

Human Anatomy

Lec.3

Nasal Region

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The Nose

The nose consists of external nose and the nasal cavity which are divided by a septum.

External Nose

Surface Appearance

The external nose is a pyramidal shape. The **nasal root** is located superiorly, and is continuous with the forehead.

The **apex** of the nose ends inferiorly in a rounded ‘tip’.

Spanning between the root and apex is the **dorsum of the nose** which is located immediately inferiorly to the apex are the nares; piriform openings into the vestibule of the nasal cavity.

The external nose has two elliptical orifices called the **nostrils**, which are separated from each other by the **nasal septum** (Fig. 1). The lateral margin, the **ala nasi**, is rounded and mobile. The framework of the external nose is made up above by the nasal bones, the frontal processes of the maxillae, and the nasal part of the frontal bone. Below, the framework is formed of plates of hyaline cartilage (Fig. 1).

❖ Anatomical Structure

The skeleton of the nose is formed by three types of tissue; bone, cartilage and fibro-fatty tissue. The structures are divided into two parts:

External nasal skeleton

Internal nasal septum

The external skeleton extends the nasal cavities onto the front of the face.

It is partly formed by the nasal and maxillary bones, which are situated superiorly.

The inferior portion of the nose is made up of hyaline cartilages; lateral, major alar, minor alar, and the cartilaginous septum.

The minor alar cartilages vary in number, there are usually 3 or 4 on each side (Fig.1).

The internal nasal septum separates the nasal cavity into two nostrils. The bones that contribute to the nasal septum can be divided into:

- **Paired bones:** Nasal, maxillary and palatine bones
- **Unpaired bones:** Ethmoid and vomer bones.

In addition to the bones of the nose, the septal and greater alar cartilages also constitute part of the nasal septum.

The **ethmoid** contributes to the central portion of nasal septum. It is one of the most **complex bones** in the human body.

- **The anterior and posterior parts** are formed by the septal cartilage and vomer bone respectively.

The **floor of the nasal cavity** is formed by the hard palate, separating it from the **oral cavity**. The hard palate consists of the palatine bone posteriorly, and the palatine process of the maxilla anteriorly. The cribriform plate of the **ethmoid bone** forms the roof of the nasal cavity Fig. (2).

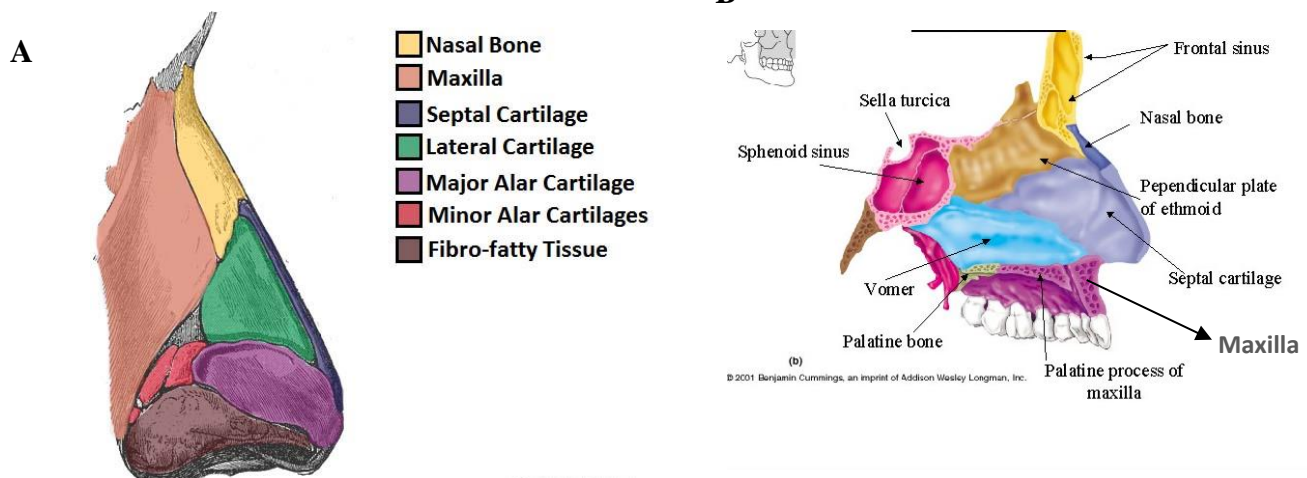


Figure 1: External Nose and nasal septum (A)Lateral view of the external nasal skeleton. (B) Lateral view of the internal nasal skeleton.

