

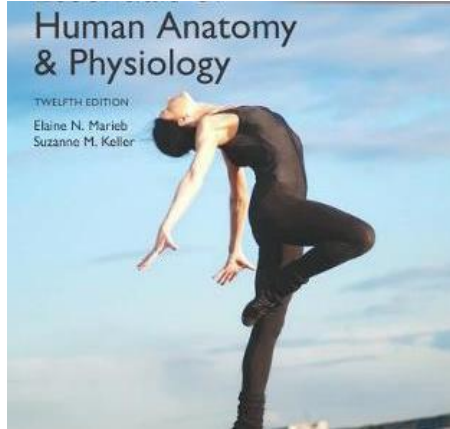


Nasal Cavity & Paranasal Sinuses

Khaleel Alyahya, PhD, MEd

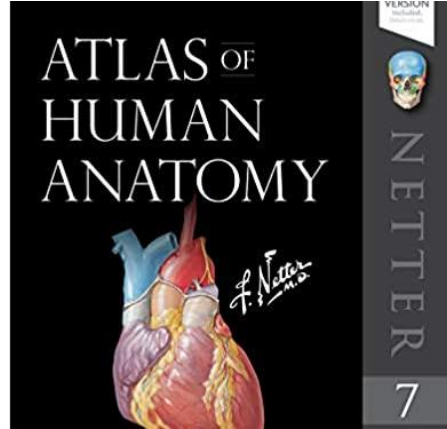
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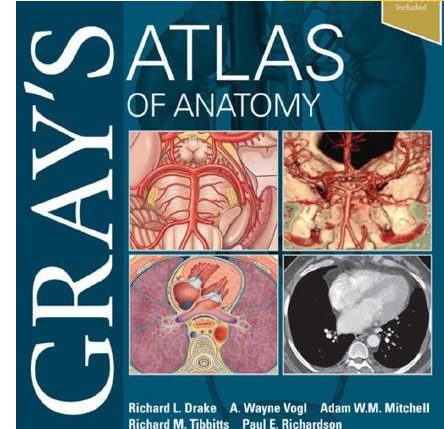
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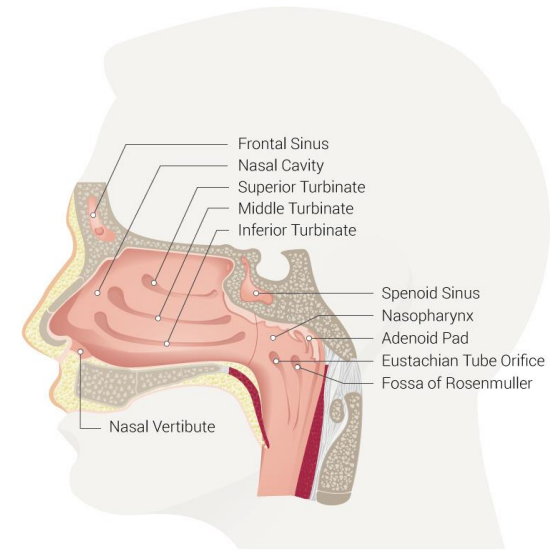


NASAL CAVITY



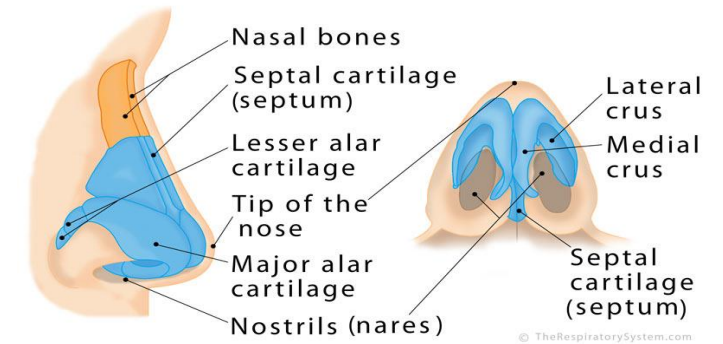
Introduction

- The nose and nasal cavity are responsible for the process of olfaction or the sense of smell.
- It also filters the air that is inhaled through it, removing dust, pathogens and irritants by trapping them in the cilia or soft hairs on the inside of the nostrils.
- It helps to warm and moisten the air to prevent the remainder of the respiratory tract from drying out.
- Sneezing is usually caused by foreign particles irritating the nasal mucosa.



