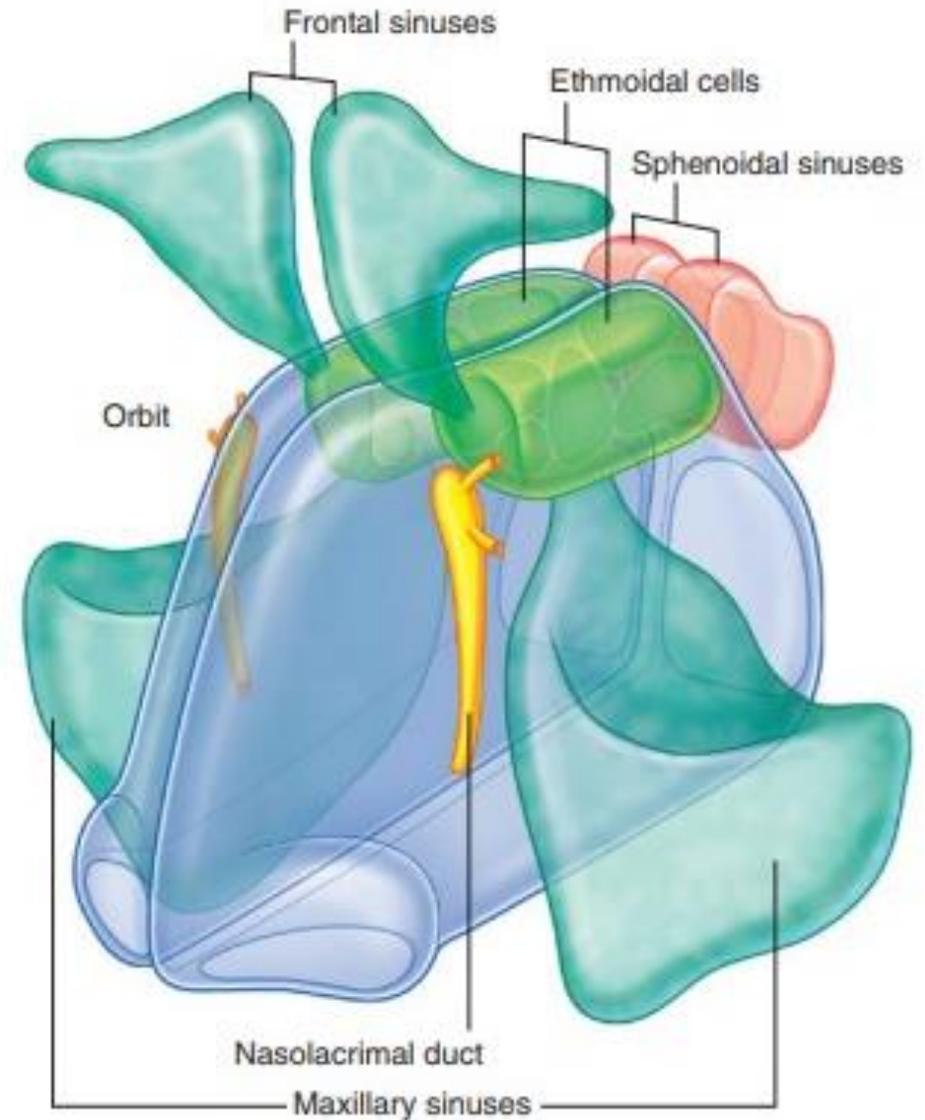
## Lateral wall

- Superior concha (from ethmoid bone)
- Middle concha (from ethmoid bone)
- Inferior concha (separate bone)
- The space below each concha is called a meatus



# Paranasal sinuses

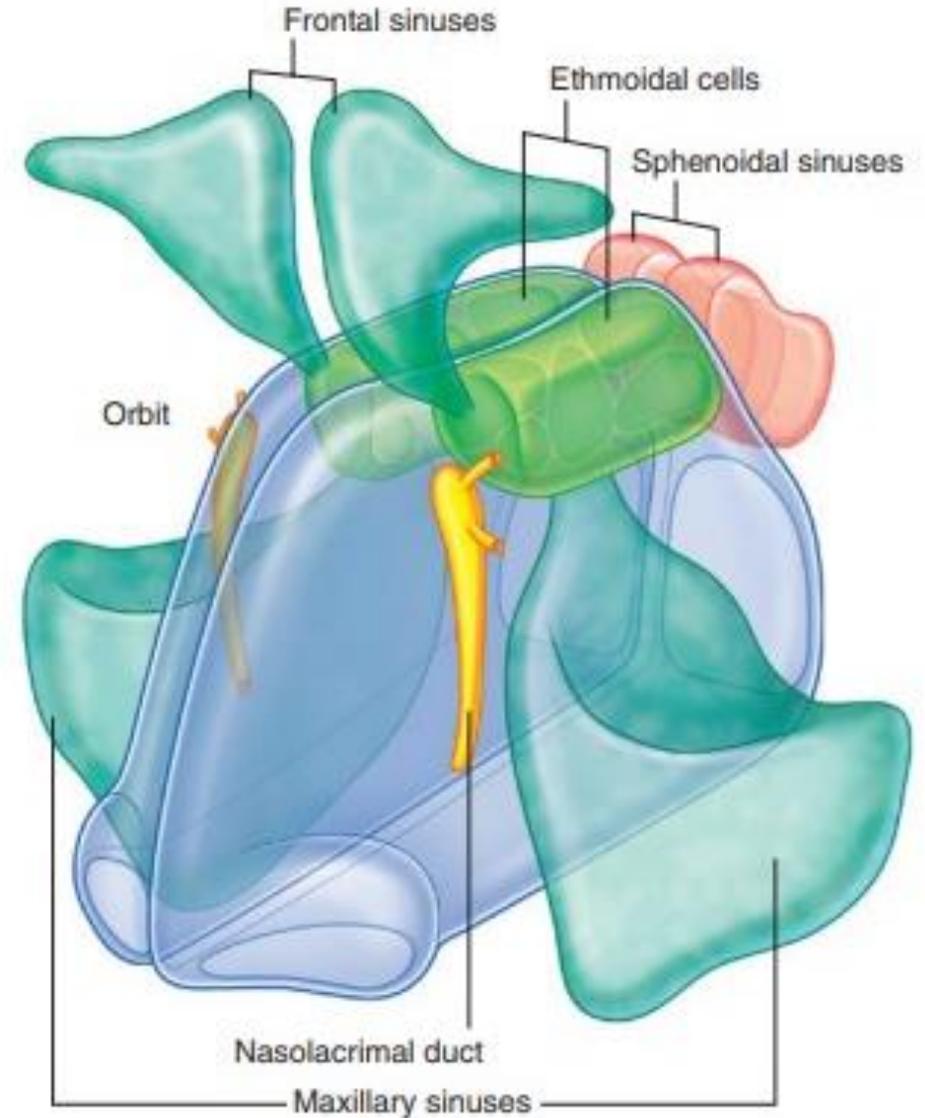
- There are four paranasal air sinuses
  - Ethmoidal cells
  - Sphenoidal
  - Maxillary
  - Frontal sinuses.
- Named according to the bone in which it is found.



# Paranasal sinuses

## ➤ Frontal sinuses:

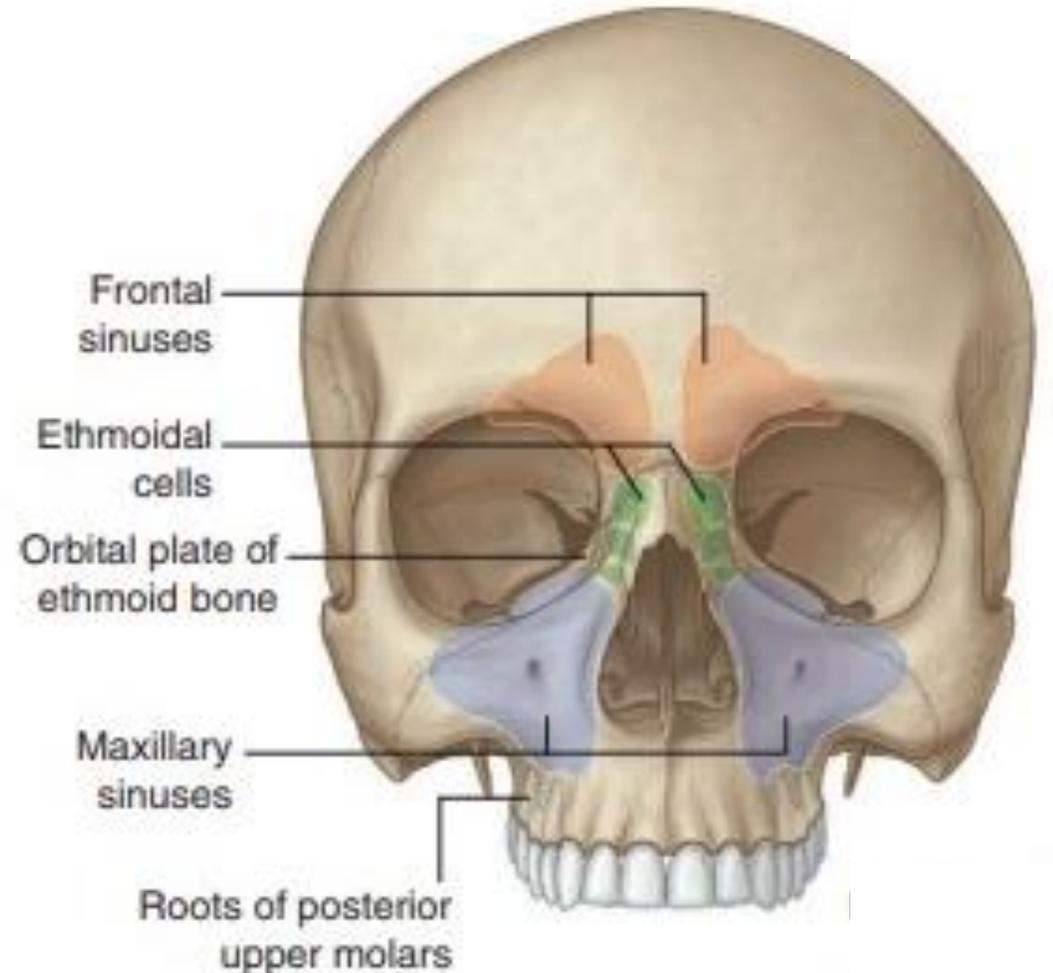
- one on each side.
- Each one is triangular in shape and is in the frontal bone under the forehead.
- The base of each triangular sinus is oriented vertically in the bone at the midline above the bridge of the nose and the apex is laterally located along the upper margin of the orbit.



# Paranasal sinuses

## ➤ The ethmoidal cells:

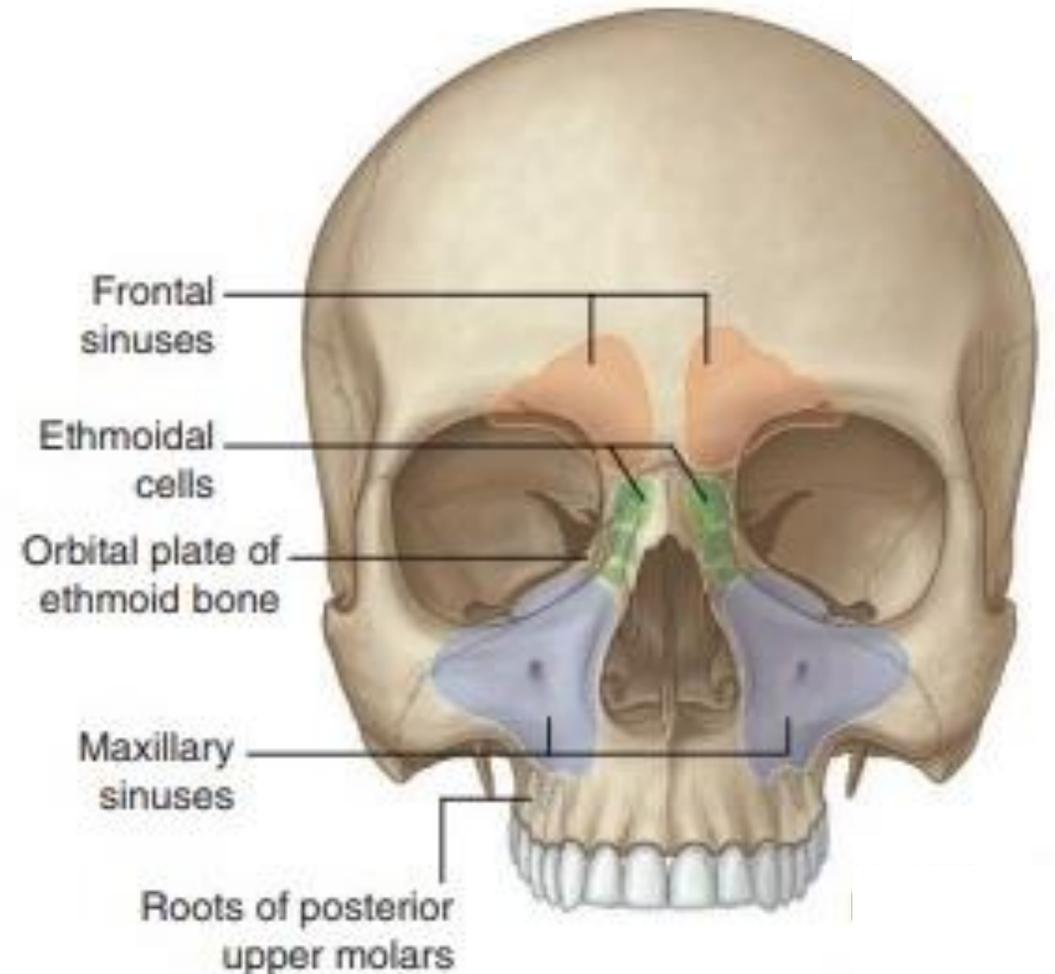
- on each side fill the ethmoidal labyrinth.
- Each cluster of cells is separated from the orbit by the thin orbital plate of the ethmoidal labyrinth,
- and from the nasal cavity by the medial wall of the ethmoidal labyrinth.
- The ethmoidal cells are formed by a variable number of individual air chambers, which are divided into **anterior, middle, and posterior ethmoidal cells** based on the location of their openings on the lateral wall of the nasal cavity



# Paranasal sinuses

## ➤ Maxillary sinuses

- one on each side
- are the largest of the paranasal sinuses and completely fill the bodies of the maxillae.
- Each is pyramidal in shape with the apex directed laterally and the base deep to the lateral wall of the adjacent nasal cavity.
- The medial wall or base of the maxillary sinus is formed by the maxilla, and by parts of the inferior concha and palatine bone that overlie the maxillary hiatus.