❖ Nerve and blood Supply of the External Nose

The external nose is supplied by the **infratrochlear** and **external nasal** branches of the **ophthalmic nerve (CN V)**, and the **infraorbital** branch of the **maxillary nerve (CN V)**.

Blood Supply and Venous Drainage of the External Nose

The skin of the external nose is supplied by branches of the **ophthalmic and the maxillary arteries**. The skin of the ala and the lower part of the septum are supplied by branches from the **facial artery**. Venous blood from the external nose drains mostly into the **facial vein** via the **angular and lateral nasal veins**.

❖ The Nasal Cavity

is the most superior part of the **respiratory tract**. It extends from the vestibule of the nose (**nostrils**) to the **posterior nasal apertures or choanae behind**, where the nose opens into the nasopharynx nasopharynx, and has three divisions:

- **Vestibule** – the area surrounding the anterior external opening to the nasal cavity.
- **Respiratory region** – lined by a ciliated pseudostratified epithelium, interspersed with mucus-secreting goblet cells.
- **Olfactory region** – located at the apex of the nasal cavity. It is lined by olfactory cells with olfactory receptors.
- The nasal cavity is divided into right and left halves by the nasal septum (Fig.2).

❖ Nasal Conchae

- Projecting out of the lateral walls of the nasal cavity are curved shelves of bone. They are called **conchae** (or turbinates).
- **There are three conchae – inferior, middle and superior**. They **project** into the nasal cavity, creating four pathways for the air to flow. These pathways are called meatuses:
- **Inferior meatus** – between the inferior concha and floor of the nasal cavity.

- **Middle meatus** – between the inferior and middle concha.
- **Superior meatus** – between the middle and superior concha.
- **Spheno-ethmoidal recess** – superiorly and posteriorly to the superior concha

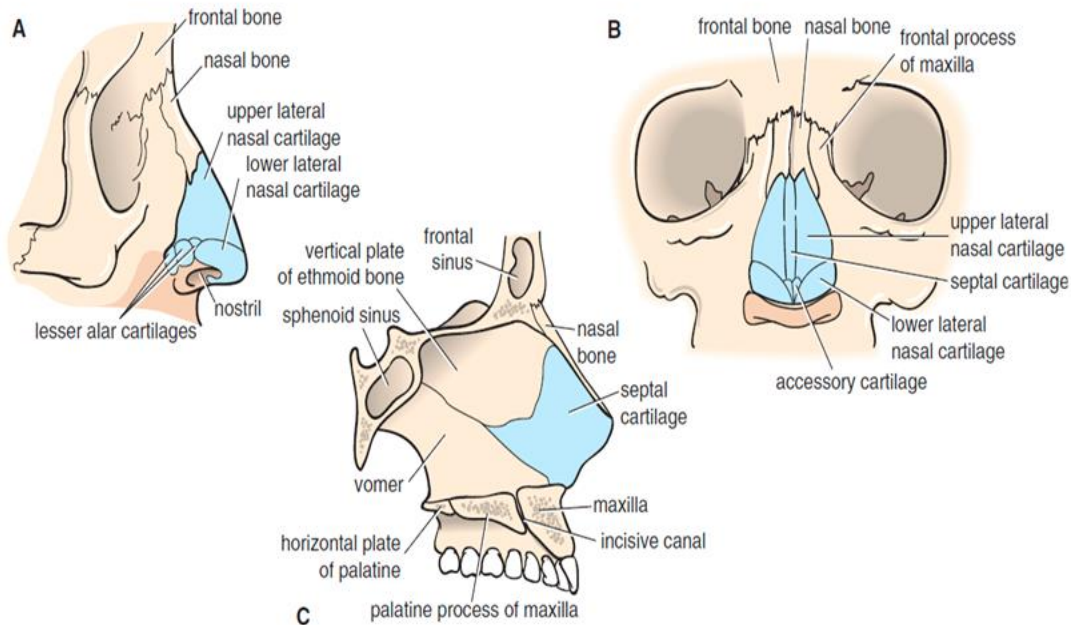


Figure 2: External nose and nasal septum. A. Lateral view of bony and cartilaginous skeleton of external nose. B. Anterior view of bony and cartilaginous skeleton of external nose. C. Bony and cartilaginous skeleton of nasal septum.