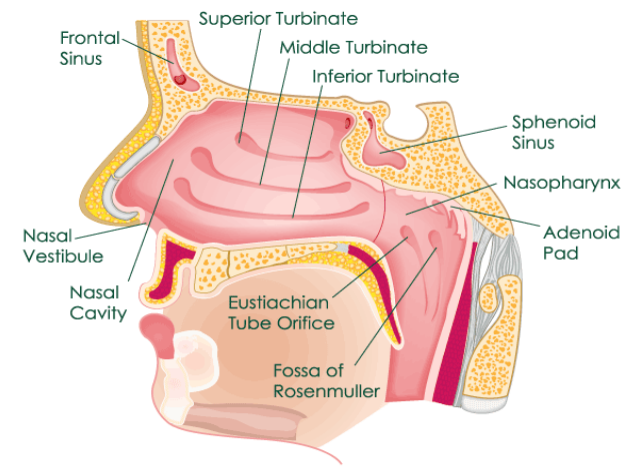
Structure

- The external (anterior) nares or nostrils, lead to the nasal cavity.
- Formed above by bony skeleton.
- Formed below by plates of hyaline cartilage.
- Smell is considered chemical senses (Chemoreceptors).
 - Stimulated by chemicals in solution.
 - Smell can differentiate a wider range of chemicals.
 - Taste has five types of receptors.
- Both senses complement each other and respond to many of the same stimuli.



Nasal Cavity

- It is a large air-filled space above and behind the nose in the middle of the face.
- Each cavity is the continuation of one of the two nostrils.
- It extends from nostrils anteriorly to turbinates (Choanae) posteriorly.
- It is divided into right and left parts by the nasal septum.
- It communicates with the nasopharynx posteriorly.
- It consists of Vestibule, Respiratory and Olfactory regions.
- Each contains, roof, floor, lateral and medial walls.



Regions

▪ Vestibule Region

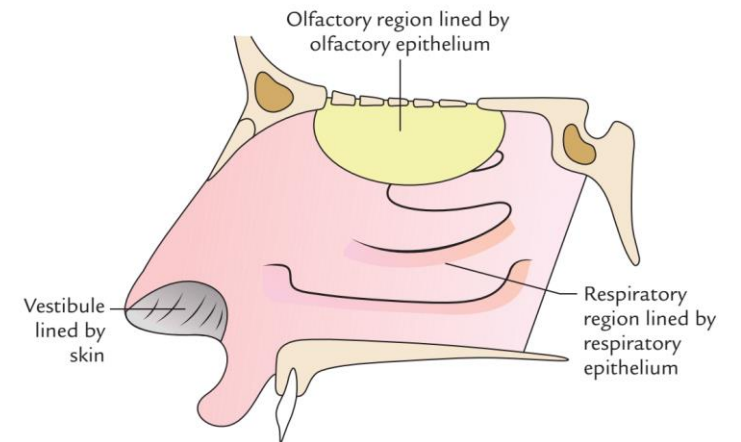
- The area surrounding the external opening to the nasal cavity
- Lined by modified skin, provided with hairs, and sebaceous glands, to filter the incoming air.

▪ Respiratory Region

- The largest and lined with mucous that is continuous with that of Nasal Sinuses, Lacrimal sac, Conjunctiva, and Nasopharynx.

▪ Olfactory Region

- Located at the apex of the nasal cavity.
- It is lined by olfactory cells with olfactory receptors.