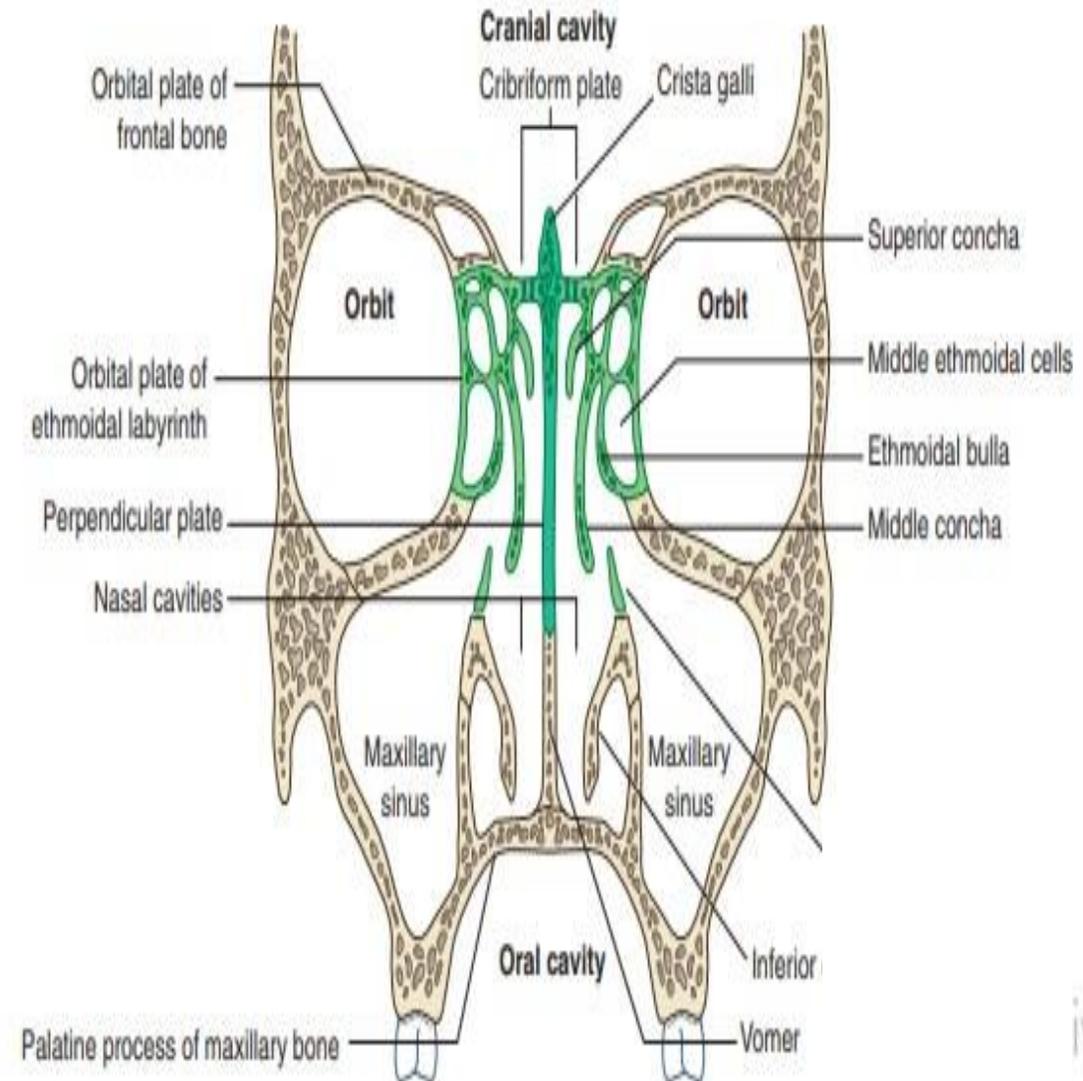


# Paranasal sinuses

## ➤ Maxillary sinuses

### ➤ Relations

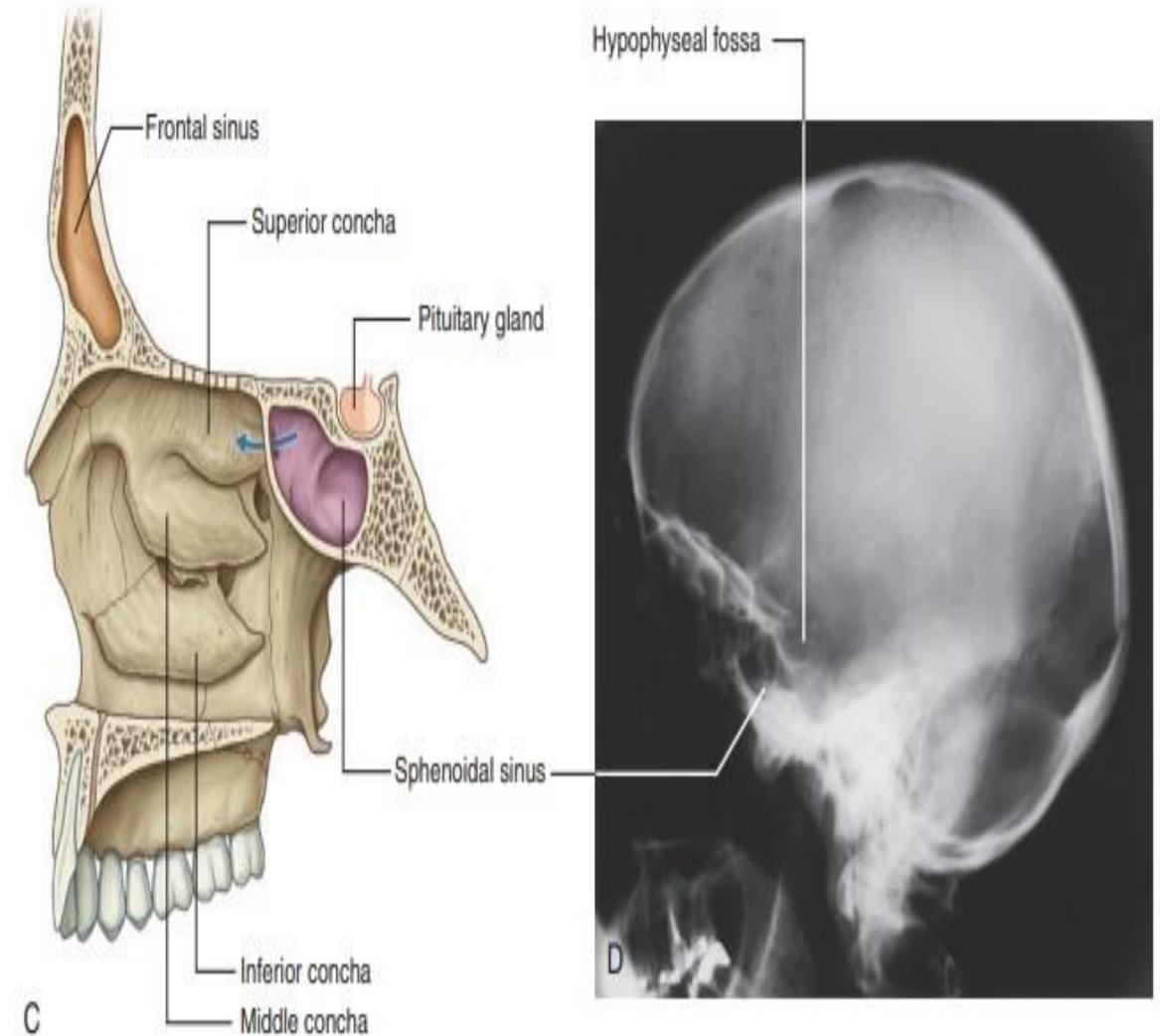
- The superolateral surface (roof) is related above to the orbit.
- The anterolateral surface is related below to the roots of the upper molar and premolar teeth and in front to the face.
- The posterior wall is related behind to the infratemporal fossa.
- **Nerve supply:** by infra-orbital and superior alveolar branches of the maxillary nerve.
- **blood supply:** through branches from the infra-orbital and superior alveolar branches of the maxillary arteries.

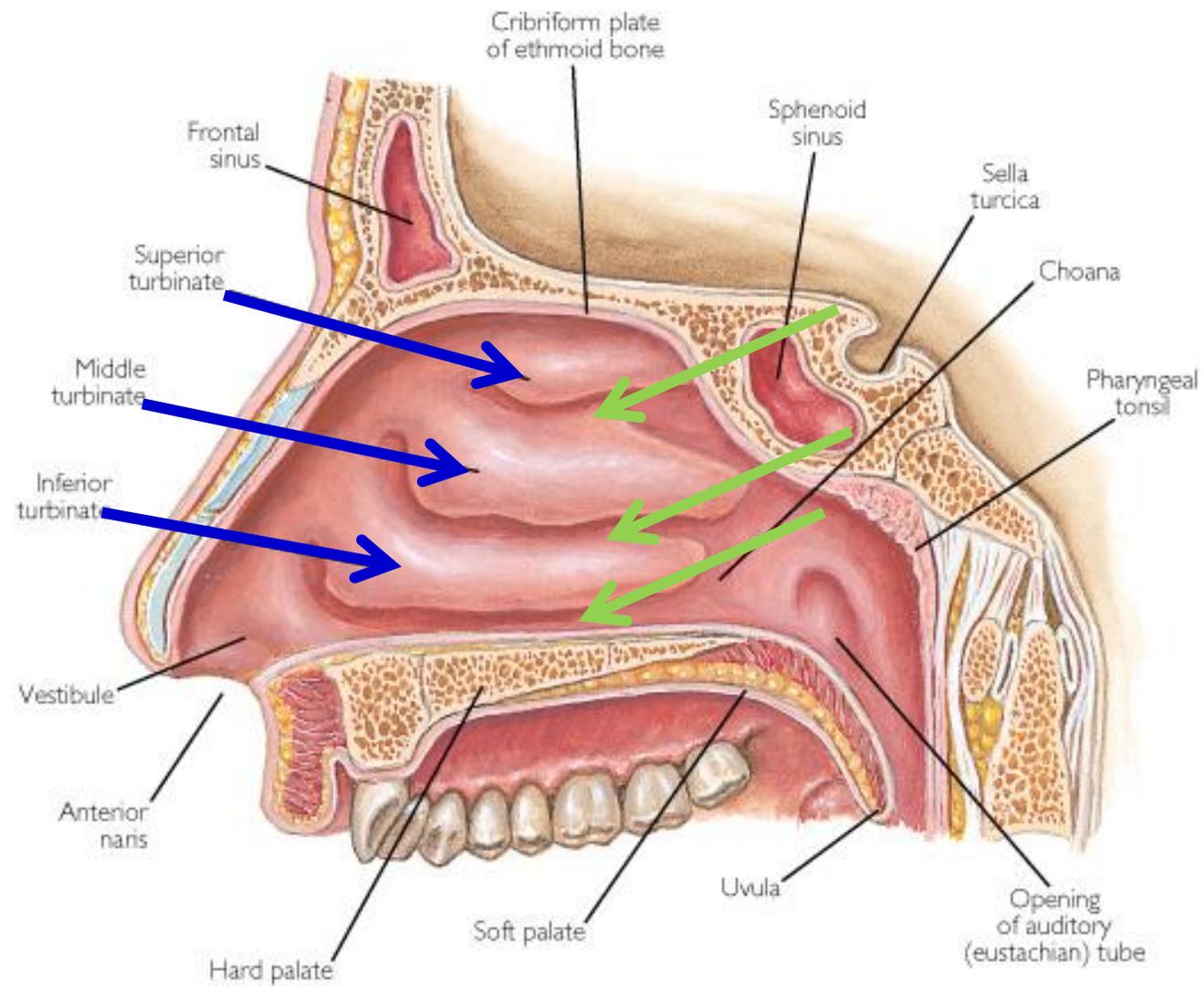


# Paranasal sinuses

## ➤ Sphenoidal sinuses

- one on either side within the body of the sphenoid,
- The sphenoidal sinuses are related:
  - ✓ **Above** to the cranial cavity, particularly to the pituitary gland and to the optic chiasm.
  - ✓ **laterally** to the cranial cavity, particularly to the cavernous sinuses.
  - ✓ **Below and in front**, to the nasal cavities.