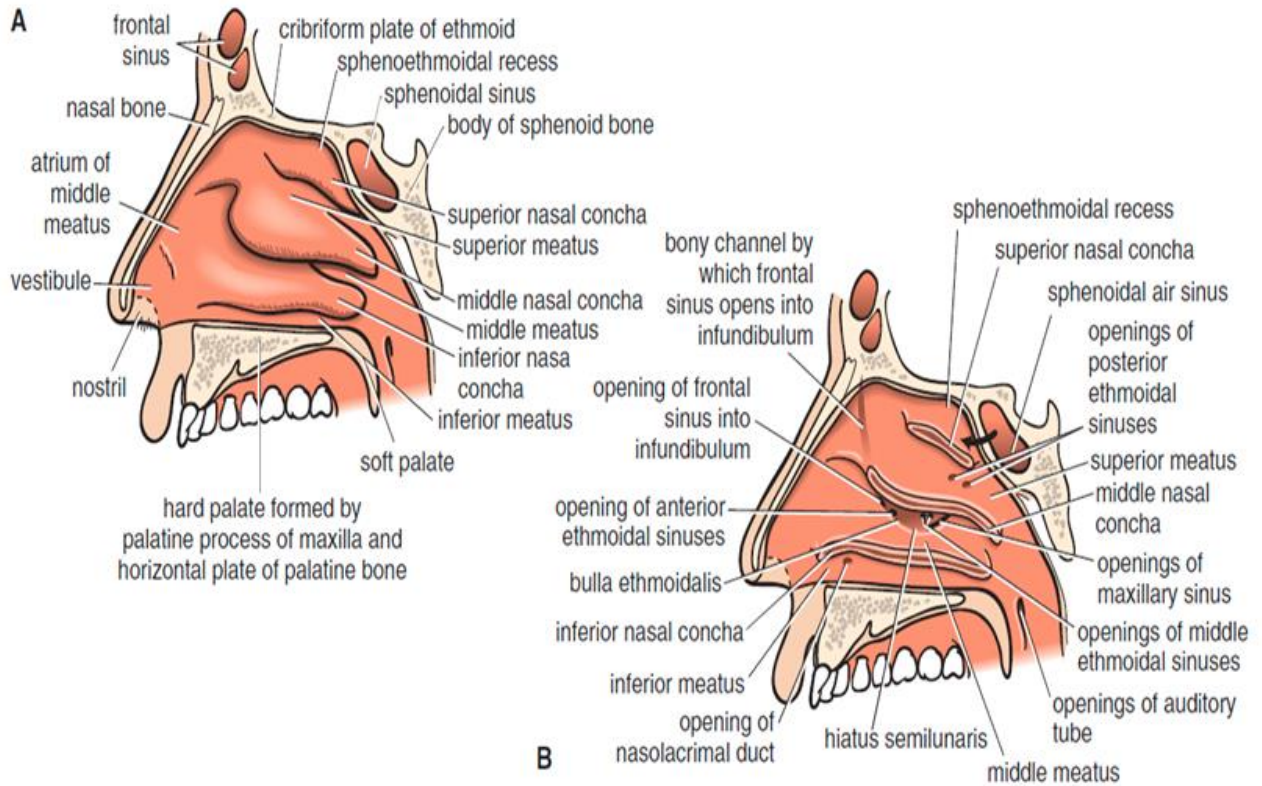


Figure 3: A. Lateral wall of the right nasal cavity. B. Lateral wall of the right nasal cavity; the superior, middle, and inferior conchae have been partially removed to show openings of the paranasal sinuses and the nasolacrimal duct into the meati.