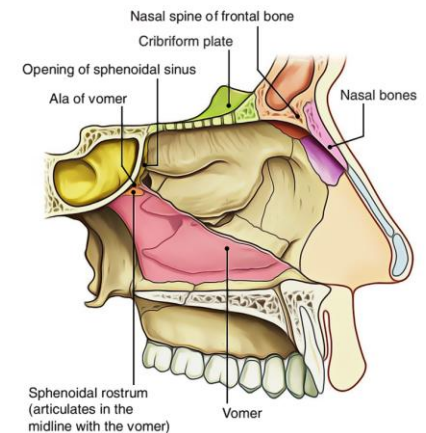
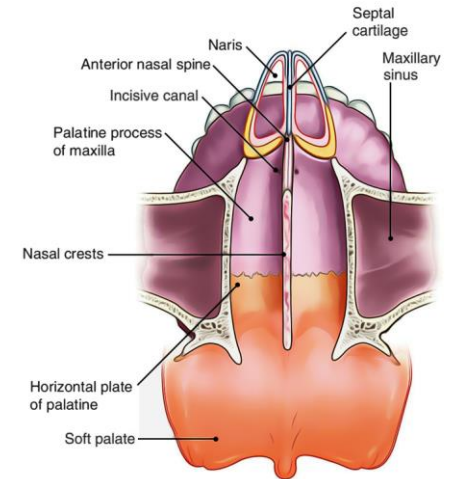
Boundaries

■ Floor

- It is formed by nasal surface of the hard palate:
 - Palatine process of maxilla.
 - Horizontal plate of palatine bone.

■ Roof

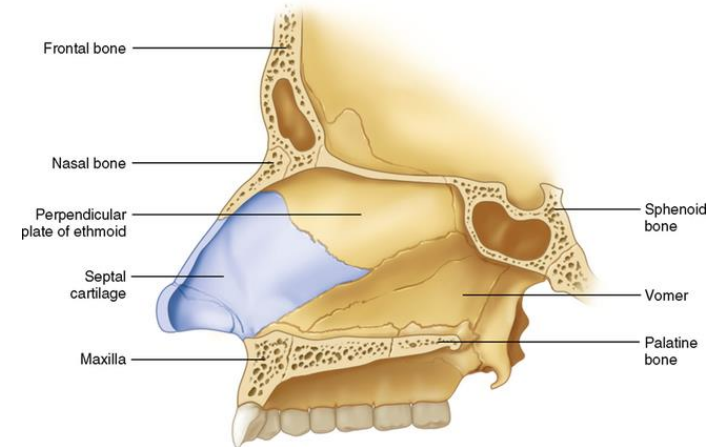
- It is formed by:
 - Body of sphenoid.
 - Cribriform plate of ethmoid.
 - Frontal bone.
 - Nasal bones.



Boundaries

▪ Medial Wall

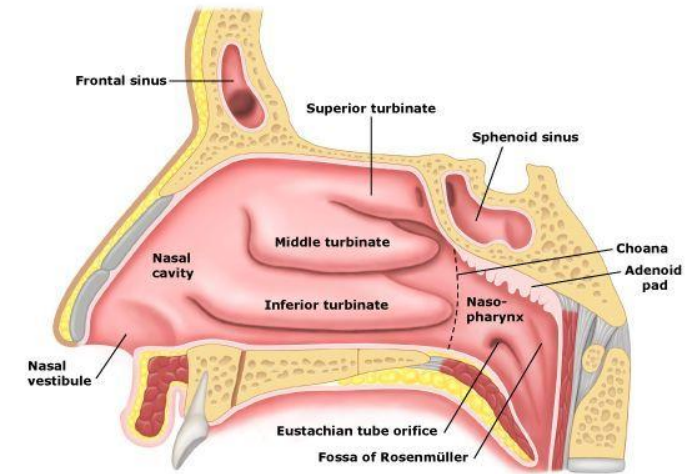
- It is formed by:
 - The nasal septum.
 - Vertical plate of ethmoid.
 - Vomer.
 - Septal cartilage.



