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Head and neck assignment

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1. Write an essay on Cavernous sinus

The cavernous sinuses are located within the middle cranial fossa, on either side of the Sella turcica of the sphenoid bone (which contains the pituitary gland)) they are enclosed by the endosteal and meningeal layers of the Dura mater.

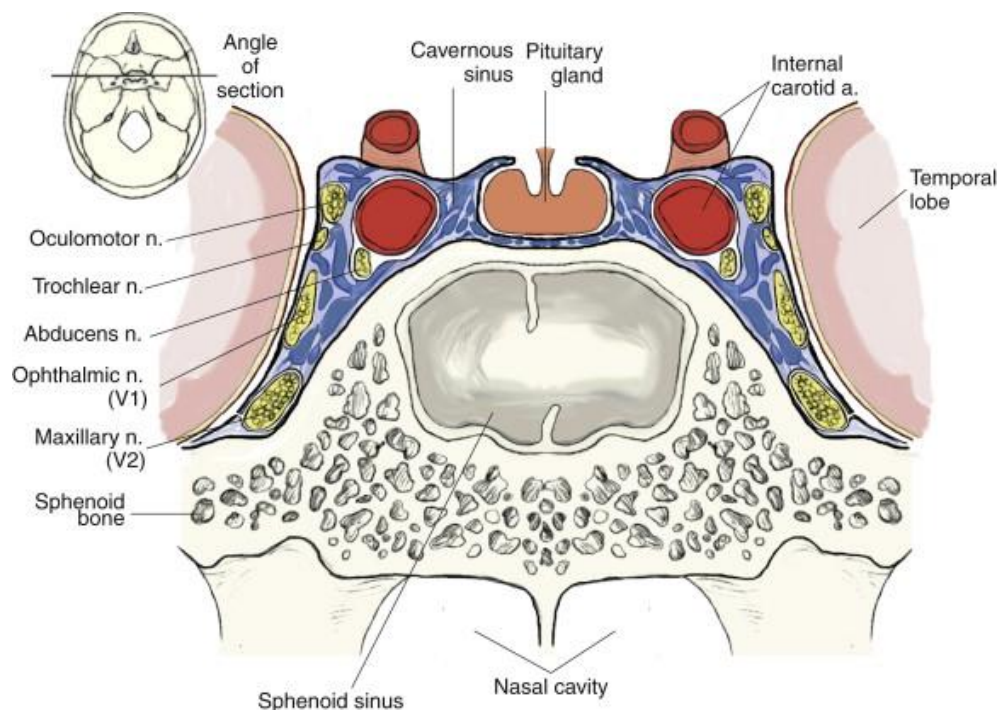


Diagram showing Cavernous sinus and some borders

The borders of the cavernous sinus are as follows:

Anterior: super orbital fissure

Posterior: Petrous part of the temporal bone

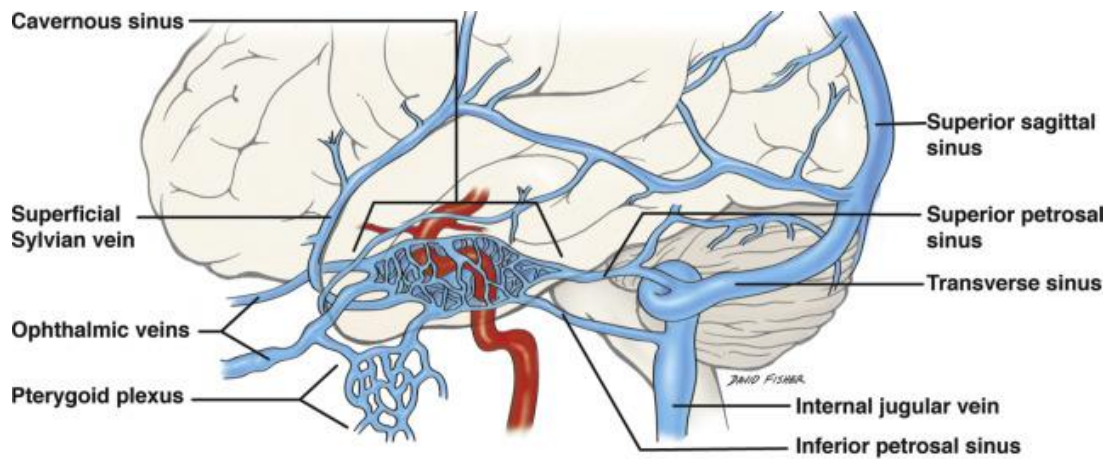
Medial: body of the sphenoid bone

Lateral: Meningeal layer of the Dura mater running from the roof to the floor of the middle cranial fossa

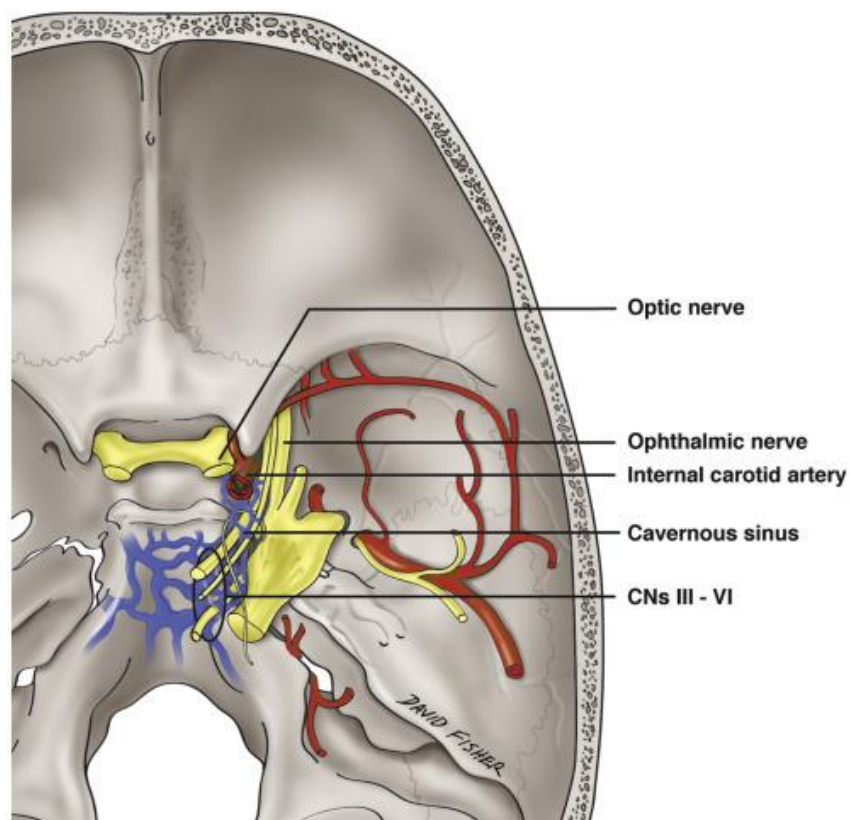
Roof: meningeal layer of the Dura mater that attaches to the anterior and middle clinoid processes of the sphenoid bone

Floor: endosteal layer of Dura mater that overlies the base of the greater wing of the sphenoid bone

The right and left wall of the cavernous sinus are joined anteriorly and posteriorly by the intercavernous sinus.



A



B

Diagram showing Cavernous sinus, artery and veins

Venous drainage

The cavernous sinuses receive blood from the

1. Cerebral veins which includes: Superficial middle cerebral veins, inferior cerebral vein
2. the superior and inferior ophthalmic veins (from the orbit)

3. Emissary veins (from the pterygoid plexus of veins in the infratemporal fossa
Each sinus extends anteriorly from the superior orbital fissure to the apex of the temporal bone posteriorly It is of great clinical importance because of the connection and structures that pass through them