❖ **Nerve Supply of the Nasal Cavity**

Innervation of the nasal cavities by three branches of cranial nerves:

- **The olfactory nerves** pass from the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone to the olfactory bulbs which are responsible for olfaction (Fig. 4).

The general sensation is carried out by the branches of **trigeminal nerve(V)**:

- **Branches of the ophthalmic division (V1):** Provides general sensation to the anterior region and superior aspect of the nasal cavity via the anterior ethmoidal nerve, a branch of the nasociliary nerve.
- **The maxillary division (V2):** Provides general sensation to the posterior region of the nasal cavity via branches of the nasopalatine and lateral nasal nerves (Fig. 4).
- **The Nasal branches:** Originate into pterygopalatine fossa:

1-Posterior superior lateral nasal nerves

2-Posterior inferior lateral nasal nerves

3-Posterior superior medial nasal nerves

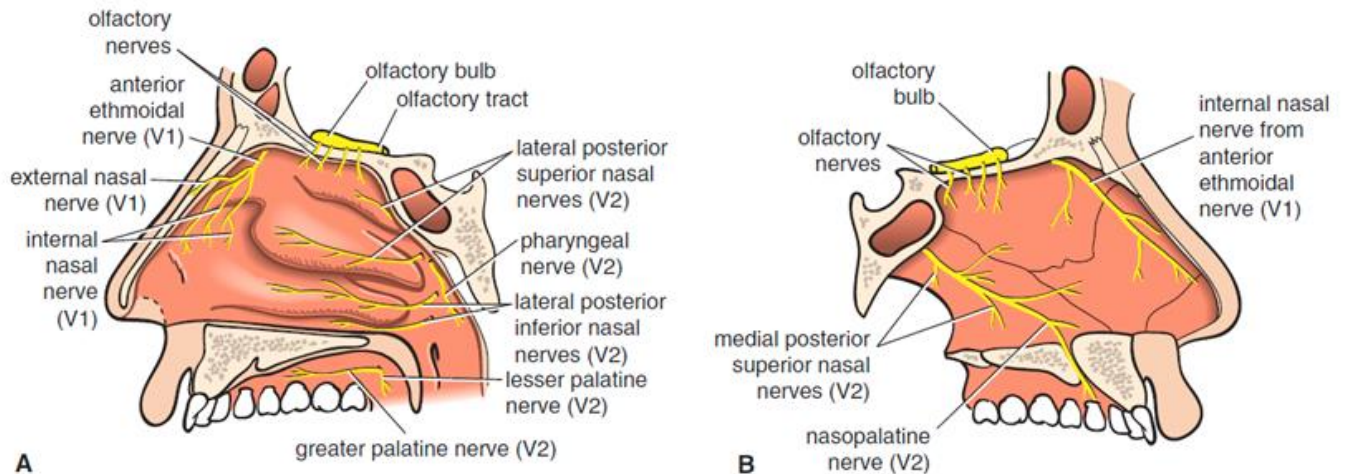


Figure 4: A. Lateral wall of nasal cavity showing sensory innervation of mucous membrane. B. Nasal septum showing sensory innervation of mucous membrane.

❖ **Blood Supply to the Nasal Cavity**

The arterial supply to the nasal cavity is from branches of the maxillary, the ophthalmic, and the facial arteries. The most important branch is the sphenopalatine artery (Fig. 5). The sphenopalatine artery anastomoses with the septal branch of the superior labial branch of the facial artery in the region of the vestibule. The submucous venous plexus is drained by veins that accompany the arteries.

The nose receives blood from both the internal and external carotid arteries (Figure 5,6):

✚ **Internal carotid branches**

- **Anterior ethmoidal artery** (a branch from the ophthalmic artery)
- **Posterior ethmoidal artery** (a branch from the ophthalmic artery).

The ethmoidal arteries descend into the nasal cavity through the cribriform plate.

✚ **External carotid branches:**

- **Sphenopalatine artery** (a branch from the maxillary artery).

- **Greater palatine artery** (a branch from the maxillary artery).
- **Septal branch of Superior labial artery** (a branch from the facial artery).