Boundaries

▪ Lateral Wall

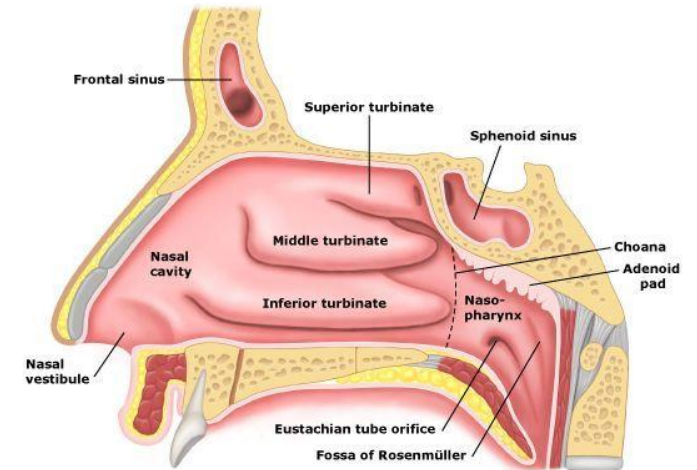
- It is marked by three projections; (nasal conchae)
 - Superior, middle, and inferior nasal conchae
- The space below each concha is called (meatus);
 - Superior, middle, and inferior meatuses.
- Sinuses opening in this wall:
 - Sphenoethmoidal recess opening of *sphenoid air sinus*
 - Superior meatus receives openings of *posterior ethmoidal sinuses*.
 - Middle meatus for opening of *middle ethmoidal sinus*.
 - Hiatus semilunaris for openings of *maxillary sinus*.
 - Infundibulum for frontal and *anterior ethmoidal sinus*.
 - Inferior meatus receives opening of *nasolacrimal duct*.



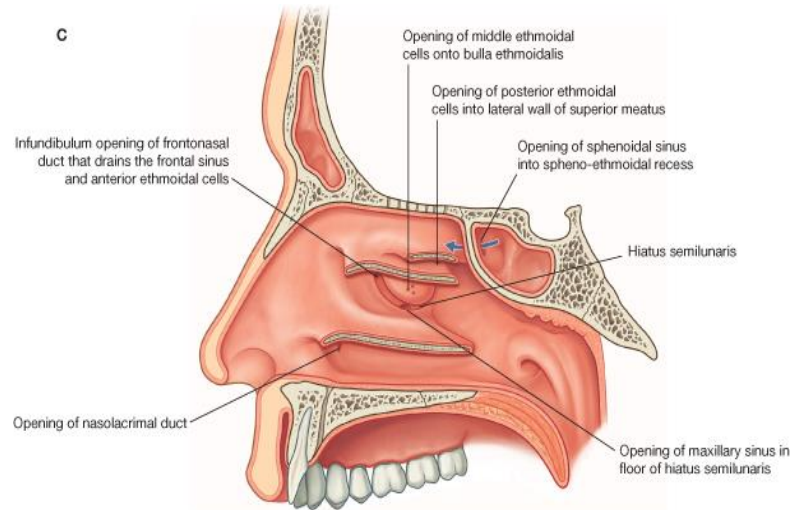
Boundaries

▪ Lateral Wall

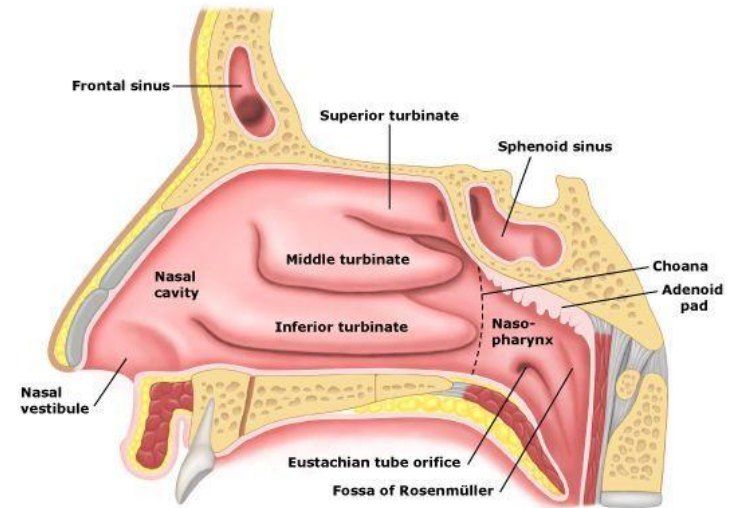
- All sinuses open into the middle meatus except:
 - Sphenoidal sinus: in Sphenoethmoidal recess.
 - Posterior ethmoidal sinus: in superior meatus.
- The mucosal lining of these sinuses is continuous with that in the nose and the throat, so infection in this area tends to migrate into the sinuses causing sinusitis.