Structures passing through the medial wall of the cavernous sinus	Structures that travels through lateral wall of the Cavernous Sinus
<ul style="list-style-type: none"> • Abducens nerve(CNVI) • Carotid Plexus • Internal Carotid artery(Cavernous portion) 	From superior to inferior <ul style="list-style-type: none"> • Oculomotor nerve(CNIII) • Trochlear nerve(CNIV) • Ophthalmic nerve(VI) • Maxillary nerve(VII)

Clinical Significance

1. Cavernous sinus Thrombosis: refers to the formation of a clot within the cavernous sinus
2. Cavernous sinus syndrome: may result from mass effect of these tumors and cause ophthalmoplegia (from compression of the oculomotor nerve, trochlear nerve and abducens nerve), Ophthalmic sensory loss and maxillary sensory loss
3. Arteriovenous fistula: it happens when the internal carotid artery ruptures within the cavernous sinus.

2. Discuss the wall of the nose

The two nasal cavities are the uppermost parts of the respiratory tract and contain the olfactory receptors. They are elongated wedge-shaped spaces with a large inferior base and a narrow superior apex and are held open by a skeletal framework consisting mainly of bone and cartilage. The nasal cavities are separated: from each other by a midline nasal septum; from the oral cavity below by the hard palate; and from the cranial cavity above by parts of the frontal, ethmoid, and sphenoid bones