The anterior part of the nasal septum is the site (**Kiesselbach area-Little's area**) of an anastomotic arterial plexus from septal branches from anterior ethmoidal artery, sphenopalatine artery and superior labial artery (Fig.5-B).

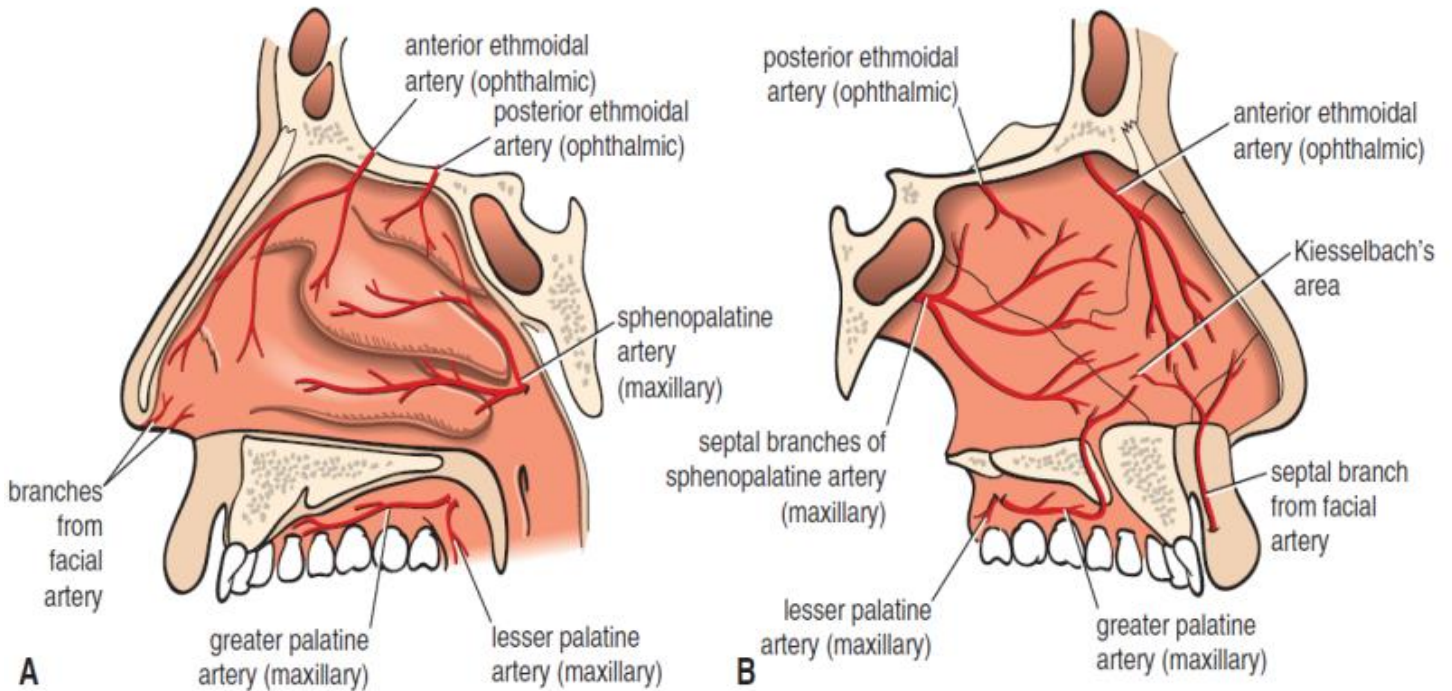


Figure 5: A. Lateral wall of nasal cavity showing the arterial supply of the mucous membrane. B. Nasal septum showing the arterial supply of the mucous membrane