Openings @ Nasal Cavity

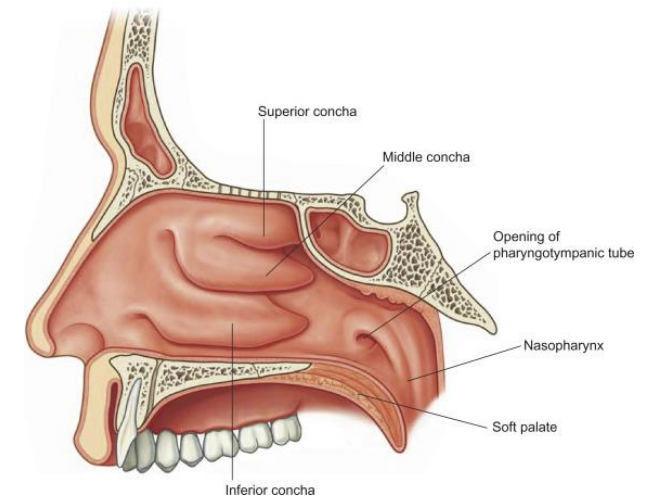


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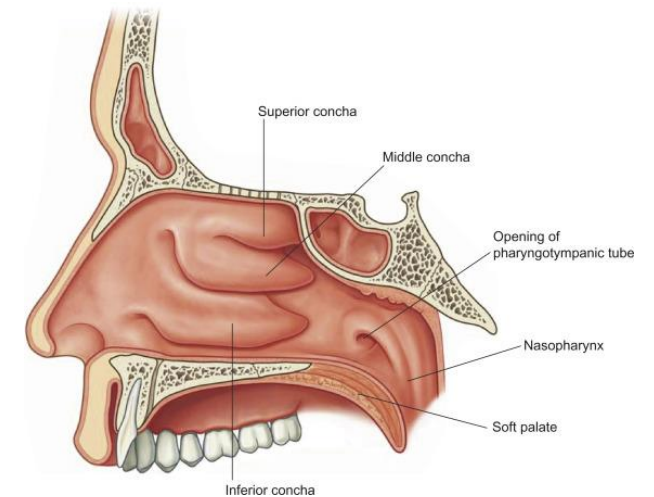
Structure of Nasal Conchae

- Projecting out of the lateral walls of the nasal cavity are curved shelves of bone.
- They project into the nasal cavity, creating four pathways for the air to flow. These pathways are called meatuses:
 - **Inferior meatus:** Lies between the inferior concha and floor of the nasal cavity.
 - **Middle meatus:** Lies between the inferior and middle concha.
 - **Superior meatus:** Lies between the middle and superior concha.
 - **Spheno-ethmoidal recess:** Lies superiorly and posteriorly to the superior concha.



