

ASSIGNMENT ON GROSS ANATOMY OF HEAD AND NECK

BY

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DEPARTMENT OF MEDICINE AND SURGERY

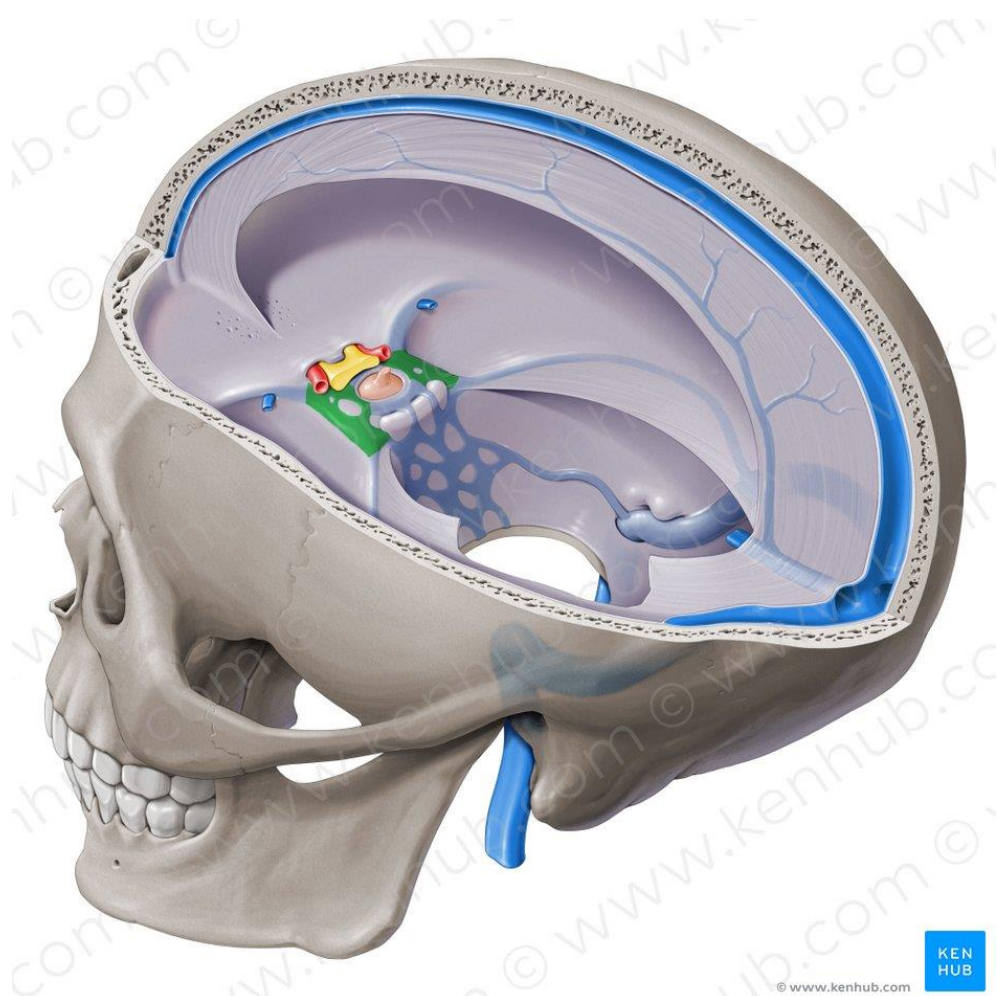
AFE BABALOLA UNIVERSITY, ADO EKITI

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Question 1 Write an essay on the cavernous sinus

The cavernous sinus is one of the dural venous sinuses of the head. It is a paired dural venous sinus located within the cranial cavity sited on either side of the sphenoid bone. It is divided by septa into small 'caves' – from which it gets its name.



DIARAM SHOWING THE CAVERNOUS SINUS

The cavernous sinus is roofed by an inner layer of dura mater that continues with the diaphragm sellae that covers the superior part of the pituitary gland.