Bones in the Nose

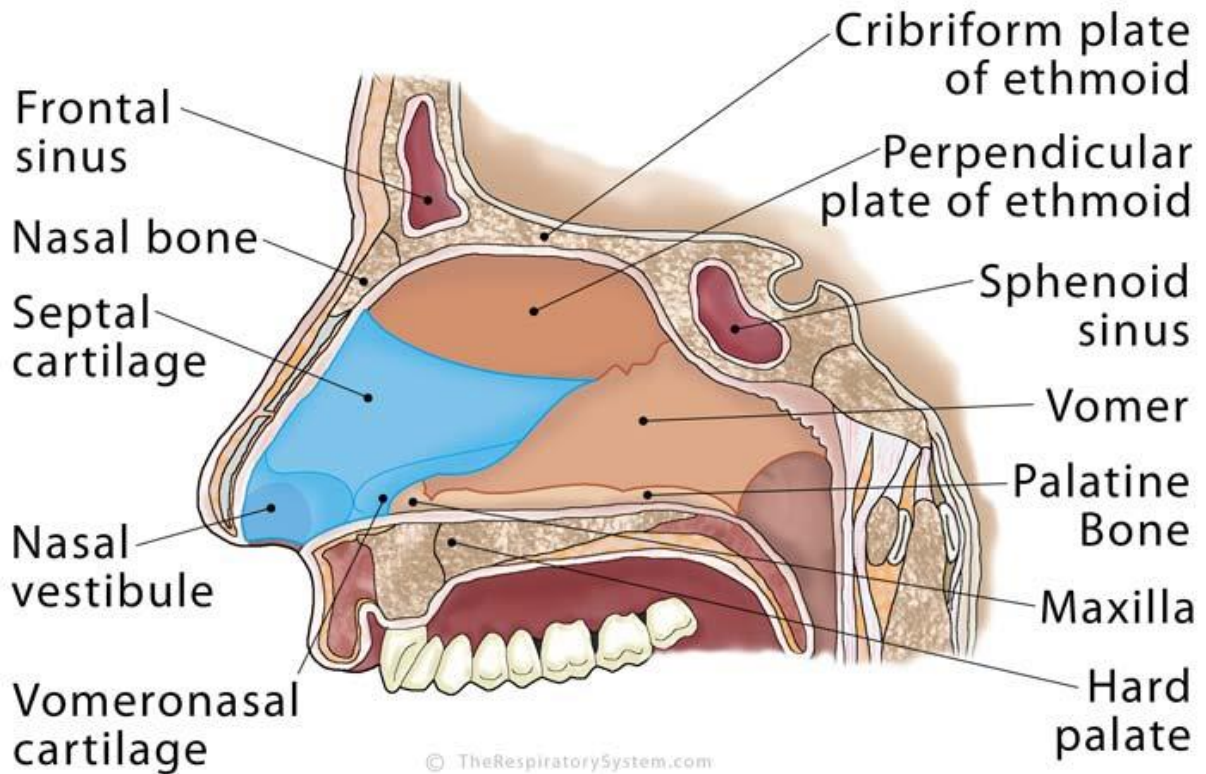


Diagram of the nose showing the bones

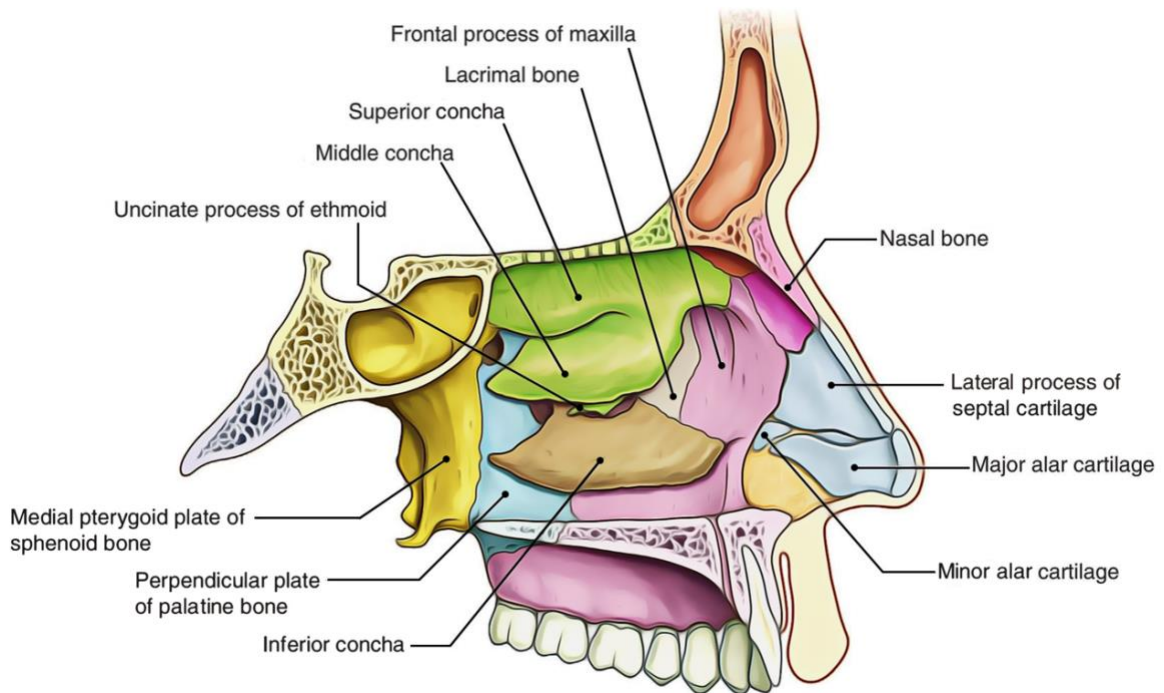
The anterior apertures of the nasal cavities are the nares, which open onto the inferior surface of the nose. The posterior apertures are the choanae, which open into the nasopharynx.

Mucosa lines the nasal cavity, except for the nasal vestibule, which is lined with skin. The superior one third of the nasal mucosa forms the olfactory area. The inferior two thirds of the nasal mucosa form the respiratory area. The olfactory area contains the peripheral organ of smell, sniffing draws air to the area.