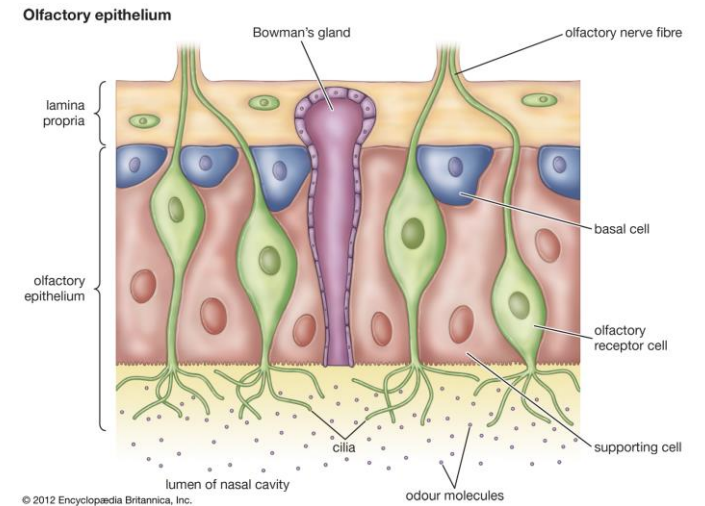
Functions of Nasal Conchae

- To **increase** the surface area of the nasal cavity to increase the amount of inspired air that can come into contact with the cavity walls.
- To **disrupt** the fast, laminar flow of the air, making it slow and turbulent.
- To **humidify** the air since it spends longer in the nasal cavity.



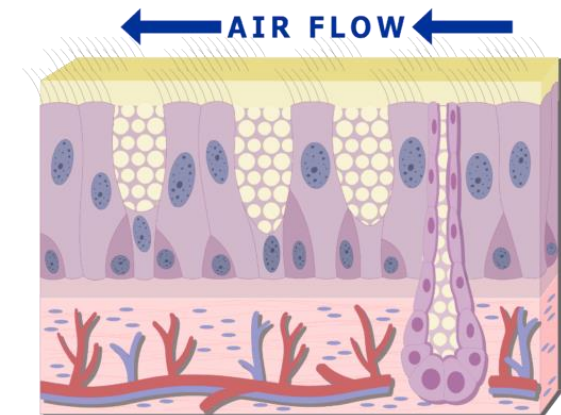
Olfactory Mucosa

- It is delicate and contains olfactory nerve cells.
- It is present in the upper part of nasal cavity.
- On the lateral wall, it lines the upper surface of the superior concha and the Sphenoethmoidal recess.
- On the medial wall, it lines the superior part of the nasal septum.



Respiratory Mucosa

- It is thick, ciliated, highly vascular and contains mucous glands & goblet cells.
- It lines the lower part of the nasal cavity (from skin of vestibule to the superior concha).
- 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.



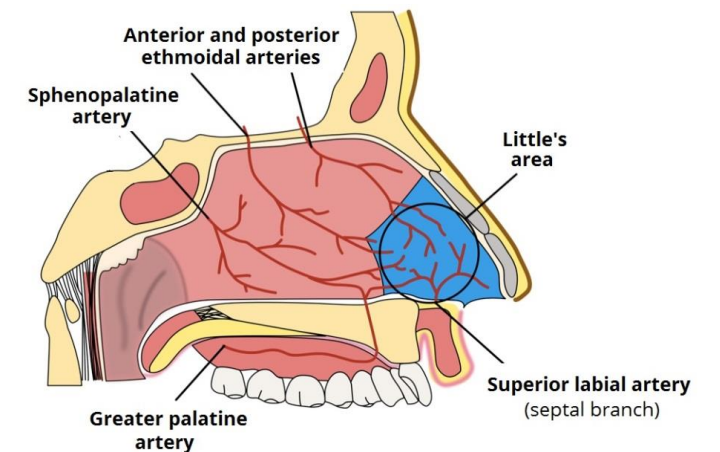
Arterial Blood Supply

Internal carotid branches:

- Anterior ethmoidal artery
- Posterior ethmoidal artery
- The ethmoidal arteries are branch of the ophthalmic artery.
- The ophthalmic artery is a branch of internal carotid artery.