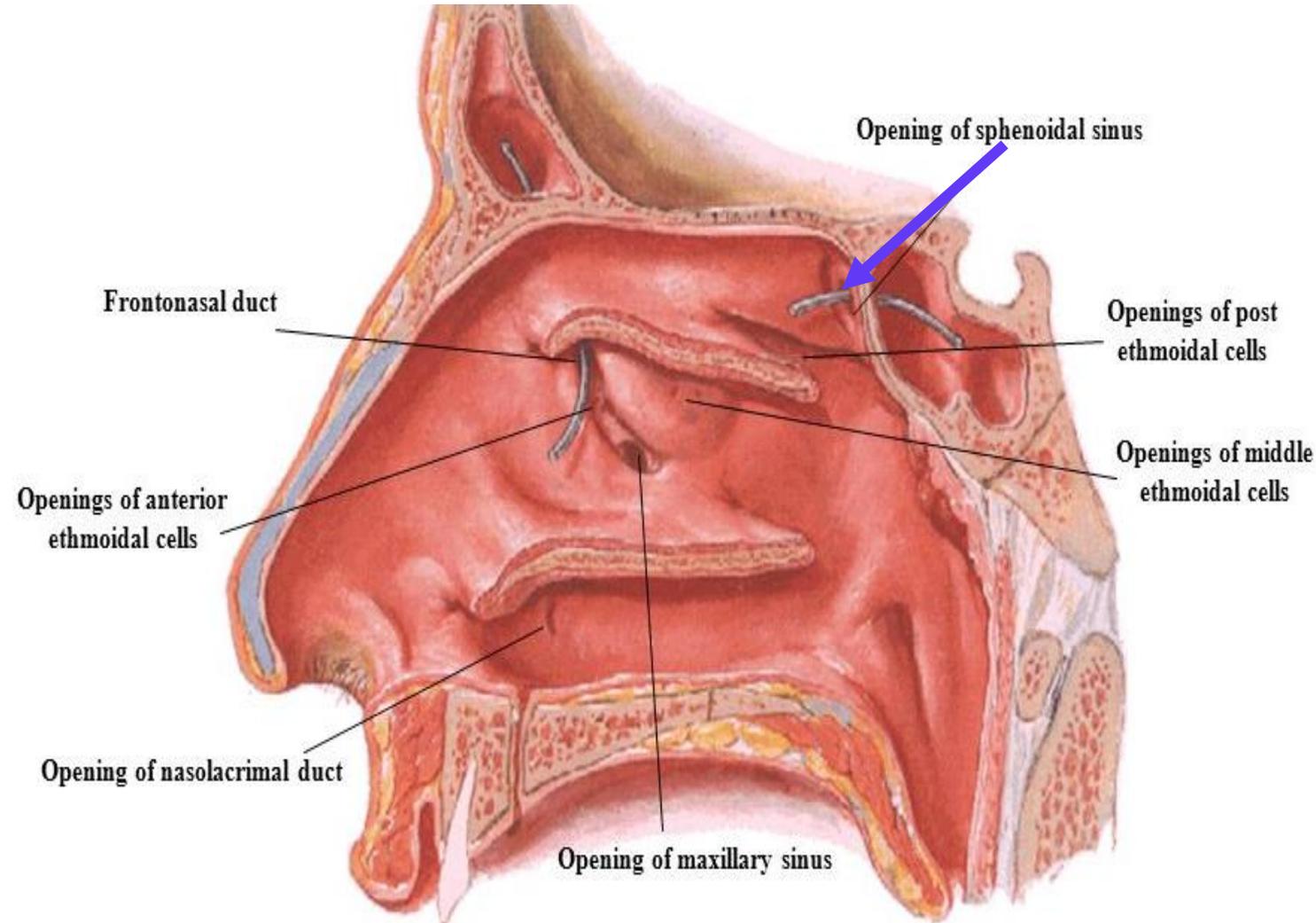




# Openings in the lateral wall of nasal cavity

## ➤ *Sphenoethmoidal recess.*

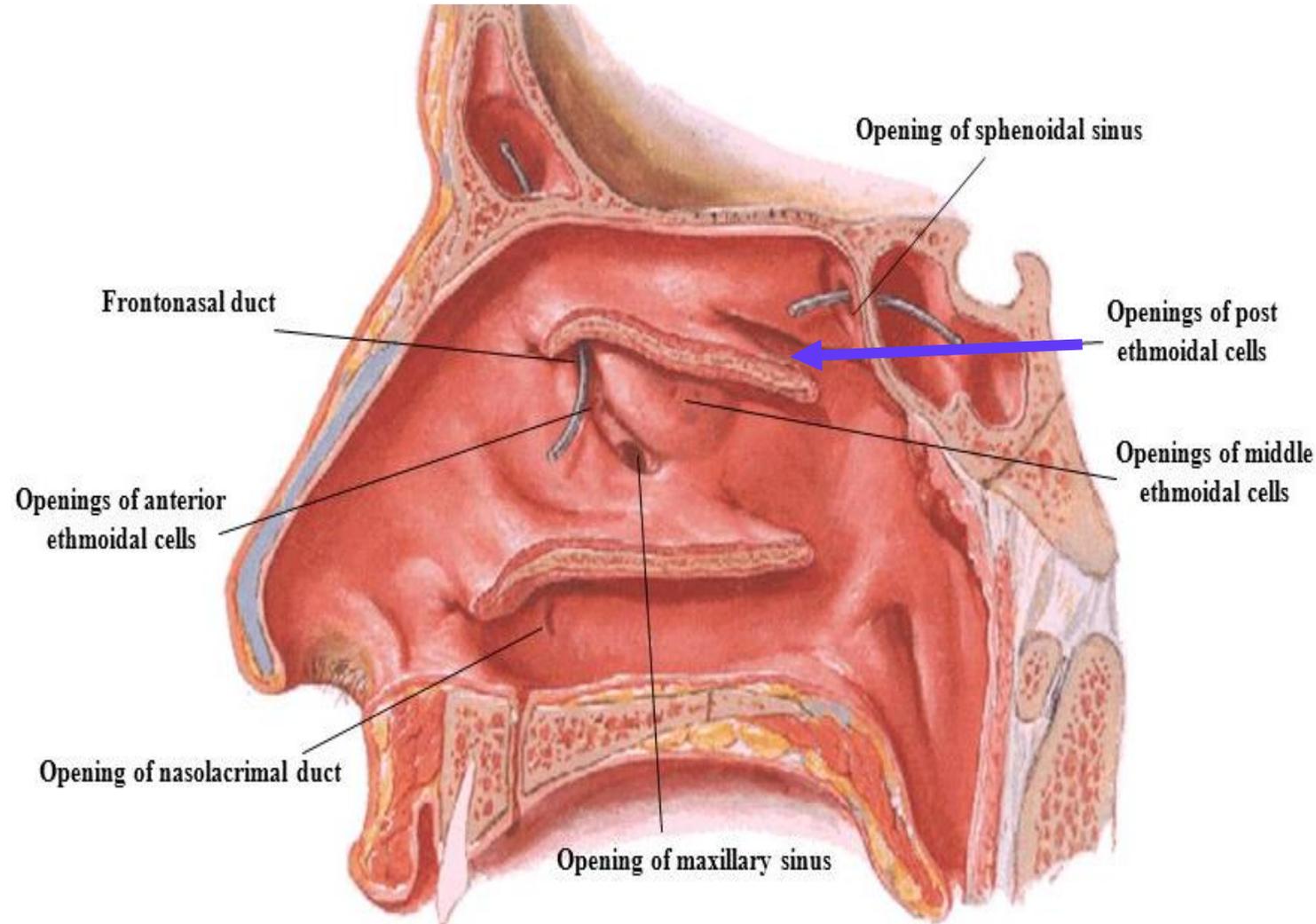
- \* It lies above and behind the superior concha
- \* It is a small triangular recess
- \* It receives the opening of the sphenoidal air sinus



# Openings in the lateral wall of nasal cavity

## ➤ *Superior meatus*

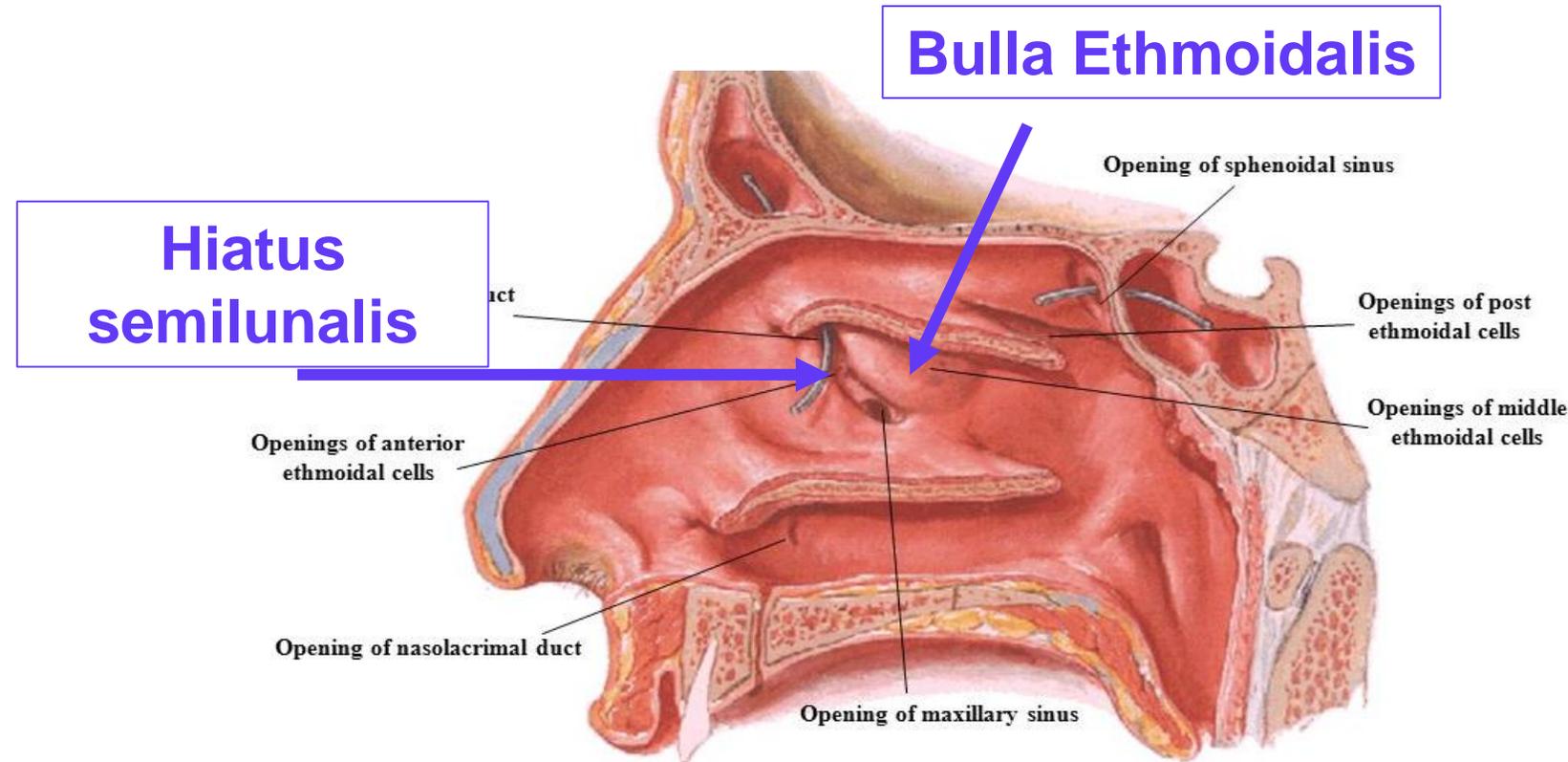
- \* Lies below the superior concha
- \* It receives the opening of: the posterior ethmoidal sinuses



## ➤ Middle meatus

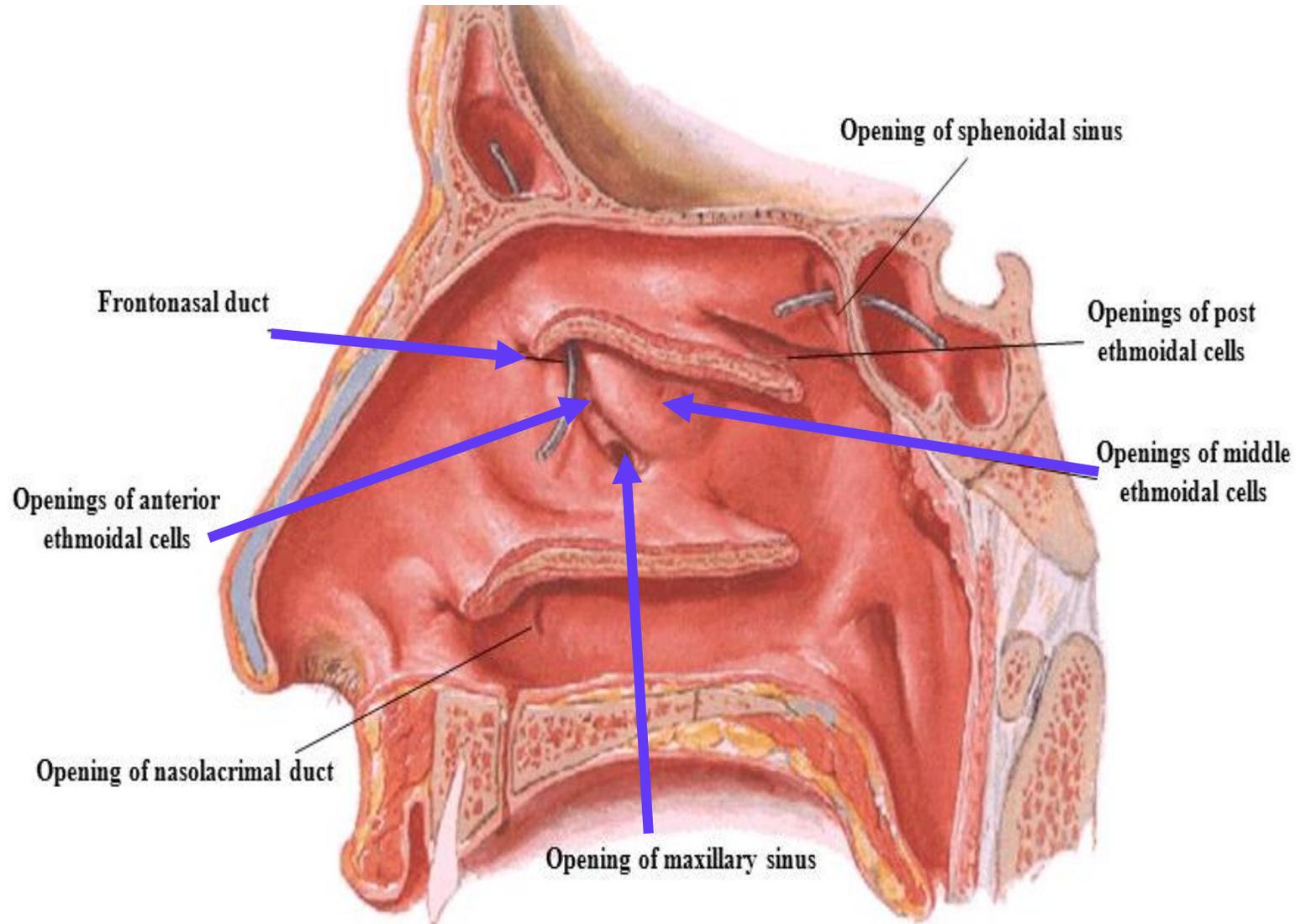
- \* Lies below the middle concha
- \* It shows a rounded eminence produced by the middle ethmoidal sinus called the **bullae ethmoidalis**
- \* Bullae ethmoidalis is bounded in front and below by a curved cleft called the **hiatus semilunaris**
- \* The anterior end of the hiatus leads into a funnel-shaped channel called the **infundibulum**
- \* Several paranasal sinuses open in the middle meatus a

## Middle meatus



# Middle meatus

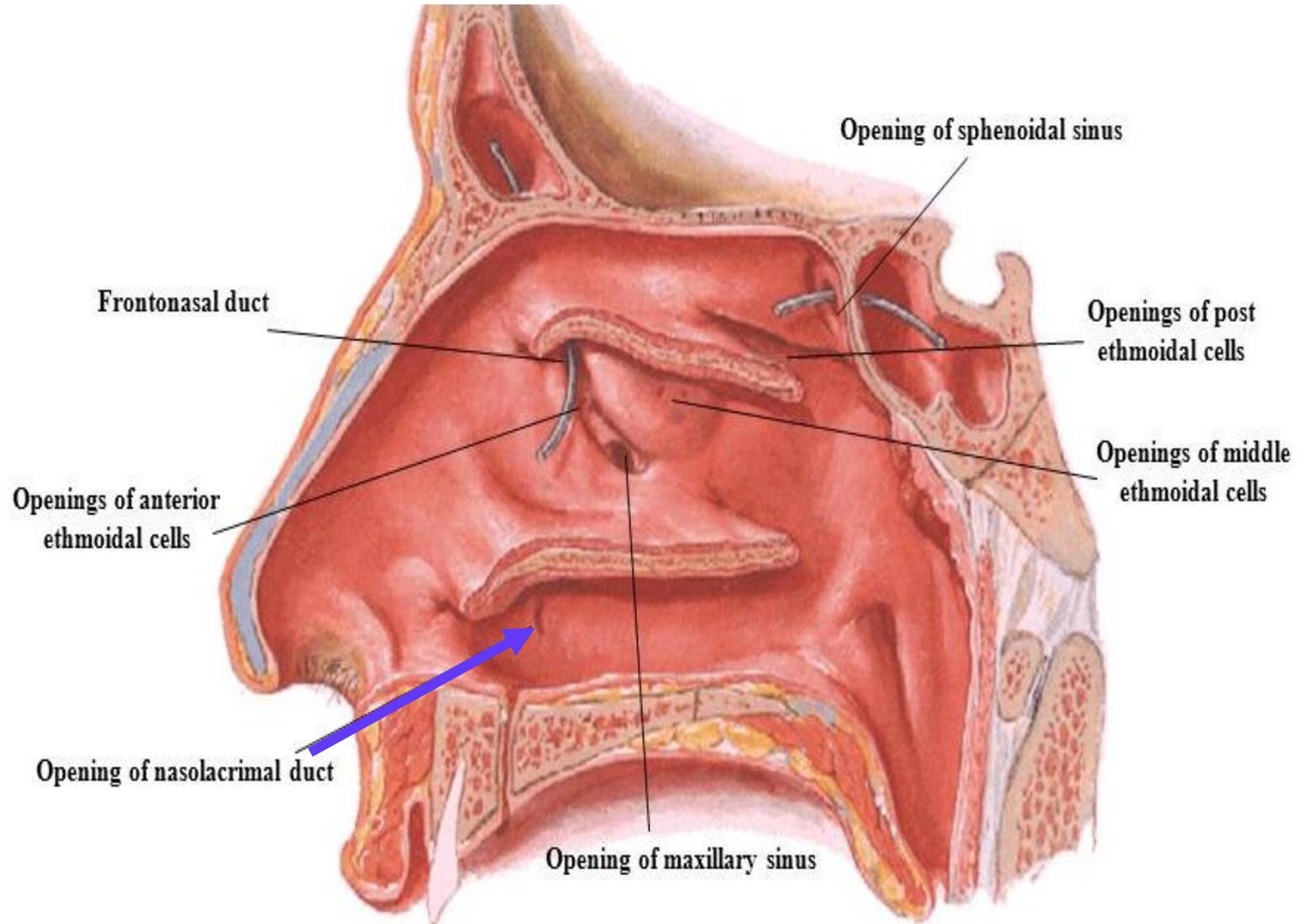
- **Frontal sinus** : Opens into the infundibulum .
- **Maxillary sinus** opens into hiatus semilunaris **below** bulla ethmoidalis
- **Anterior ethmoidal sinuses** open into hiatus semilunaris **in front** bulla ethmoidalis
- **Middle ethmoidal sinus** opens on bulla ethmoidalis



# Inferior meatus

## ➤ *Inferior meatus*

- \* Lies below the inferior concha
- \* It receives the openings of the nasolacrimal duct.