Walls of the nose

Medial wall

The medial wall of the nasal cavity comprises the nasal septum, the septal cartilages and various bones of the skull



Nasal septum

Is a structure consisting of both bony and cartilaginous components. The bony components are the:

- Perpendicular plates of the ethmoid bone superoinferiorly
- The vomer bone posteroinferiorly
- The crest of the maxillary bone anteroinferiorly
- The crest of the Palatine bone inferior to the vomer

Various bones of the nasal septum include:

Ethmoid bone: The medial wall of the nasal cavity is formed by both bony elements and cartilage. Posteriorly the perpendicular plate of the ethmoid bone forms the superoposterior part of the bony nasal septum and articulates superiorly with the cribriform plate. The posterior border articulates superiorly with the sphenoidal crest and with the vomer by its inferior border

Maxillary bone: Further posteriorly than the ethmoid bone, the crest of both the maxilla and the palatine bone completes the posterior septum

Vomer: an unpaired bone of the skull forms the inferior part of the septum. It is located in the mid-sagittal plane and articulates with the ethmoid, both palatine bone and both maxillary bone

Palatine bone: the nasal surface of the bone forms part of the inferior meatus of the nose, while the serrated anterior maxillary surface articulates with the maxilla. Laterally the bone articulates with the perpendicular plate and the superior portion of the plates forms the posterior part of the nasal cavity. The inferior surface of the plate is rough and provides attachment to the oral mucosa of the hard palate

Nasal Cartilages

The septal cartilage is approximately 3-4mm thick. It divides the nasal cavity into two halves.

The anteroinferior part of the cartilage has an expansion known as 'Foot plate' which is about 4-8mm wide. This foot plate lies in free contact with the membranous septum. The cartilage is expanded in other regions, namely the Junction with the lateral nasal cartilage termed the Posterior process. The cartilage is firmly adhered to the nasal bone by taut collagen fibers.

The cartilage of the septum is also termed the 'quadrangular cartilage' due to its shape. The posterior nasal spine is a sharp pointed projection of the posterior border of the palatine bone. The musculus uvula gains attachment here. The torus tubarius is also known as the tubar tonsil. It resides at the base of the cartilaginous section of the Eustachian tube.

The Lateral wall

The lateral wall of the nasal cavity is a region of the nasopharynx essential for humidifying and filtering the air. The lateral wall of each nasal cavity is complex and is formed by bone, cartilage, and soft tissues. Bony support for the lateral wall is provided by:

- The ethmoidal labyrinth and uncinat process;
- the perpendicular plate of the palatine bone;
- the medial plate of the pterygoid process of the sphenoid bone;
- the medial surfaces of the lacrimal bones and maxillae
- the inferior concha.

In the external nose, the lateral wall of the cavity is supported by cartilage (lateral process of the septal cartilage and major and minor alar cartilages) and by soft tissues. The surface of the lateral wall is irregular in contour and is interrupted by the three nasal conchae