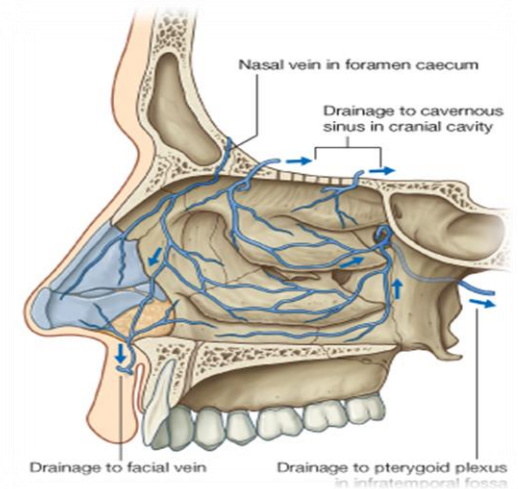
External carotid branches:

- Sphenopalatine artery
- Greater palatine artery
- Superior labial artery
- Lateral nasal arteries



Venous Blood Drainage

- Plexus in submucosa by veins accompany the arteries.
- They drain into cavernous sinus & pterygoid venous plexus.



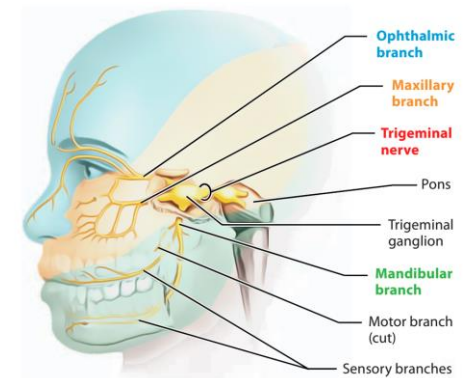
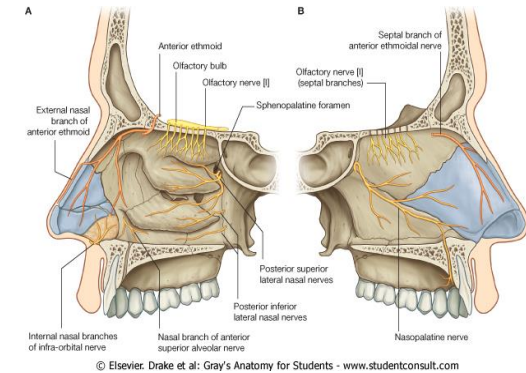
Innervation

■ Sensory

- Olfactory Nerves (Cr 1).

■ Nerves of general sensation:

- Ophthalmic and Maxillary divisions of Trigeminal nerve (Cr 5).
 - Anterior part is supplied by anterior ethmoidal nerve.
 - Posterior part is supplied by branches of the pterygopalatine ganglion:
 - Nasopalatine
 - Nasal
 - Palatine



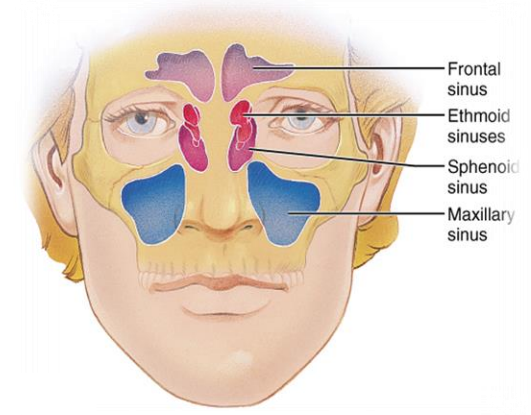


PARANASAL SINUSES



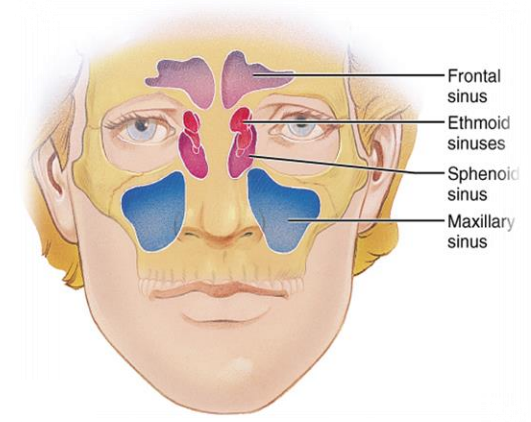
Classification

- They are a group of four paired air-filled spaces that surround the nasal cavity.
 - **Maxillary Sinuses:** the largest of the paranasal sinuses, located under the eyes in the maxillary bones.
 - **Frontal Sinuses:** superior to the eyes in the frontal bone, which forms the hard part of the forehead.
 - **Ethmoidal Sinuses:** formed from several discrete air cells within the ethmoid bone between the nose and the eyes.
 - **Sphenoidal Sinuses:** in the sphenoid bone.