## **Blood supply:**

### **Arterial supply :**

**3 main arteries supply the nasal cavity : maxillary , ophthalmic & facial**

#### **➤ Lateral wall:**

#### **Anterior superior quadrant:**

**Anterior ethmoidal artery of ophthalmic.**

**Anterior inferior quadrant: Facial artery**

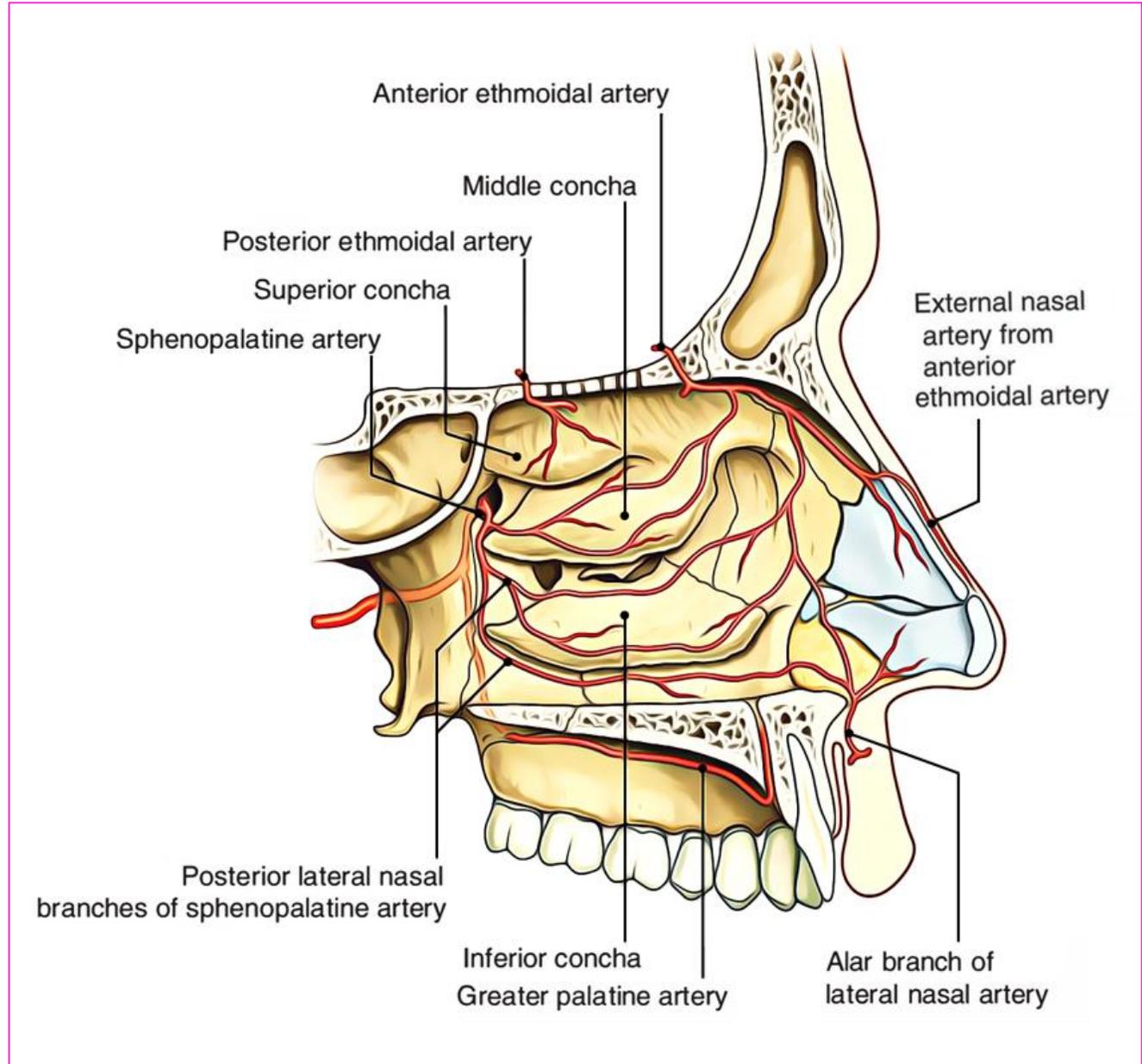
**Greater palatine artery of maxillary.**

#### **Posterior superior quadrant:**

**Sphenopalatine artery of maxillary.**

#### **Posterior inferior quadrant:**

**Greater palatine artery of maxillary.**



➤ Arterial supply :

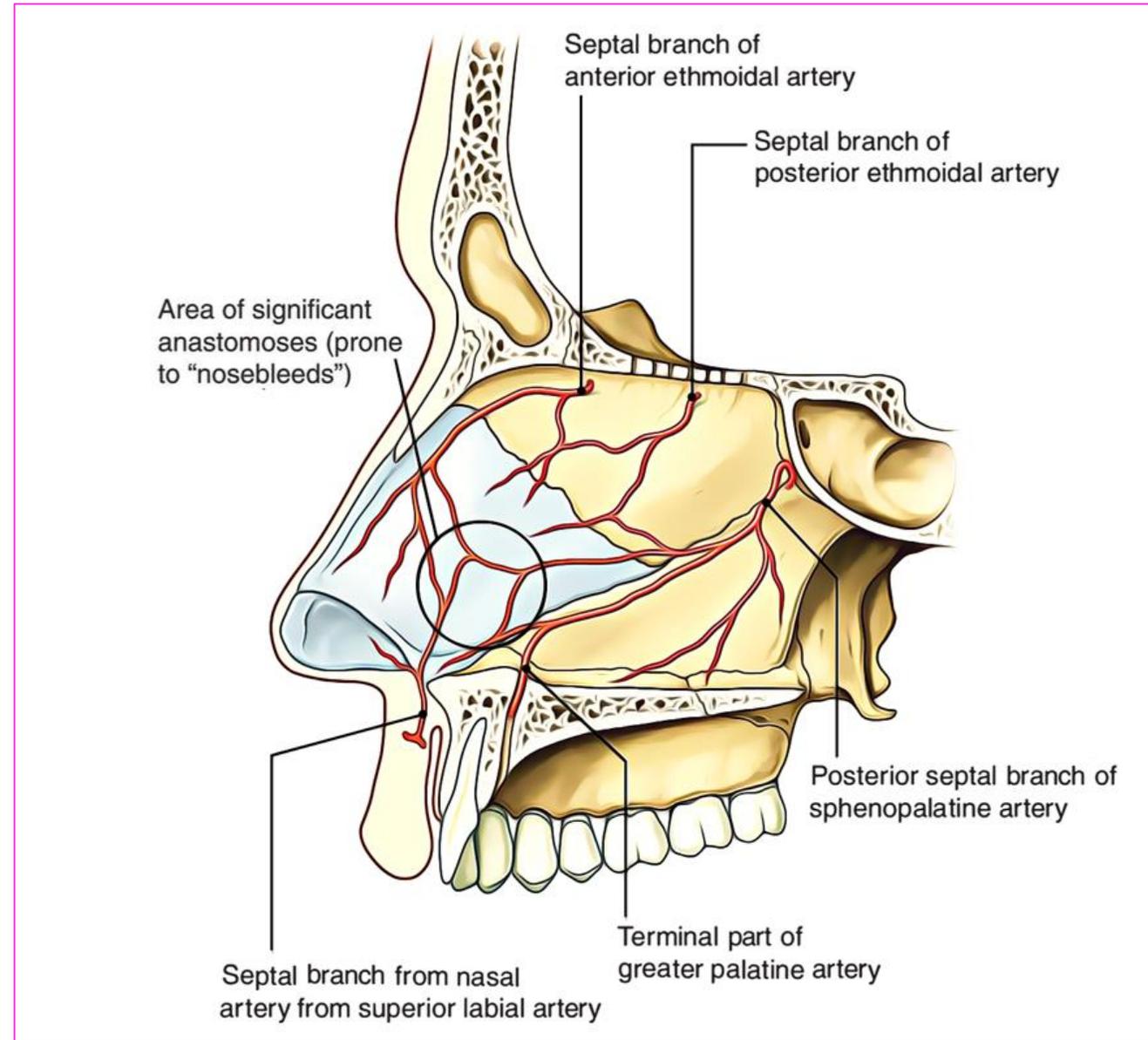
➤ **Medial wall ( septum ) :**

**Anterior superior half:** Anterior ethmoidal artery and Septal branch of superior labial artery of facial

**Posterior inferior half:** Sphenopalatine artery

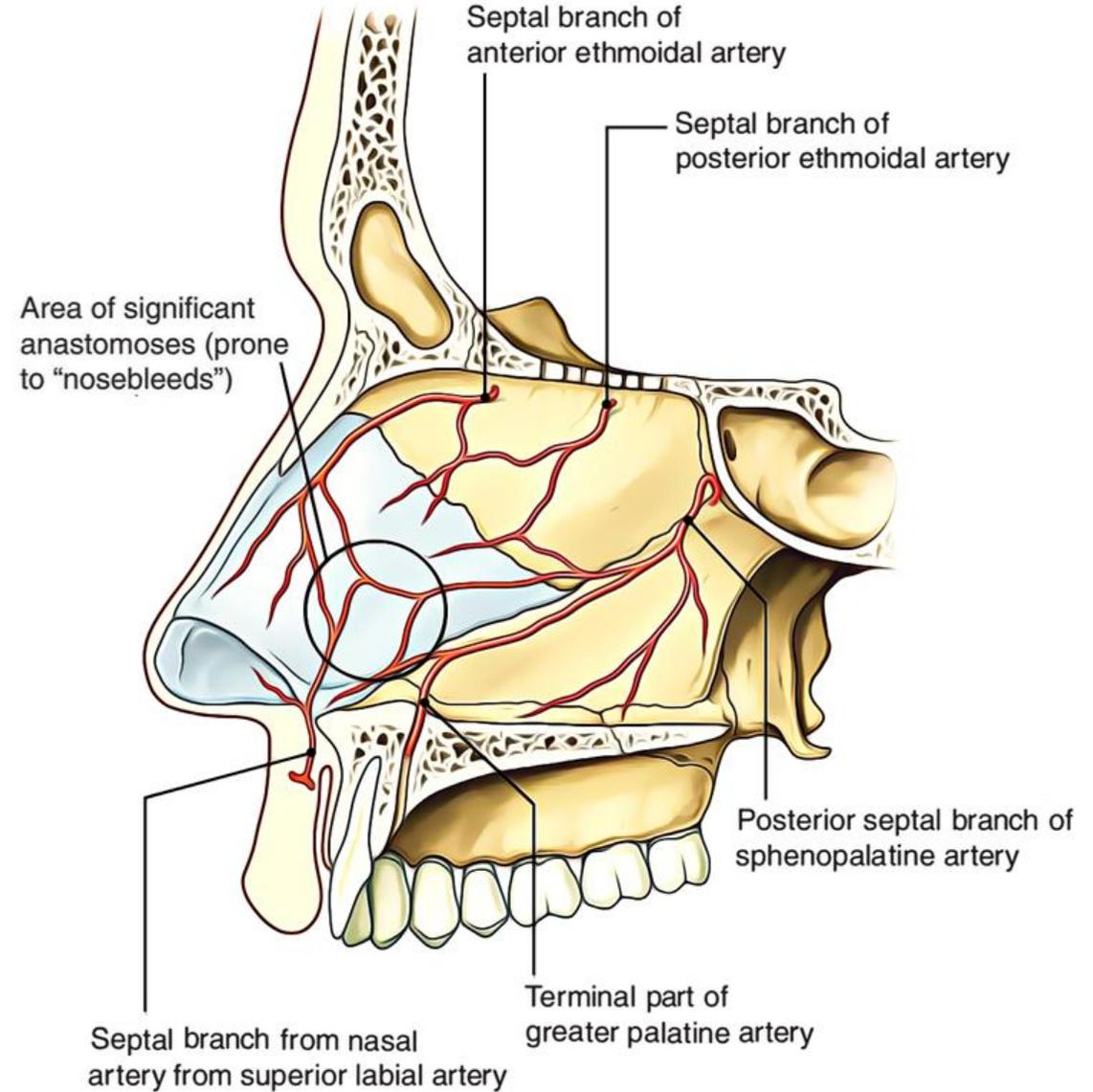
**N.B.**

In the region of the vestibule , branches from the above 3 vessels anastomose together at **Little's area** which is a common site of bleeding from nose (epistaxis)



**Venous drainage:**

The veins of the nose form a rich plexus which is drained by veins that accompany the arteries.



# Nerve supply of nasal cavity

## General sensation

### Lateral wall :

Anterior superior quadrant :

*Anterior ethmoidal nerve*

Anterior inferior quadrant:

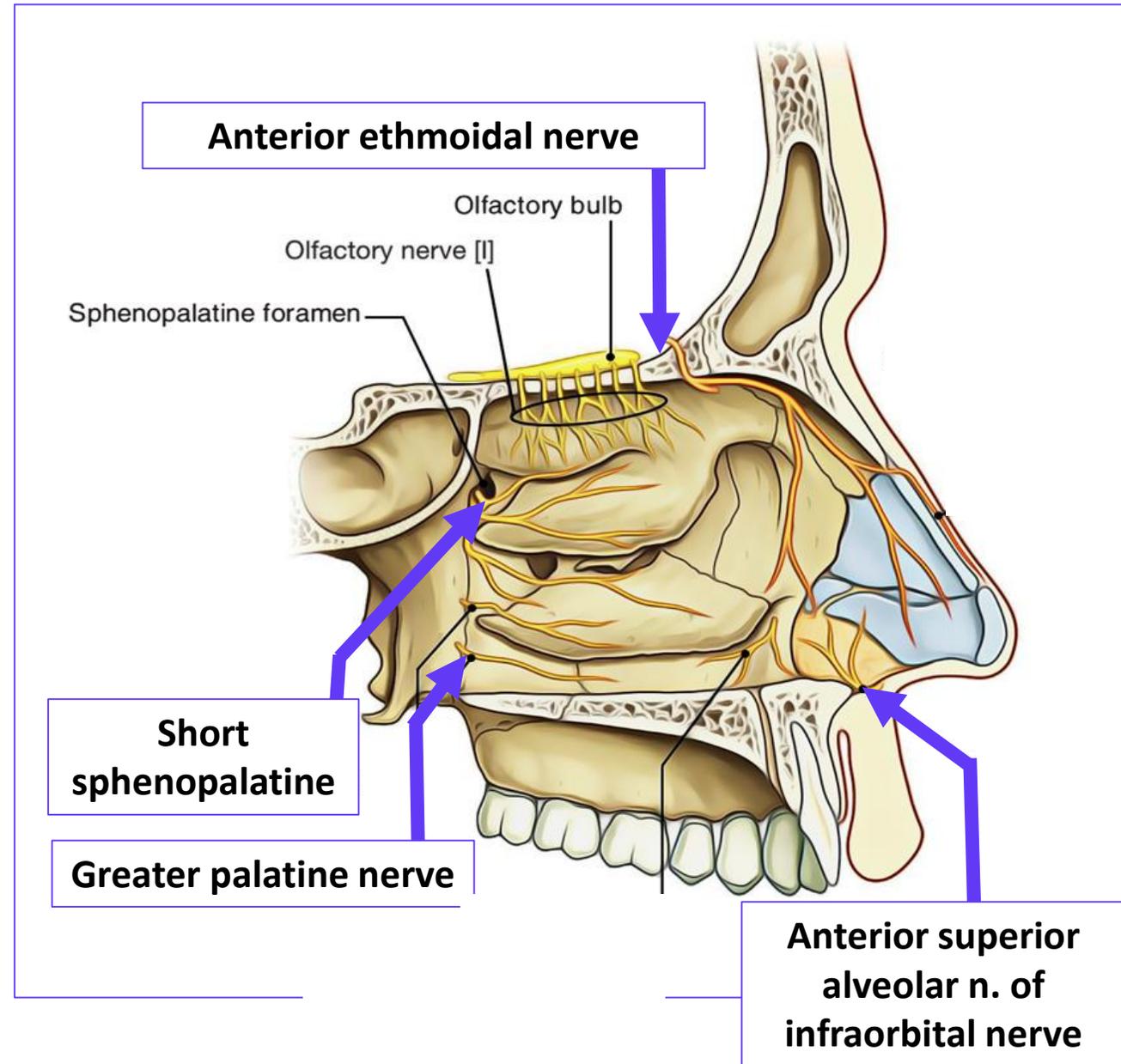
*Anterior superior alveolar.*

Posterior superior quadrant:

*Short sphenopalatine nerve.*

Posterior inferior quadrant:

*Greater palatine nerve*



# Nerve supply of nasal cavity

## General sensation

**Medial wall ( septum ) :**

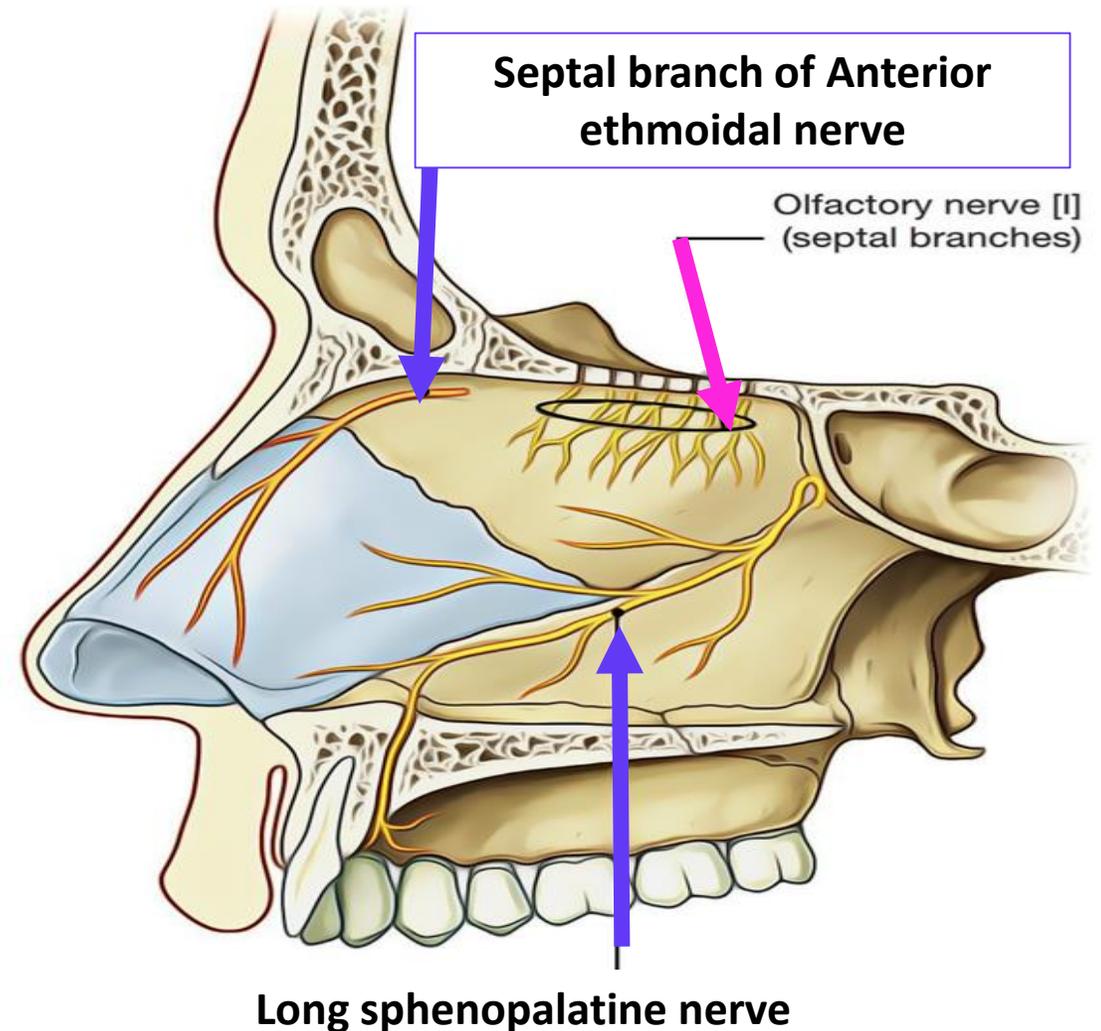
**Anterior superior half :**

***Anterior ethmoidal nerve:***

**Posterior inferior half:**

***Long sphenopalatine( nasopalatine)***

**Olfaction: *Olfactory nerve.* Carries olfactory sensation from the upper 1/3**



## **REFERENCES**

- **Snell`s clinical anatomy by regions ,Tenth Edition**
- **Gray`s Anatomy for students, Third Edition**
- **Grant`s Atlas of Anatomy**

Thank  
you



# **LARYNX**

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# Lecture ILOS & Objectives:

- **By the end of this lecture the student should be able to:**
- **Define the larynx and outline its extension**
- **Enumerate the cartilages of larynx**
- **Describe the membranes and ligaments of larynx.**
- **Identify the boundaries of inlet of larynx and identify parts of its cavity.**
- **Describe the nerve supply, arterial supply and lymphatic drainage of the larynx**

# **larynx**

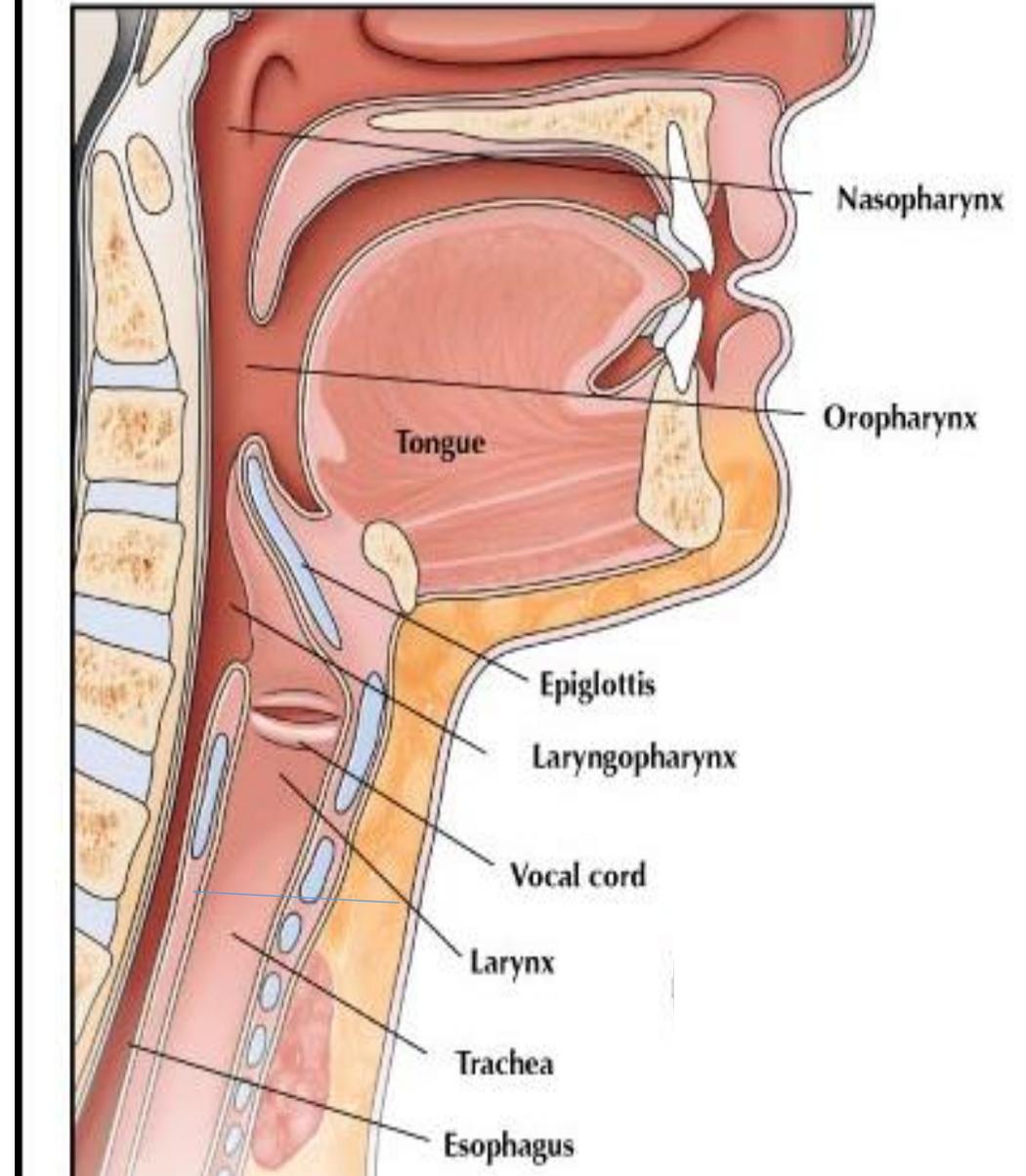
It is a specialized structure responsible for voice production

**It extends from :**

***Above* :** the inlet of the larynx .

***Below* :** Beginning of the trachea at the 6<sup>th</sup> cervical vertebra.

**It lies opposite** the 3<sup>rd</sup> , 4<sup>th</sup> , 5<sup>th</sup> and 6<sup>th</sup> cervical vertebrae



# LARYNX

## Cartilages of the larynx (skeleton of larynx):

### Single cartilages:

Epiglottis

Thyroid

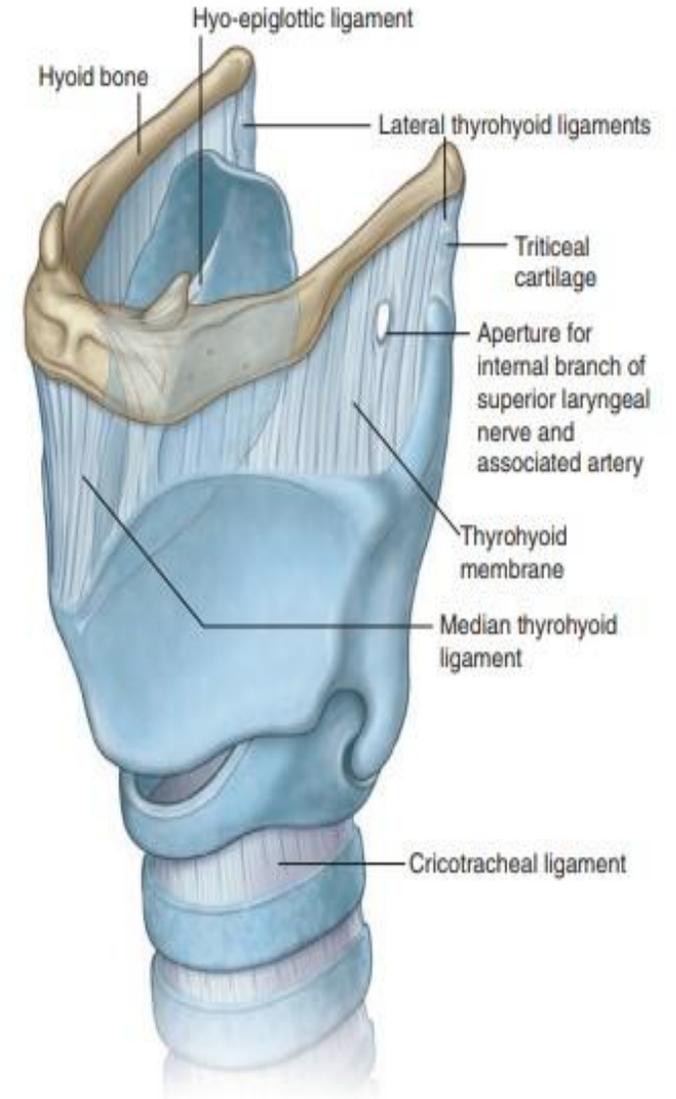
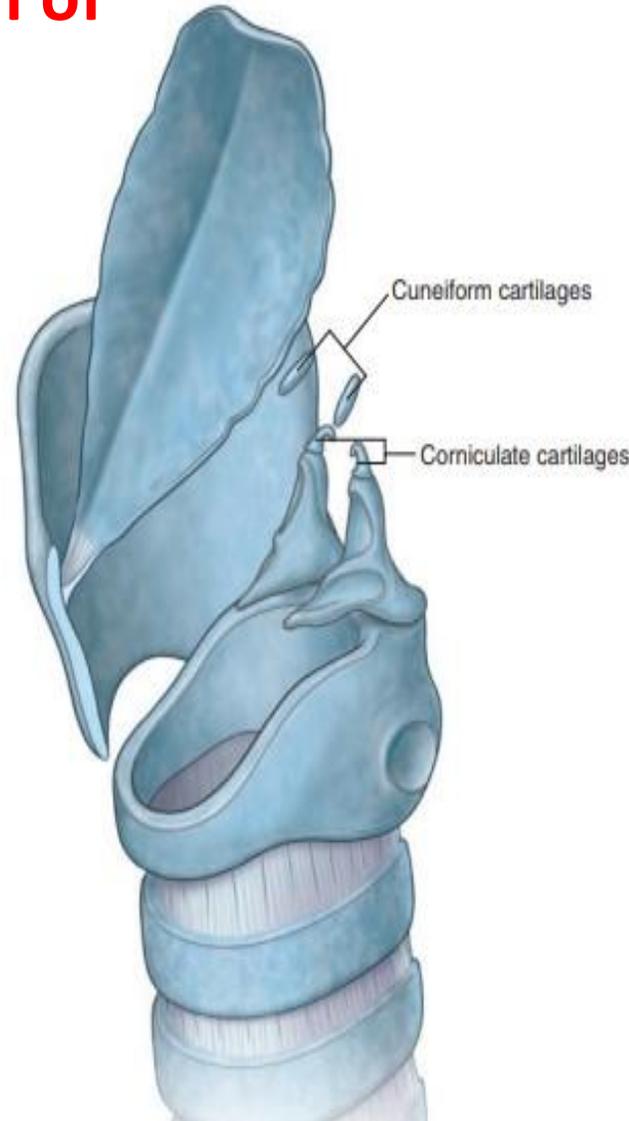
Cricoid