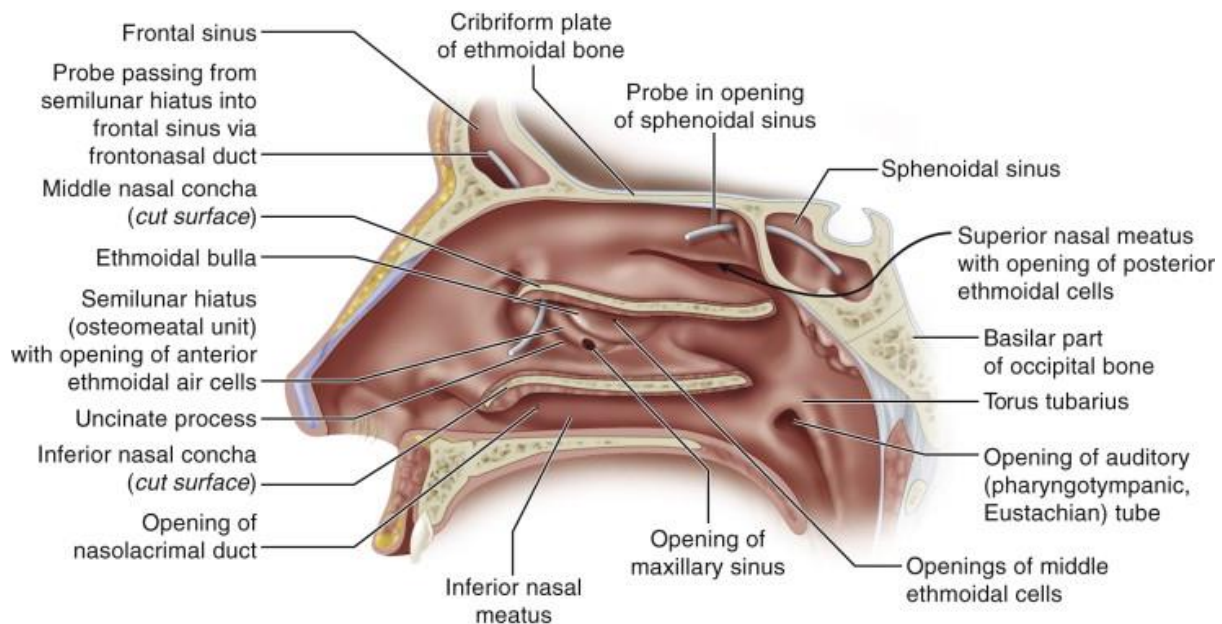


Diagram of nose showing the Concha

The nasal conchae includes;

- **Inferior nasal conchae:** It is the longest and broadest of the conchae and is formed by an independent bone (of the same name, inferior conchae). The conchae is covered by a mucous membrane that contains large vascular spaces and is one of the three that work to both humidify and clear the air that passes into the nasopharynx.
- **Superior nasal conchae:** are smaller structures connected to the middle conchae by nerve endings, and serve to protect the olfactory. The opening to the posterior ethmoidal sinuses exist under the superior meatus
- **Middle nasal conchae :** smaller, in humans, they are usually as long as a little finger. They project downward over the opening of the maxillary and anterior and middle ethmoid sinuses and act as buffer the sinuses from coming in direct contact with pressurized nasal airflow

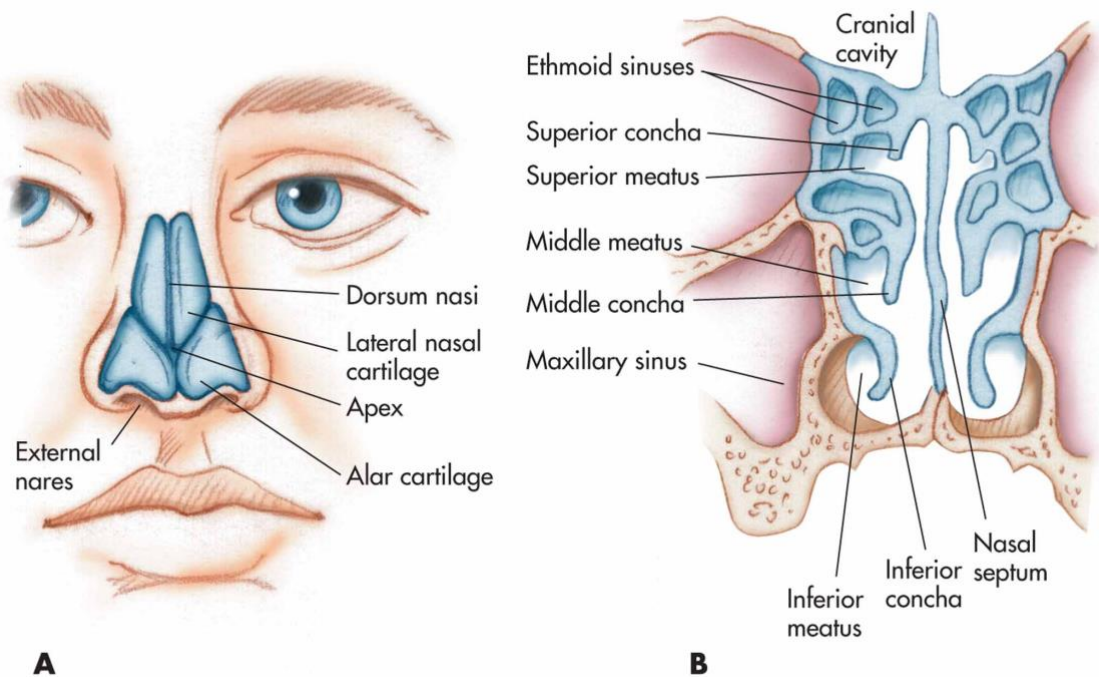


Diagram of the nose showing the meatus

The conchae divide each nasal cavity into four air channels and

- **inferior nasal meatus between the inferior conchae and the nasal floor;**
- **a middle nasal meatus between the inferior and middle conchae;**
- **a superior nasal meatus between the middle and superior concha;**
- **and a sphenoidal recess between the superior concha and the nasal roof**

