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**DEPARTMENT:** MEDICINE AND SURGERY  
**COURSE:** GROSS ANATOMY OF THE HEAD AND NECK

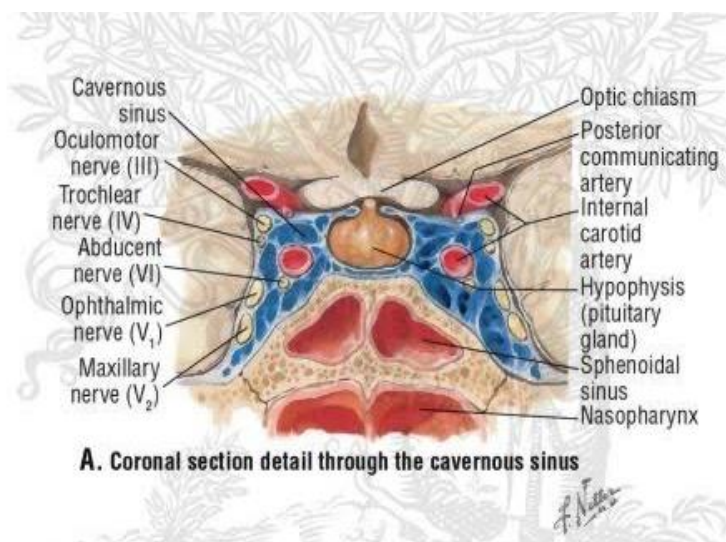
### **QUESTION 1**

Write an essay on the cavernous sinus.

### **ANSWER**

The **cavernous sinus** is a paired dural venous sinus located within the cranial cavity at 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. It is divided into the left and right cavernous sinus and communicates through the anterior and posterior intercavernous sinuses.

The cavernous sinus is one of the several drainage pathways for the brain and it receives venous drainage from the brain and tributaries of the face. It drains into the **superior and inferior petrosal sinus** which joins **the sigmoid sinus** and ultimately empties into **the internal jugular vein**.



### **BORDERS OF THE CAVERNOUS SINUS**

The borders of the cavernous sinus are as follows:

- Anterior – superior 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.

## CONTENTS OF THE CAVERNOUS SINUS

Several important structures pass through the cavernous sinus to enter the orbit making it the most clinically important sinus. They can be sub-classified by whether they travel through the sinus itself, or through its lateral wall:

### Structures travelling through the cavernous sinus:

- Abducens nerve
- Carotid plexus
- Internal Carotid

### Structures travelling through the lateral wall of cavernous sinus:

- Oculomotor nerve
- Trochlear nerve
- Ophthalmic and maxillary branches of the trigeminal nerve.

The cavernous sinus is the only site in the body where an artery (internal carotid) passes completely through a venous structure. This is thought to allow for heat exchange between the warm arterial blood and cooler venous circulation.

Each cavernous sinus receives venous drainage from:

- **Ophthalmic veins** (superior and inferior) – these enter the cavernous sinus via the superior orbital fissure.
- **Central vein of the retina** – drains into the superior ophthalmic vein, or directly into the cavernous sinus.
- **Sphenoparietal sinus** – empties into the anterior aspect of the cavernous sinus.
- **Superficial middle cerebral vein** – contributes to the venous drainage of the cerebrum
- **Pterygoid plexus** – located within the infratemporal fossa.

## APPLIED ANATOMY

- It is important to note that the superior ophthalmic vein forms an anastomosis with the facial vein. Therefore, the ophthalmic veins represent a potential route by which infection can spread from an extracranial to an intracranial site.
- **Cavernous sinus thrombosis (CST)** refers to the formation of a clot within the cavernous sinus. This most common cause of CST is infection; which typically spreads from an extracranial location such as the orbit, paranasal sinuses, or the 'danger zone' of the face. Infection is able to spread in this manner due to the anastomosis between the facial vein and superior ophthalmic veins. Common clinical features include headache, unilateral periorbital oedema, proptosis (eye bulging), photophobia and cranial nerve palsies. The abducens nerve (CN VI) is most commonly affected. Treatment is typically with antibiotic therapy. Where the cause is infection, thrombosis of the cavernous sinus can rapidly progress to meningitis.