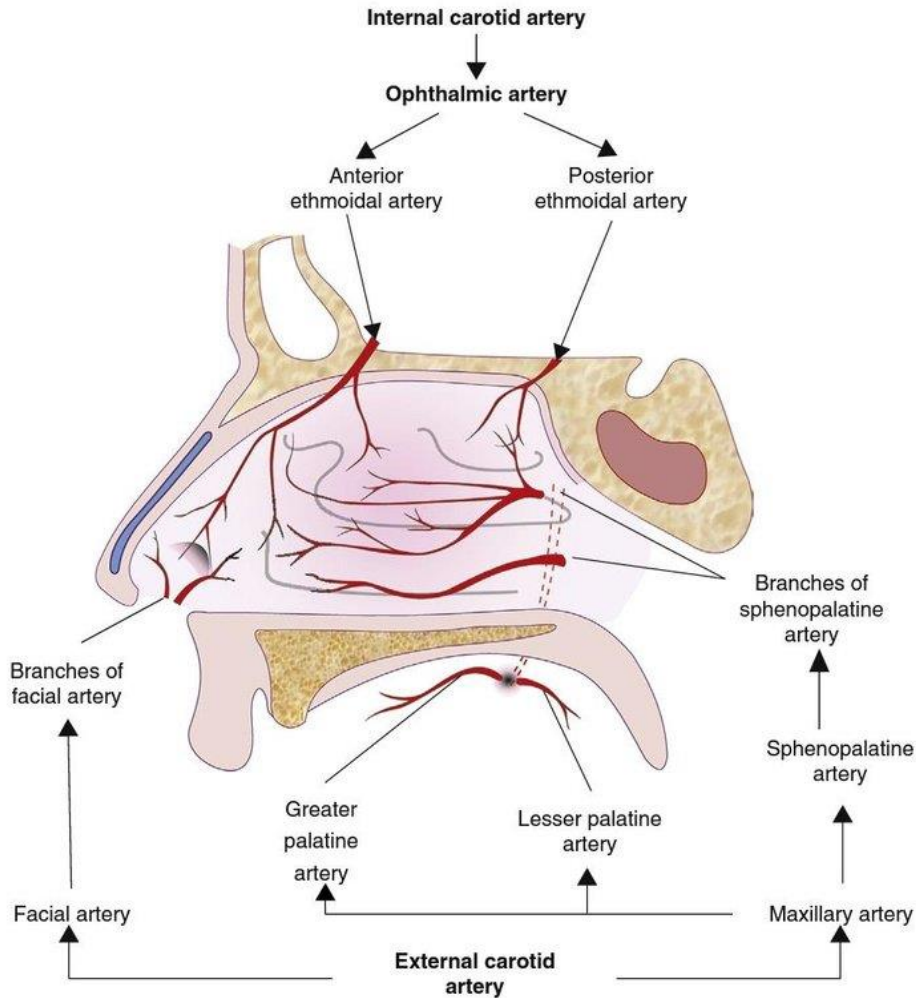


Figure 6: Nasal septum with the arterial supply of the mucus membrane (branches of external and internal carotid artery).

❖ **Veins of the nasal cavity**

veins of the nose tend to follow the arteries. They drain into the **pterygoid plexus, facial vein or cavernous sinus.**

In some individuals, a few nasal veins join with the **sagittal sinus** (a dural venous sinus). This represents a potential pathway by which infection can spread from the nose into the **cranial cavity.**

❖ **Lymph Drainage of the Nasal Cavity**

The lymph vessels draining the vestibule end in the **submandibular nodes**. The remainder of the nasal cavity is drained by vessels that pass to the upper deep **cervical nodes**.

❖ **The Paranasal Sinuses**

The paranasal sinuses are cavities found in the interior of the **maxilla, frontal, sphenoid, and ethmoid bones, drain into nasal cavity** (Fig. 7). They are lined with mucoperiosteum and filled with air; they communicate with the nasal cavity through relatively small apertures. **The frontal, maxillary and the anterior ethmoidal sinuses open into the middle meatus (Fig.8).**

The maxillary and sphenoidal sinuses are present in a rudimentary form at birth; they enlarge appreciably after the eighth year and become fully formed in adolescence.

Drainage of Mucus and Functions of Paranasal Sinuses

The mucus produced by the mucous membrane is moved into the nose by ciliary action of the columnar cells. Drainage of the mucus is also achieved by the siphon action created during the blowing of the nose. The function of the sinuses is to act **as resonators to the voice**; they also **reduce the weight of the skull**. When the apertures of the sinuses are blocked or they become filled with fluid, the quality of the voice is markedly changed.