### Paired cartilages :

Arytenoid

Corniculate

Cuneiform



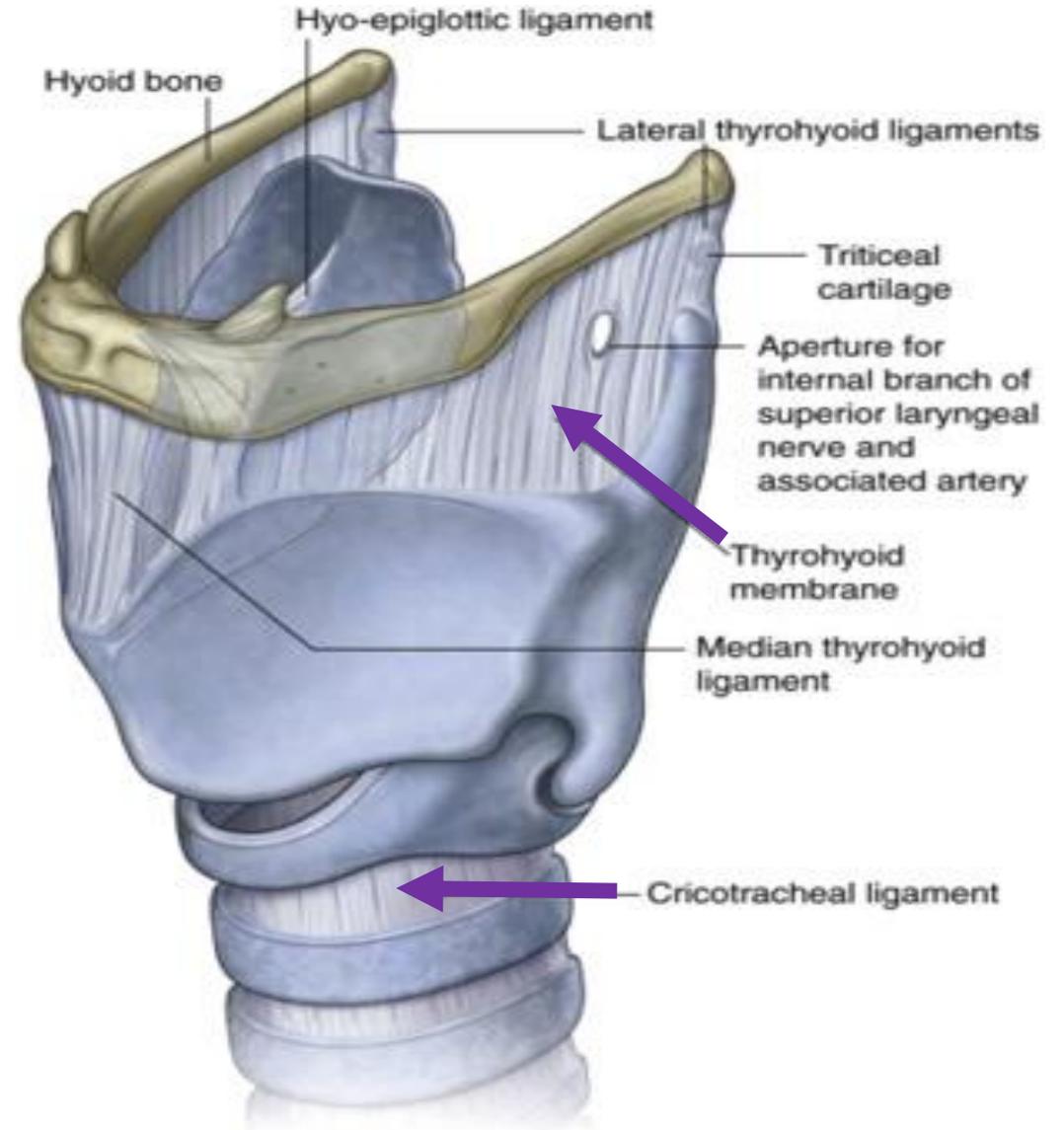
# Ligaments and membranes of larynx

## Thyrohyoid membrane:

- Stretches from upper border of thyroid cartilage to the hyoid bone.
- It is pierced by superior laryngeal vessels and internal laryngeal nerve.
- The posterior borders of the thyrohyoid membrane are thickened to form the lateral thyrohyoid ligaments.
- The membrane is also thickened anteriorly in the midline to form the median thyrohyoid ligament.

## Cricotracheal ligament:

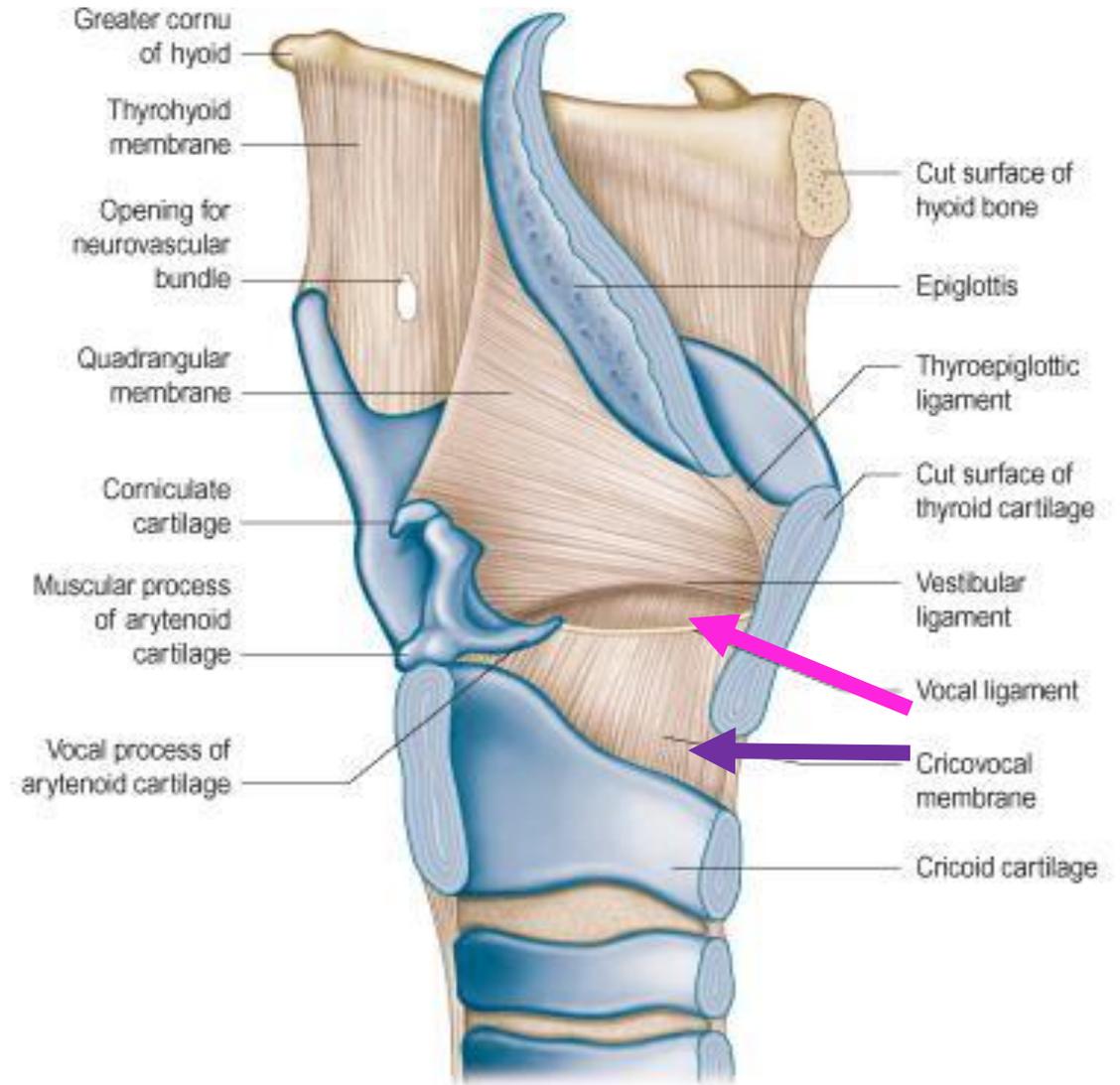
- Connects lower margin of cricoid and 1<sup>st</sup> tracheal ring



# Ligaments and membranes of larynx

## Cricothyroid ligament

- Attached from upper margin of cricoid cartilage below to medial surface of thyroid cartilage above.
- Its free upper margin forms vocal ligament.



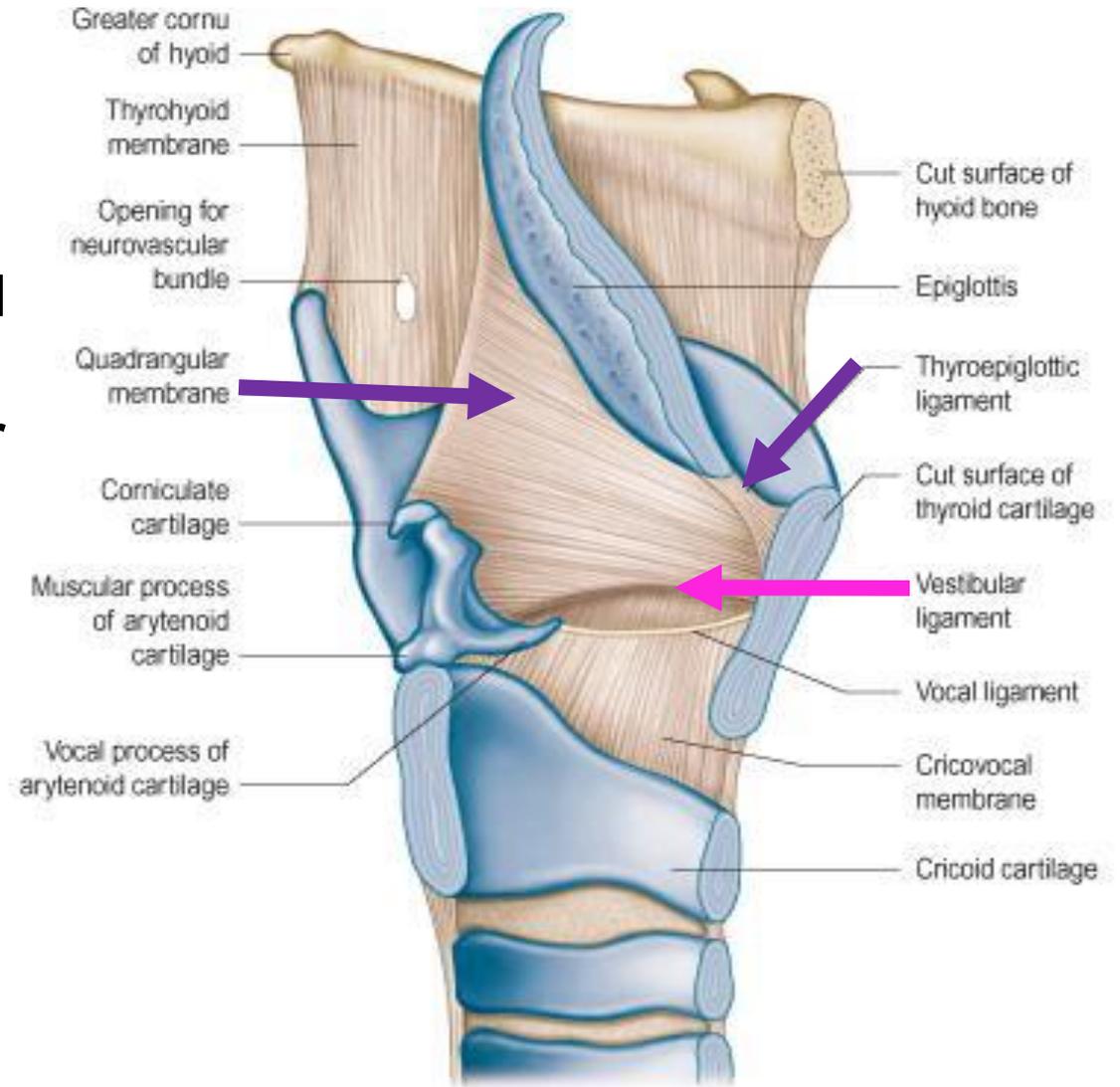
# Ligaments and membranes of larynx

## Quadrangular ligament:

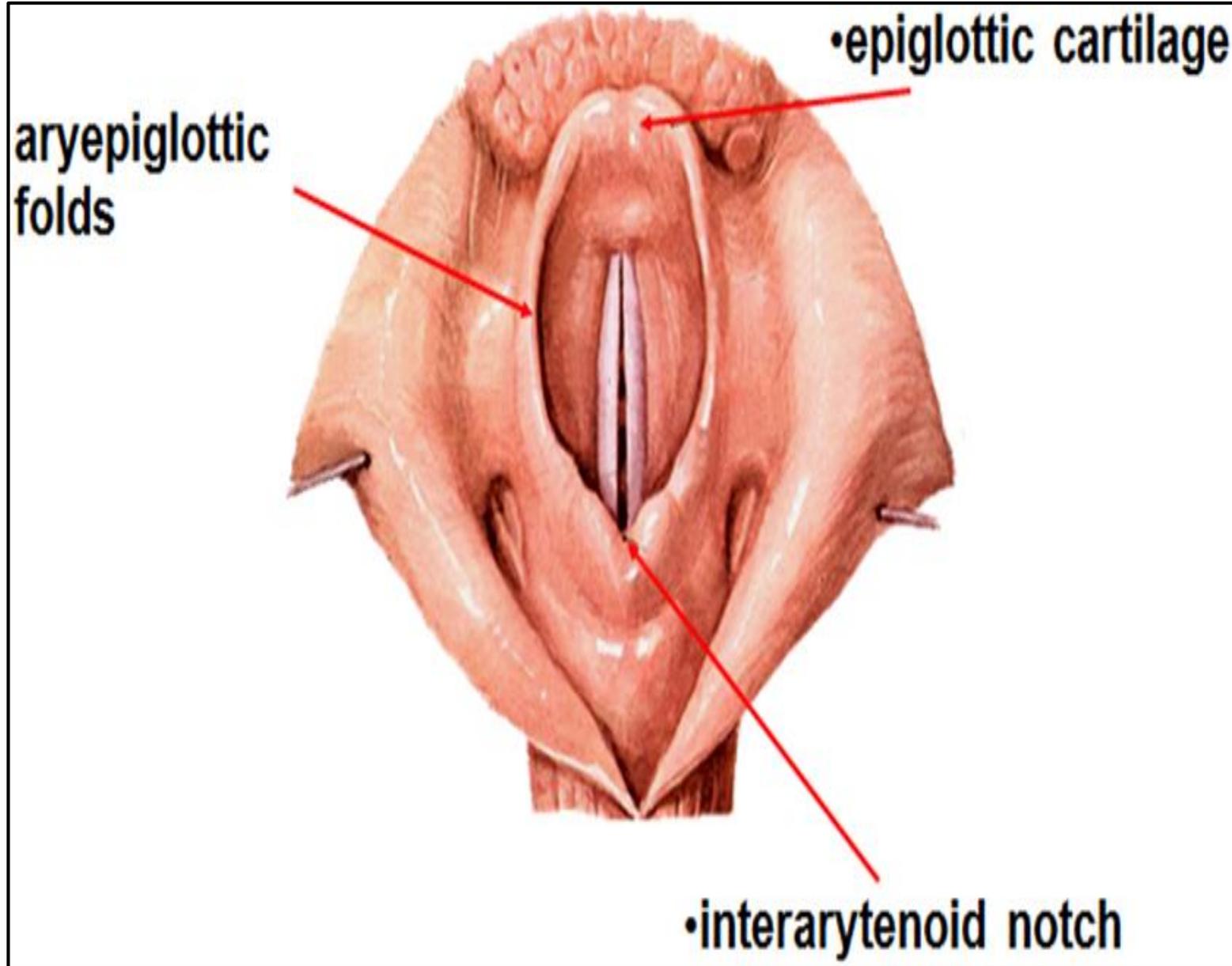
- Extends between epiglottis and arytenoid cartilages.
- Its lower margin forms vestibular ligaments which forms vestibular folds

## Thyroepiglottic ligament:

- Attaches epiglottis to thyroid cartilage



- **Inlet of the larynx**
- looks backward and upward into the laryngopharynx and **bounded by:**
  - **anteriorly** by the upper margin of the epiglottis.
  - **Laterally** by the aryepiglottic fold.
  - **Posteriorly** by the mucous membrane stretched between the 2 arytenoids.