## QUESTION 2

Discuss the walls of the nose

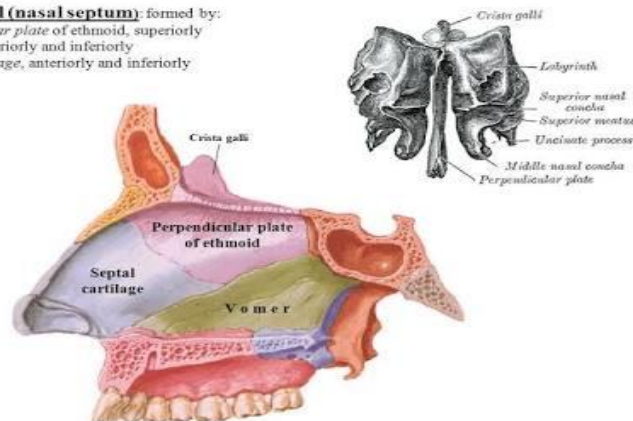
## ANSWER

The nose has two walls which are the lateral and medial wall.

### THE MEDIAL WALL

**Medial wall (nasal septum):** formed by:

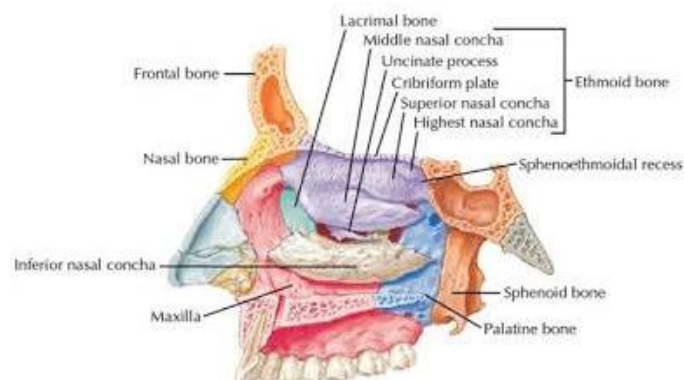
- Perpendicular plate of ethmoid, superiorly
- Vomer, posteriorly and inferiorly
- Septal cartilage, anteriorly and inferiorly



The **medial wall** of the nasal cavity is formed by the nasal septum, which divides the nasal cavity into the right and left halves and it also has osseous and cartilaginous parts. The main components of the nasal septum are:

- The perpendicular plate of the ethmoid superiorly
- The vomer inferiorly
- The septal cartilage anteriorly
- The nasal crests of the maxillary and palatine bones.

### THE LATERAL WALL



The **lateral wall** of the nasal cavity is uneven because of the nasal conchae which are the superior, middle, and inferior conchae and these three elevations project inferiorly like scrolls. The conchae curves inferomedially with each forming a roof for a meatus or recess.

The nasal conchae divide the nasal cavity into four passages which are:

- **The sphenoidal recess**, lying superoposterior to the superior concha, receives the opening of the sphenoidal sinus.
- **The superior nasal meatus** is a narrow passage between the superior and the middle nasal conchae (parts of the ethmoid bone) into which the posterior ethmoidal sinuses open by one or more orifices.
- **The middle nasal meatus** is longer and deeper than the superior one. The anterosuperior part of this passage leads into the ethmoidal infundibulum, an opening through which it communicates with the frontal sinus, via the frontonasal duct.
- **The inferior nasal meatus** is a horizontal passage, inferolateral to the inferior nasal concha (an independent, paired bone). The nasolacrimal duct from the lacrimal sac opens into the anterior part of this meatus.

### **BLOOD SUPPLY**

The arterial supply of the medial and lateral walls of the nasal cavity is from branches of the sphenopalatine artery, anterior and posterior ethmoidal arteries, greater palatine artery, superior labial artery, and the lateral nasal branches of the facial artery. On the anterior part of the nasal septum is an area rich in capillaries (Kiesselbach area) where all five arteries supplying the septum anastomose. This area is often where profuse bleeding from the nose occurs. A rich plexus of veins drains deep to the nasal mucosa into the sphenopalatine, facial, and ophthalmic veins.

### **INNERVATION**

The nerve supply of the posteroinferior half to two thirds of the nasal mucosa is chiefly from CN V2 by way of the nasopalatine nerve to the nasal septum and posterior lateral nasal branches of the greater palatine nerve to the lateral wall. The anterosuperior part of the nasal mucosa (both the septum and lateral wall) is supplied by the anterior ethmoidal nerves, branches of CN V1.