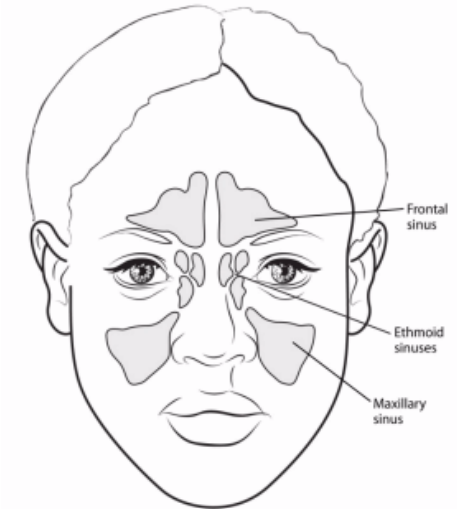
Characteristics

- Lined with mucoperiosteum.
- Filled with air.
- Communicate with the nasal cavity.
- Open in the lateral wall of the nasal cavity



Functions

- **Decreasing** the relative weight of the front of the skull, and especially the bones of the face.
- **Increasing** resonance of the voice.
- **Providing** a buffer against facial trauma.
- **Insulating** sensitive structures like dental roots and eyes from rapid temperature fluctuations in the nasal cavity.
- **Humidifying** and heating of inhaled air because of slow air turnover in this region.





CLINICAL NOTES



Nose Bleeding

- It is common case due to rich blood supply of the nose.
- Most likely occur in anterior third of nasal cavity.
- Cause could be local due to trauma or systemic due to hypertension.



Inflammation

- The paranasal sinuses are joined to the nasal cavity via small orifices called ostia.
- These become blocked easily by allergic inflammation, or by swelling in the nasal lining that occurs with a cold.
- If this happens, normal drainage of mucus within the sinuses is disrupted, and sinusitis may occur.
- Because the maxillary posterior teeth are close to the maxillary sinus, this can also cause clinical problems if any disease processes are present, such as an infection in any of these teeth.



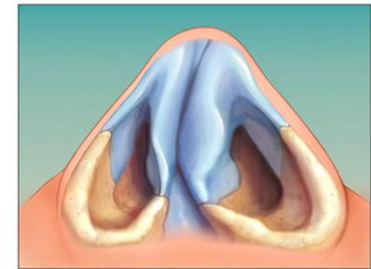
Cancer

- Malignancies of the paranasal sinuses comprise approximately 0.2% of all malignancies.
- About 80% of these malignancies arise in the maxillary sinus.
- They most often occur in the age group between 40 and 70 years.
- Carcinomas are more frequent than sarcomas.
- Tumours of the sphenoid and frontal sinuses are extremely rare.

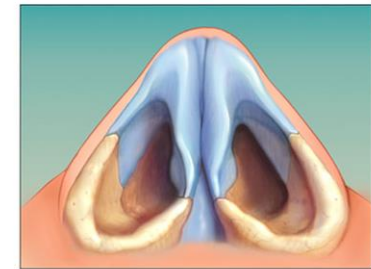


Deviated Septum

- Occurs when the thin wall (nasal septum) between the nasal passages is displaced to one side.
- In many people, the nasal septum is displaced or deviated making one nasal passage smaller.
- When a deviated septum is severe, it can block one side of the nose and reduce airflow, causing difficulty breathing.
- Nasal obstruction can occur from a deviated nasal septum, from swelling of the tissues lining the nose, or from both.
- Treatment of nasal obstruction may include medications to reduce the swelling or nasal dilators that help open the nasal passages.
- To correct a deviated septum, surgery is necessary.



Deviated nasal septum



Straightened nasal septum



QUESTIONS?

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