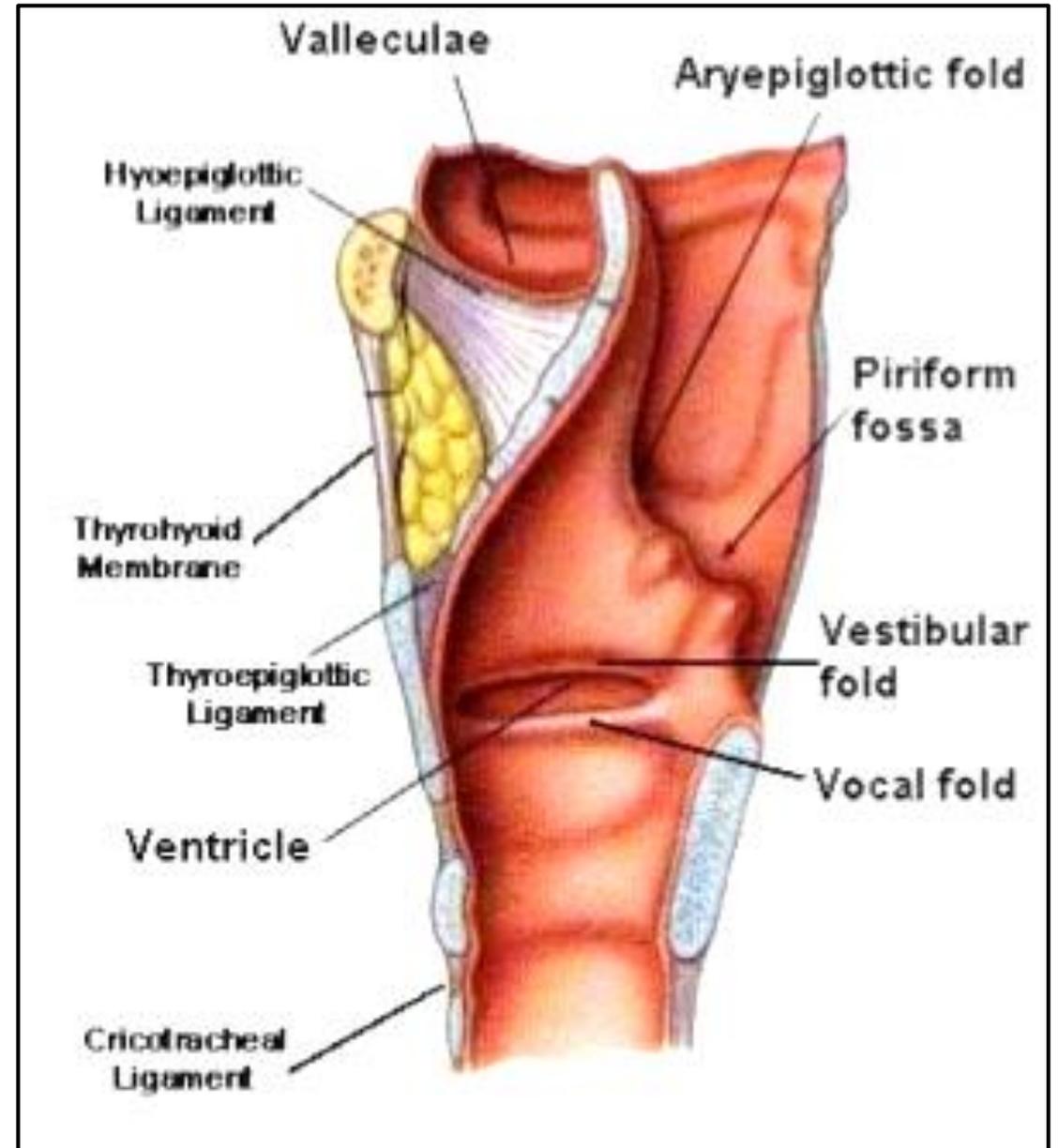


# CAVITY OF THE LARYNX

it is lined with mucous membrane and has 2 pairs of folds projecting from its lateral walls:

**Upper pair of folds are the vestibular folds**

**The lower pair of folds are the vocal folds.**



# CAVITY OF THE LARYNX

**the cavity of the larynx is divided into:**

**vestibule:**

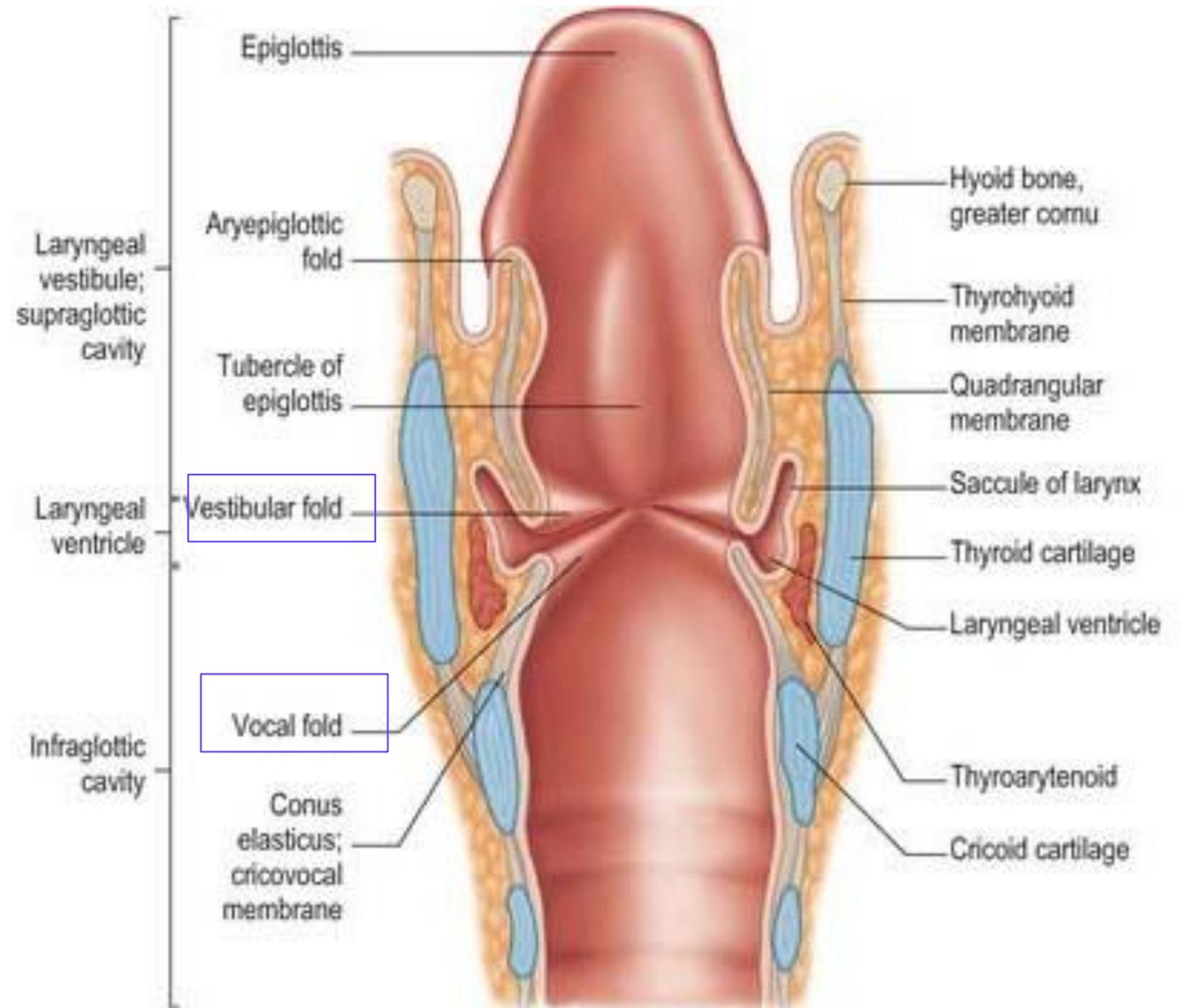
**is the part between the inlet and the vestibular fold**

**sinus of the larynx (ventricle):**

**is a small recess on each side of the larynx situated between the vestibular and vocal folds.**

**Infraglottic region:**

**between vocal folds and lower border of cricoid cartilage.**



# MUSCLES OF LARYNX

Muscle	Origin	Insertion	Innervation	Function
Cricothyroid	Anterolateral aspect of arch of cricoid cartilage	Oblique part—inferior horn of the thyroid cartilage; straight part—inferior margin of thyroid cartilage	External branch of superior laryngeal nerve from the vagus nerve [X]	Forward and downward rotation of the thyroid cartilage at the cricothyroid joint
Posterior crico-arytenoid	Oval depression on posterior surface of lamina of cricoid cartilage	Posterior surface of muscular process of arytenoid cartilage	Recurrent laryngeal branch of the vagus nerve [X]	Abduction and external rotation of the arytenoid cartilage. The posterior crico-arytenoid muscles are the primary abductors of the vocal folds. In other words, they are the primary openers of the rima glottidis.
Lateral crico-arytenoid	Superior surface of arch of cricoid cartilage	Anterior surface of muscular process of arytenoid cartilage	Recurrent laryngeal branch of the vagus nerve [X]	Internal rotation of the arytenoid cartilage and adduction of vocal folds
Transverse arytenoid	Lateral border of posterior surface of arytenoid cartilage	Lateral border of posterior surface of opposite arytenoid cartilage	Recurrent laryngeal branch of the vagus nerve [X]	Adduction of arytenoid cartilages
Oblique arytenoid	Posterior surface of muscular process of arytenoid cartilage	Posterior surface of apex of adjacent arytenoid cartilage; extends into ary-epiglottic fold	Recurrent laryngeal branch of the vagus nerve [X]	Sphincter of the laryngeal inlet
Thyro-arytenoid	Thyroid angle and adjacent cricothyroid ligament	Anterolateral surface of arytenoid cartilage; some fibers continue in ary-epiglottic folds to the lateral margin of the epiglottis	Recurrent laryngeal branch of the vagus nerve [X]	Sphincter of vestibule and of laryngeal inlet
Vocalis	Lateral surface of vocal process of arytenoid cartilage	Vocal ligament and thyroid angle	Recurrent laryngeal branch of the vagus nerve [X]	Adjusts tension in vocal folds

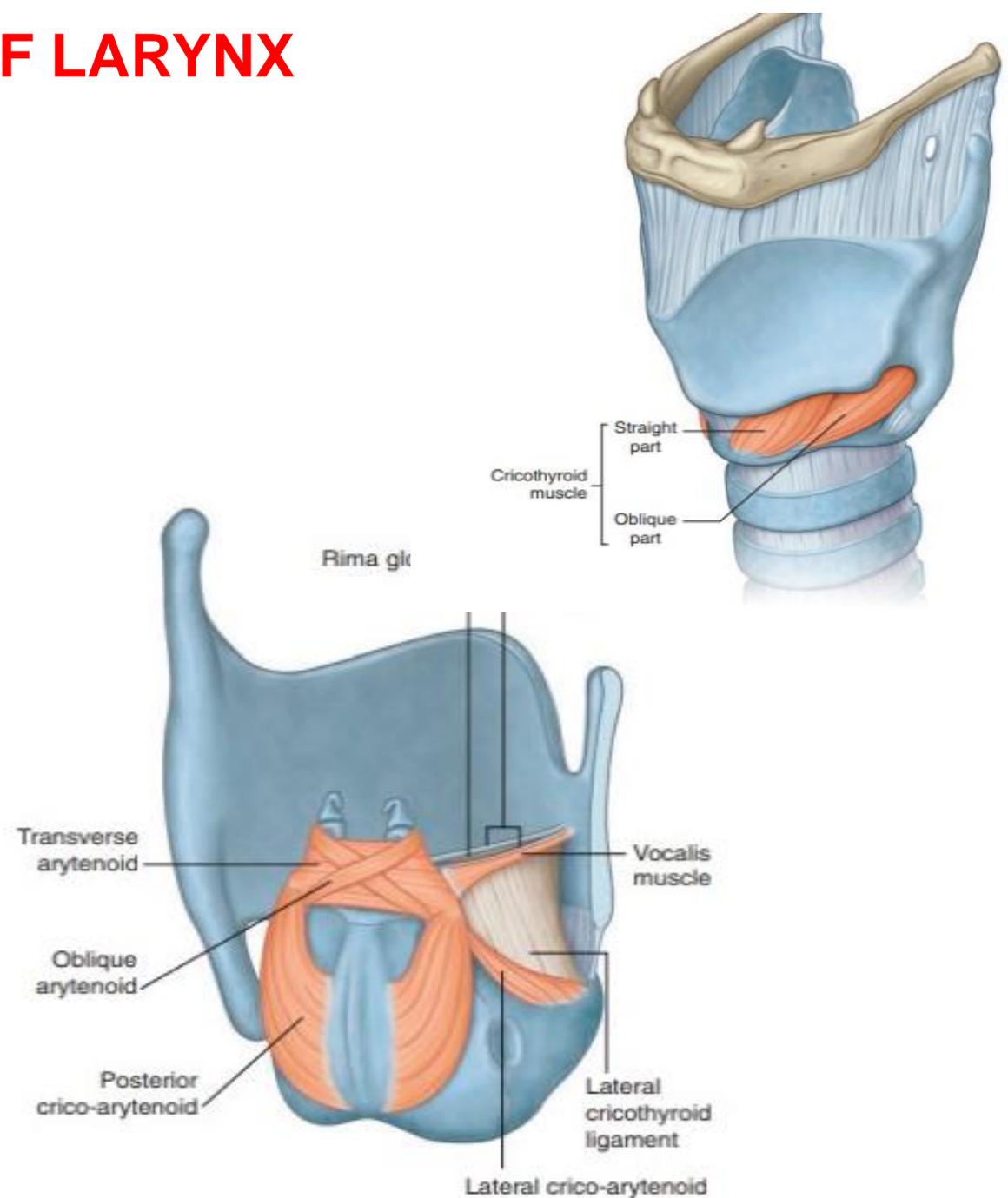
# MUSCLES OF LARYNX

## The intrinsic muscles of the larynx

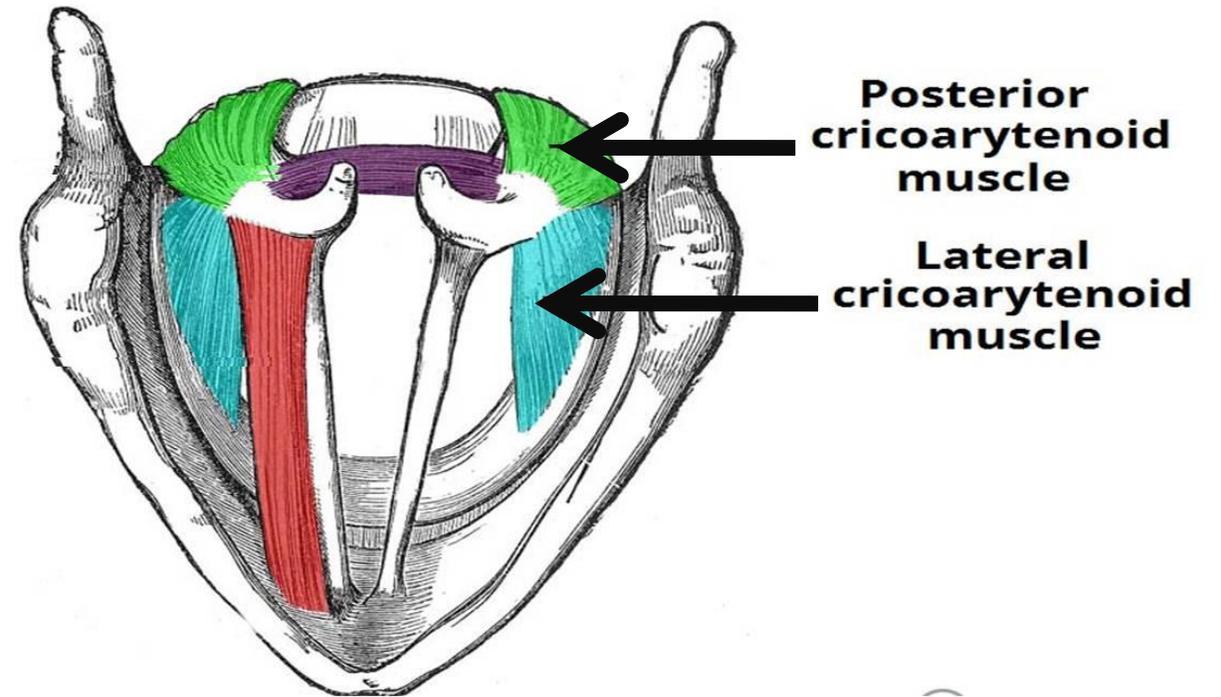
- adjust tension in the vocal ligaments
- control the inner dimensions of the vestibule,
- facilitate closing of the laryngeal inlet.