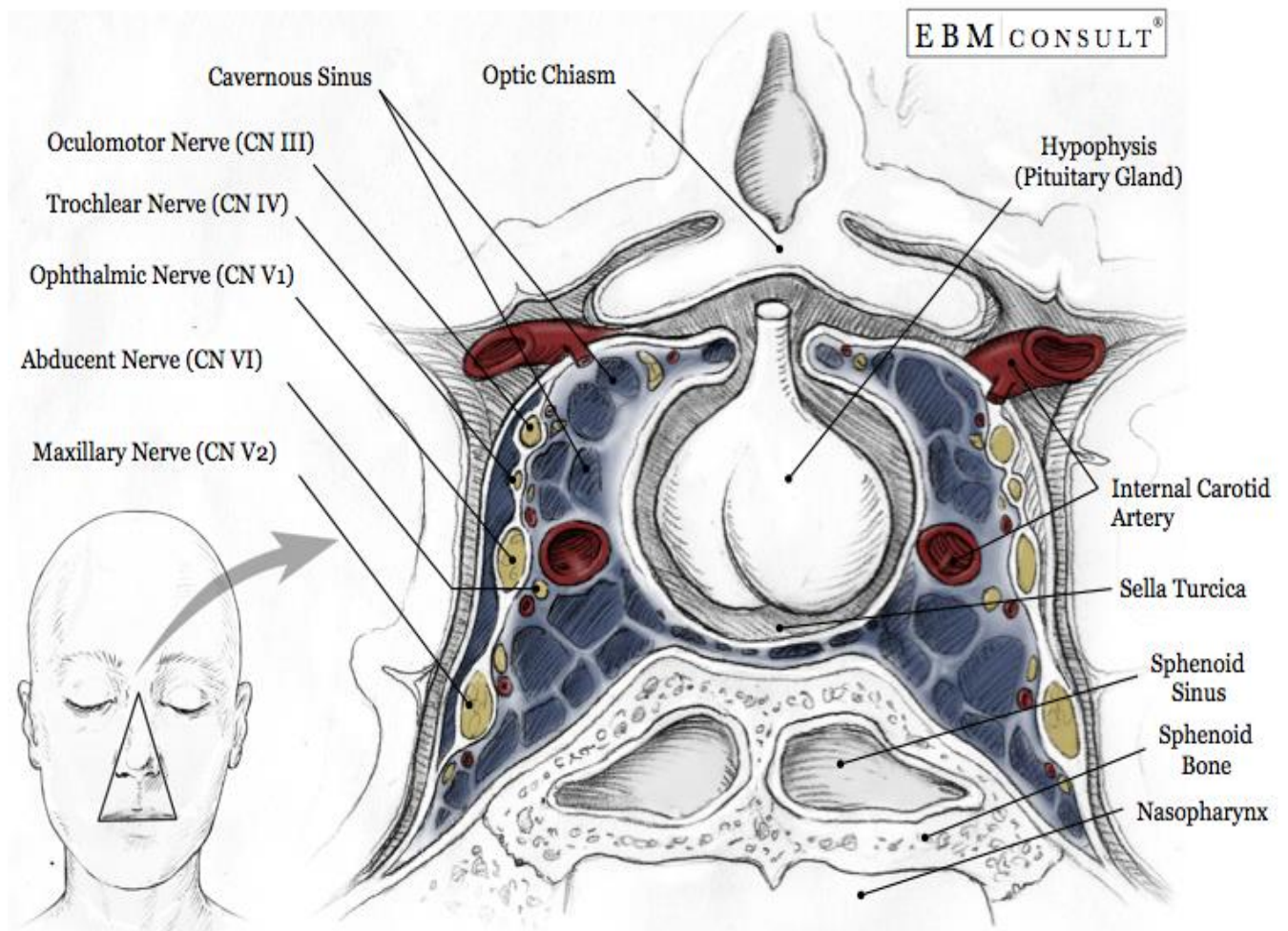


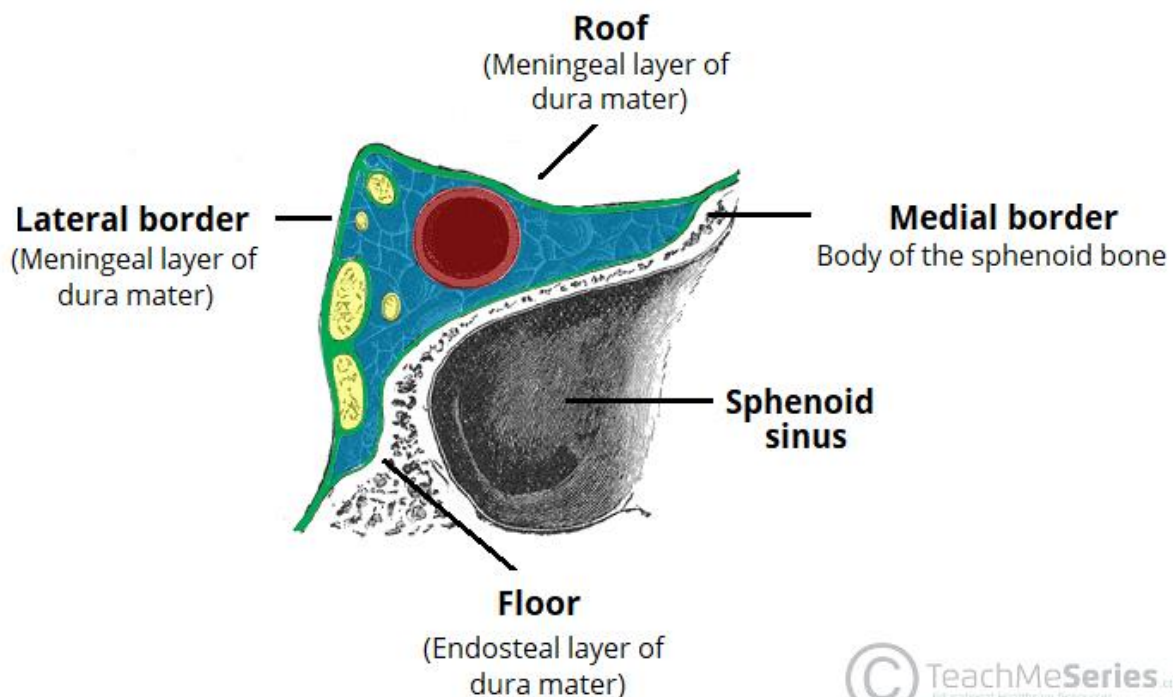
DIAGRAM SHOWING THE CARVERNOUS SINUSES AND ITS RELATING STRUCTURES.