❖ **Maxillary Sinus**

The maxillary sinus is pyramidal in shape and located within the body of the maxilla behind the skin of the cheek (Fig. 7). The roof is formed by the floor of the orbit, and the floor is related to the roots of the premolars and molar teeth. The maxillary sinus opens into the middle meatus of the nose through the hiatus semilunaris (Fig. 7).

❖ **Frontal Sinuses**

The two frontal sinuses are contained within the frontal bone (Fig. 7). They are separated from each other by a bony septum. Each sinus is roughly triangular, extending upward above the medial end of the eyebrow and backward into the medial part of the roof of the orbit.

❖ Sphenoidal Sinuses

The two sphenoidal sinuses lie within the body of the sphenoid bone (Fig.6. 7). A thin bony septum separates the sinuses. It **drains onto the sphenoethmoidal recess**.

❖ Ethmoid Sinuses

The ethmoidal bone houses three pairs of sinuses (**anterior, middle, and posterior**) between the nose and the orbit (Fig. 7). They are separated from the orbit by an extremely thin plate of bone. Therefore, the infection can readily spread from the sinuses into the orbit. The middle ethmoidal sinuses empty out onto a structure called the **ethmoidal bulla (Fig.8)**. This is a bulge in the lateral wall formed by the middle ethmoidal sinus itself. The posterior ethmoidal sinuses open out at the level of the **superior meatus**.

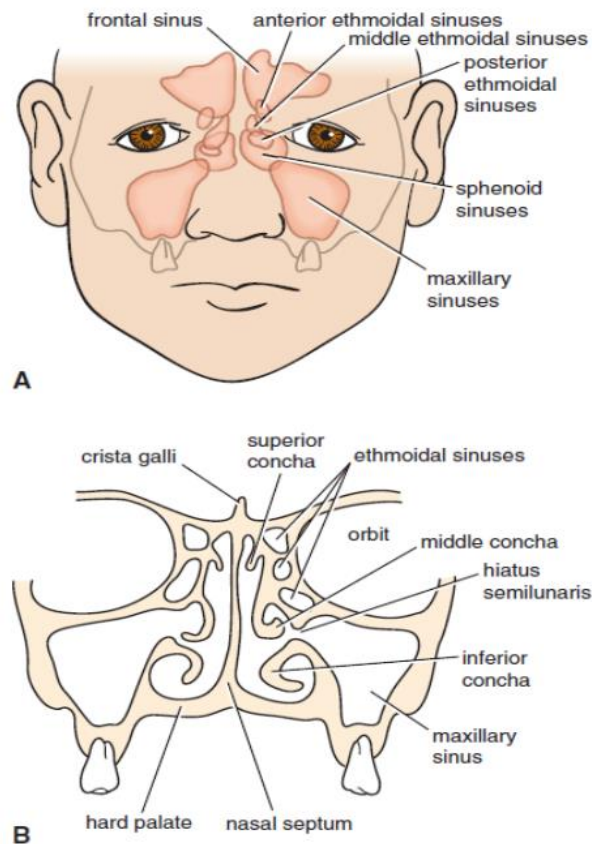


Figure 7: A. Anterior view showing the position of the paranasal sinuses in relation to the face. B. Coronal section through the nasal cavity showing the ethmoidal and the maxillary sinuses.