They do this mainly by:

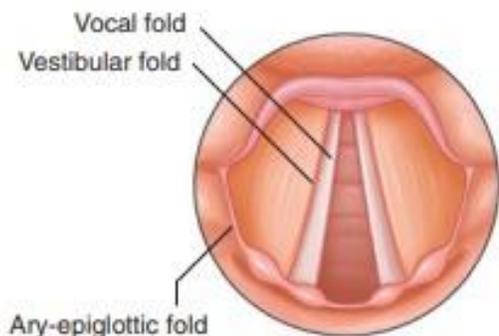
- acting on the cricothyroid and crico-arytenoid joints,
- adjusting the distance between the epiglottis and arytenoid cartilages.
- pulling directly on the vocal ligaments.
- forcing soft tissues associated with the quadrangular membranes and vestibular ligaments toward the midline.



- **Abduction of the vocal cords:** by the posterior cricoarytenoid muscle.
- **Adduction of the vocal cords:** by the lateral cricoarytenoid muscle.



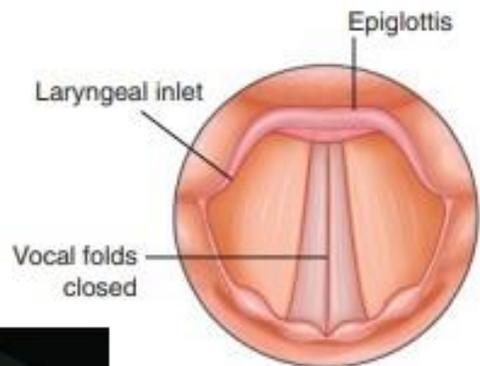
### Quiet respiration



A

### Phonation

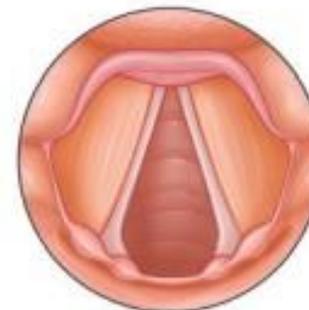
- Vocal folds adducted and stridulating as air is forced between them
- Vestibule open



C

### Forced inspiration

- Vocal folds abducted and rima glottidis wide open
- Vestibule open

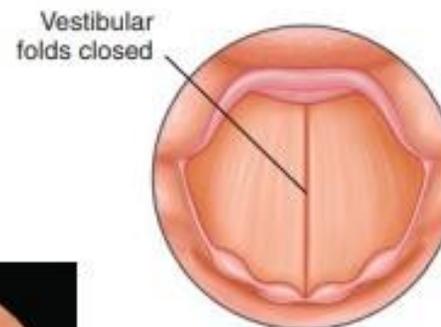


B



### Effort closure

- Vocal folds and vestibular folds adducted
- Rima glottidis and vestibule closed



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# NERVE SUPPLY OF LARYNX

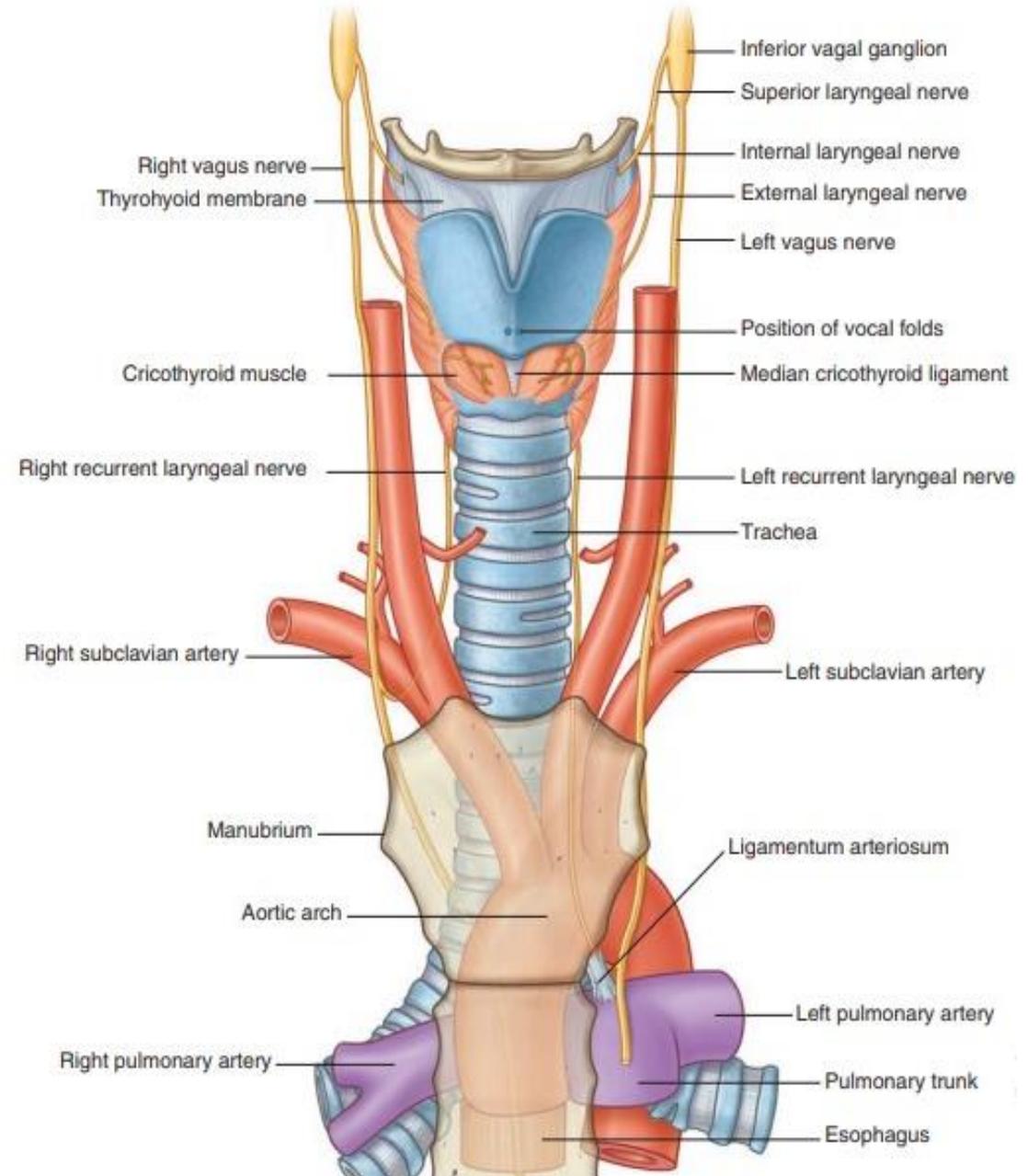
## Motor:

all intrinsic muscles of larynx are supplied by recurrent laryngeal nerve **except cricothyroid muscle** which is supplied by external laryngeal nerve

## Sensory:

**Above level of vocal cords** by internal laryngeal nerve

**Below level of vocal cords** by recurrent laryngeal nerve

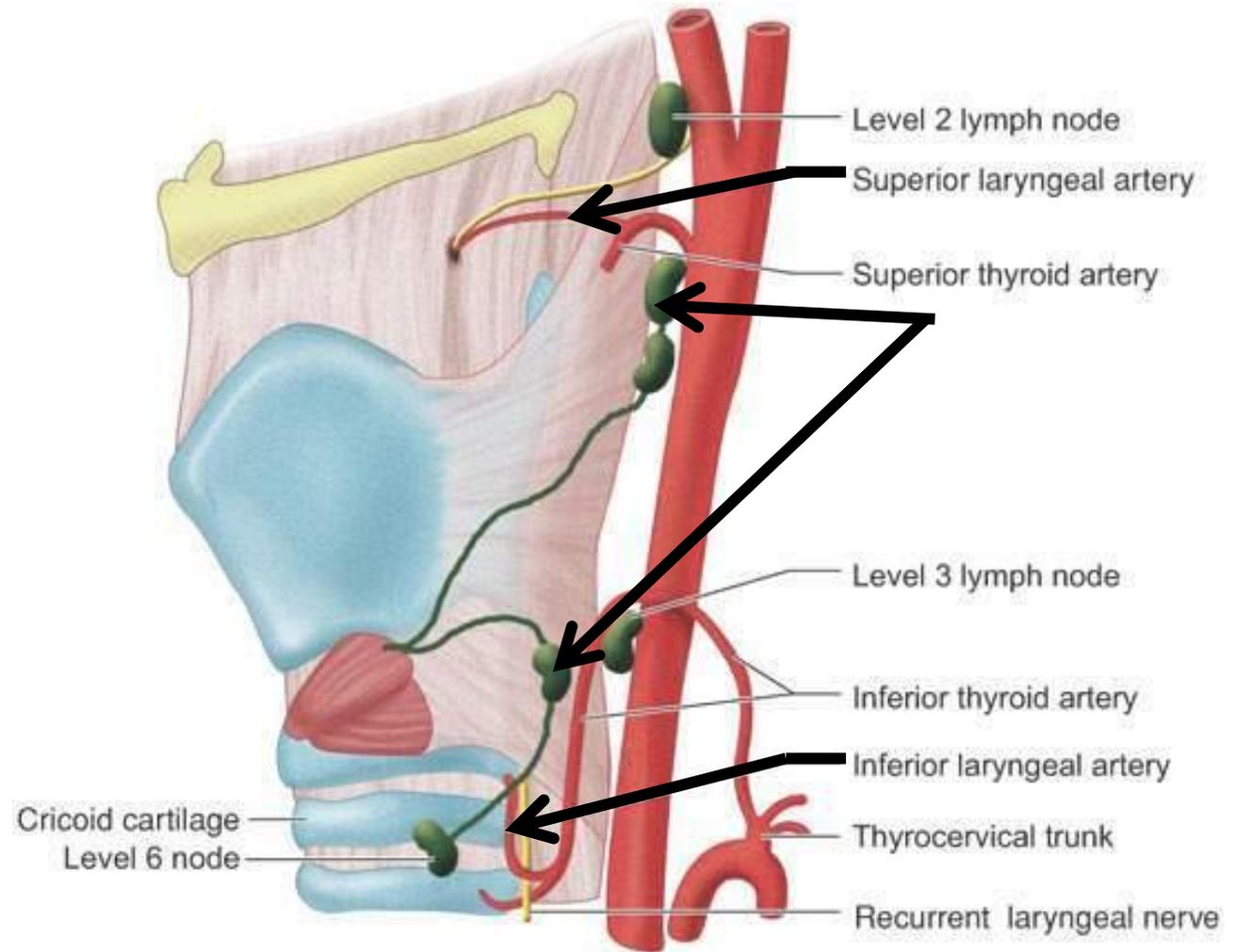


## Arterial Supply

- Above level of vocal cords: Superior laryngeal branch of the superior thyroid artery
- Below level of vocal cords: Inferior laryngeal branch of the inferior thyroid artery

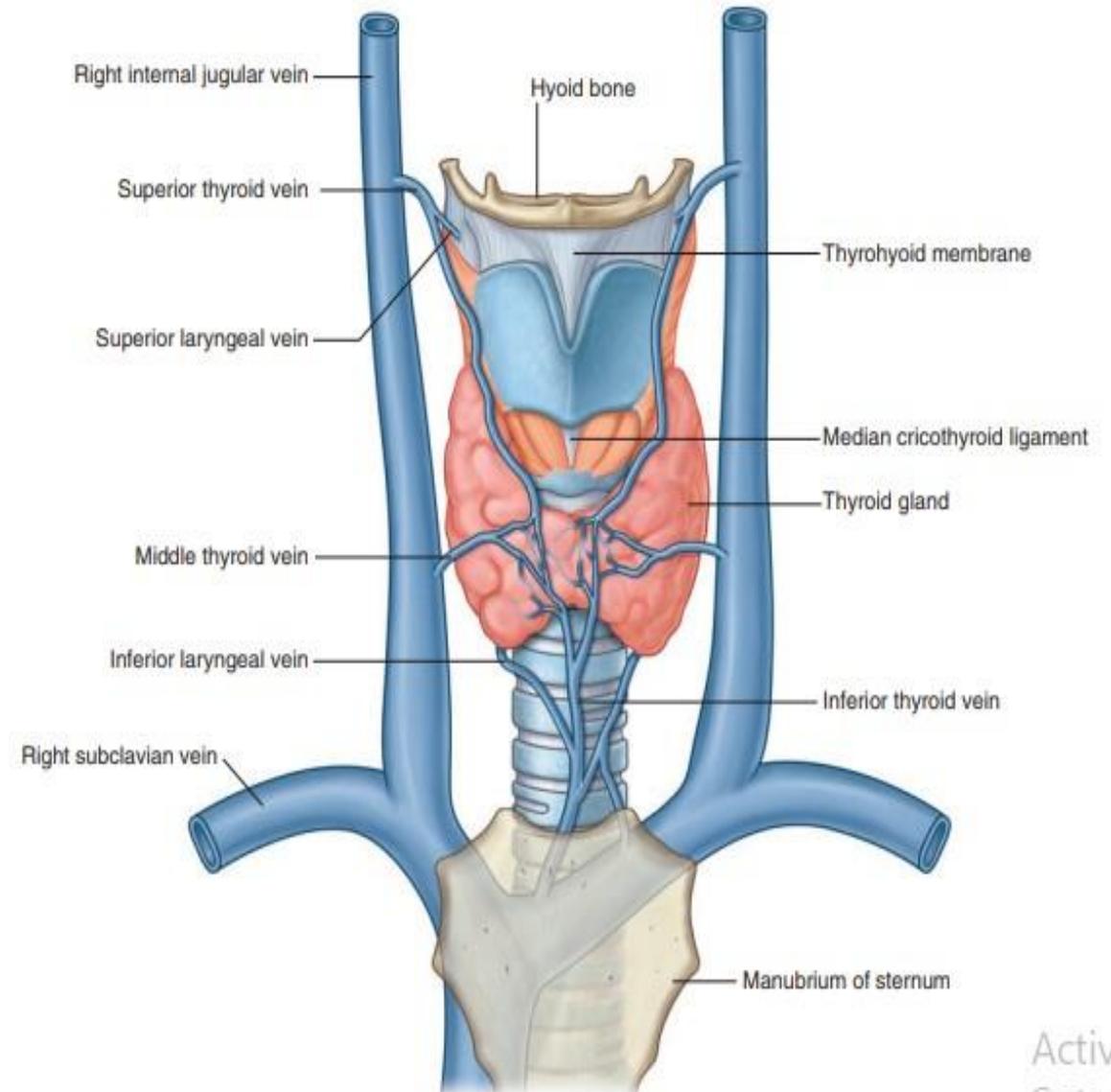
## Lymphatic Drainage

The lymph vessels drain into the deep cervical lymph nodes.



## Veins draining the larynx accompany the arteries:

- Superior laryngeal veins drain into superior thyroid veins, which in turn drain into the internal jugular veins .
- Inferior laryngeal veins drain into inferior thyroid veins, which drain into the left brachiocephalic vein.



## **REFERENCES**

- **Snell`s clinical anatomy by regions ,Tenth Edition**
- **Gray`s Anatomy for students, Third Edition**
- **Grant`s Atlas of Anatomy**

Thank  
you