The inferior, middle, and superior conchae extend medially across the nasal cavity, separating it into four air channels, an inferior, middle, and superior meatus, and a sphenoidal recess. The conchae do not extend forward into the external nose. The anterior end of each concha curves inferiorly to form a lip that overlies the end of the related meatus. Immediately inferior to the attachment of the middle concha and just anterior to the midpoint of the concha, the lateral wall of the middle meatus elevates to form the dome-shaped ethmoidal bulla. This is formed by the underlying middle ethmoidal cells, which expand the medial wall of the ethmoidal labyrinth. Inferior to the ethmoidal bulla is a curved gutter (the semilunar hiatus), which is formed by the mucosa covering the lateral wall as it spans a defect in the bony wall between the ethmoidal bulla above and the uncinat process below.

The anterior end of the semilunar hiatus forms a channel (the ethmoidal infundibulum), which curves upward and continues as the frontonasal duct through the anterior part of ethmoidal labyrinth to open into the frontal sinus.

The nasolacrimal duct and most of the paranasal sinuses open onto the lateral wall of the nasal cavity:

- the nasolacrimal duct opens onto the lateral wall of the inferior nasal meatus under the anterior lip of the inferior concha-it drains tears from the conjunctival sac of the eye into the nasal cavity and originates at the inferior end of the lacrimal sac on the anteromedial wall of the orbit;
- the frontal sinus drains via the frontonasal duct and ethmoidal infundibulum into the anterior end of the semilunar hiatus on the lateral wall of the middle nasal meatus-the anterior ethmoidal cells drain into the frontonasal duct or ethmoidal infundibulum (in some cases, the frontal sinus drains directly into the anterior end of the middle nasal meatus and the frontonasal duct ends blindly in the anterior ethmoidal cells);
- the middle ethmoidal cells open onto or just above the ethmoidal bulla;
- the posterior ethmoidal cells usually open onto the lateral wall of the superior nasal meatus; the large maxillary sinus opens into the semilunar hiatus, usually just inferior to the center of the ethmoidal bulla-this opening is near the roof of the maxillary sinus.

The only paranasal sinus that does not drain onto the lateral wall of the nasal cavity is the sphenoidal sinus, which usually opens onto the sloping posterior roof of the nasal cavity

The arterial supply

The arterial supply of the **medial** and **lateral walls** of the nasal cavity is from five sources:

- Anterior ethmoidal artery (from the ophthalmic artery)
- Posterior ethmoidal artery (from the ophthalmic artery)
- Sphenopalatine artery (from the maxillary artery)
- Greater palatine artery (from the maxillary artery)
- Septal branch of the superior labial artery (from the facial artery)

- ❖ The anterior part of the nasal septum is the site (**Kiesselbach area**) of an anastomotic arterial plexus involving all five arteries supplying the septum
- ❖ The **external nose** also receives blood from the 1st and 5th arteries listed above plus
 - nasal branches of the infraorbital artery
 - lateral nasal branches of the facial artery

Venous drainage

- A rich submucosal venous plexus deep to the nasal mucosa drains into the sphenopalatine, facial, and ophthalmic veins

Innervation

- olfactory nerve
- branches of the ophthalmic [V₁] which include the anterior and posterior ethmoidal nerves
- maxillary [V₂] nerves which include;
 - posterior superior lateral nasal nerves
 - posterior superior medial nasal nerves
 - nasopalatine nerve
 - posterior inferior nasal nerves

Clinical Anatomy

Nose bleeding: usually caused by a damaged blood vessel that leaks blood