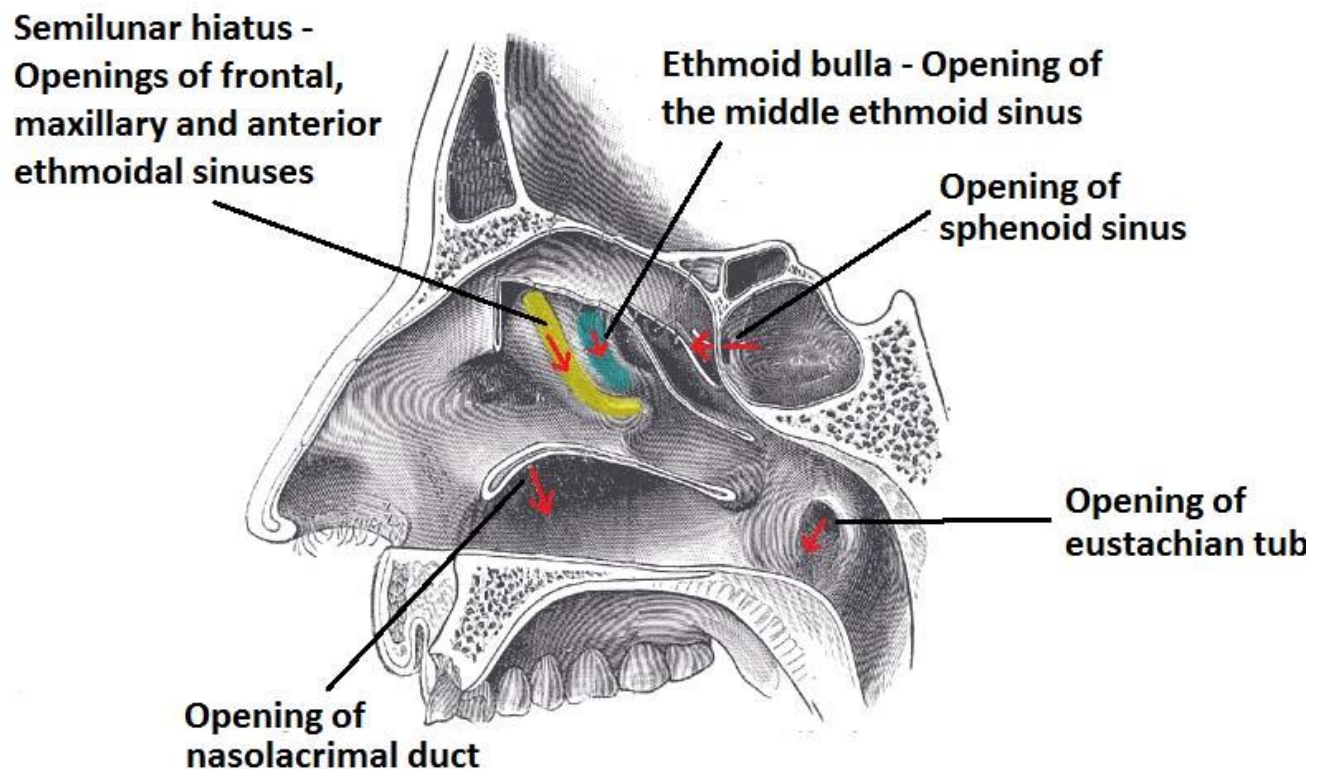


Figure 8: Paranasal sinuses and sites of the drainages into the nose

Clinical Notes

➤ **Foreign bodies in the nose**

Foreign bodies in the nose are common in children. It should be remembered that the nasal septum is rarely situated in the midline. A severely deviated septum may interfere with drainage of the nose and the paranasal sinuses.

➤ **Trauma to the Nose**

Fractures involving the nasal bones are common. Blows directed from the front may cause one or both nasal bones to be displaced downward and inward. Lateral fractures also occur; the nasal septum is usually involved.

➤ **Nose Bleeding**

Epistaxis, or bleeding from the nose, is a frequent condition. The most common cause is nose picking. The bleeding may be arterial or venous, and most episodes occur on the anteroinferior portion of the septum.

➤ **Infection of the nasal cavity**

Infection can spread in a variety of directions. The paranasal sinuses are especially prone to infection. Organisms may spread via the nasal part of the pharynx and the auditory tube to the middle ear. It is possible for organisms to ascend to the meninges of the anterior cranial fossa, along the sheaths of the **olfactory nerves** through the cribriform plate, and produce meningitis. Infection of the paranasal sinuses is a common complication of nasal infections. Rarely, the cause of maxillary sinusitis is extension from an apical dental abscess.

References

- ✚ Snell RS. Clinical Anatomy by Regions. 9th edition. Philadelphia, PA: Lippincott Williams & Wilkins, 2012.
- ✚ <https://teachmeanatomy.info>