The cavernous sinuses, a rich plexus of veins located in 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 surrounds the internal carotid arteries, lie lateral to the pituitary fossa. Anteriorly, lie the tuberculum sellae and the anterior clinoid processes and posteriorly are the posterior clinoid processes. The lateral wall has two dural layers between which travel cranial nerves III, IV, and the ophthalmic division of the trigeminal nerve (V1). V2 and part of the trigeminal ganglion may lie in the inferolateral wall of the cavernous sinus. Cranial nerve VI lies free in the cavernous sinus. Sympathetic fibers from the superior sympathetic ganglion ascend with the internal carotid artery and join the under surface of cranial nerve VI in the cavernous sinus briefly before fusing with the ophthalmic division of the trigeminal nerve to enter the orbit.

Borders of the cavernous sinus

- 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.



BORDERS OF THE CAVERNOUS SINUS

Venous connections

The cavernous sinus receives blood from:

- Superior and inferior ophthalmic veins
- Sphenoparietal sinus
- Superficial middle cerebral veins
- Inferior cerebral veins

Blood leaves the sinus via superior and inferior petrosal sinuses as well as via the emissary veins through the foramina of the skull (mostly through foramen ovale). There are also connections with the pterygoid plexus of veins via inferior ophthalmic vein, deep facial vein and emissary veins.

Contents

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

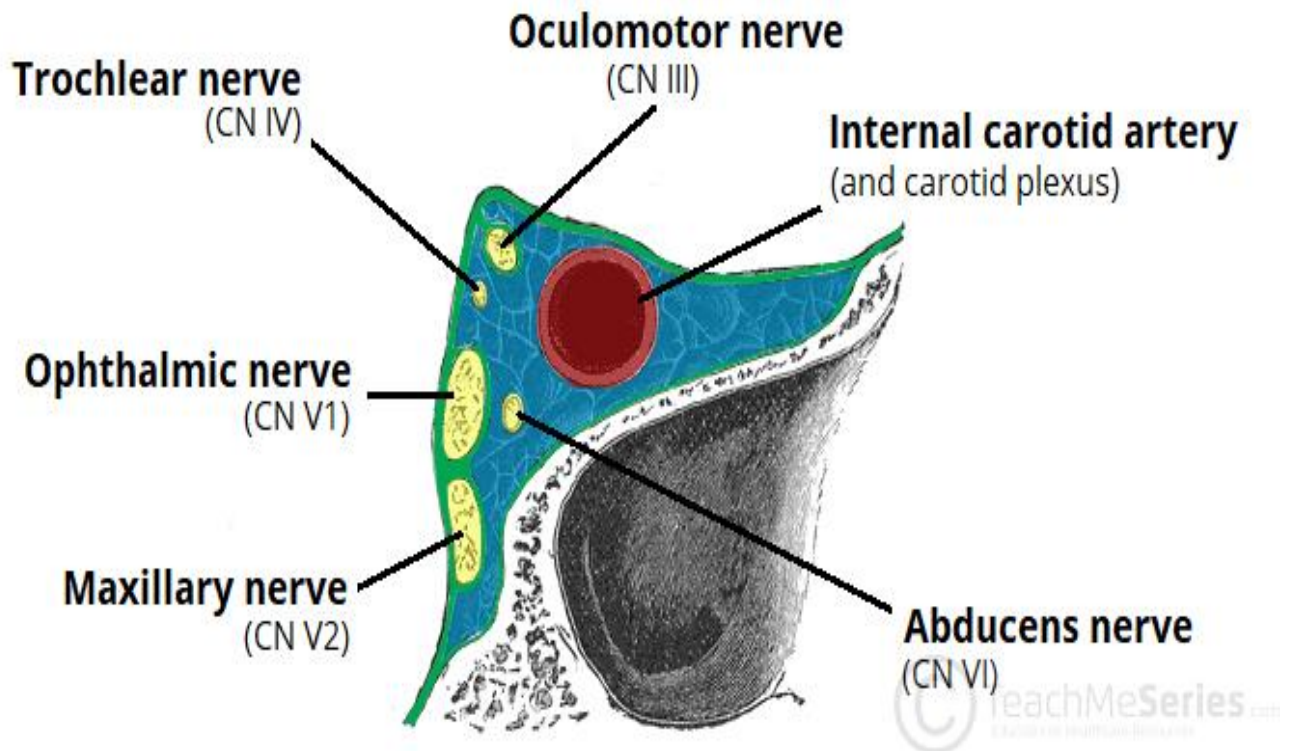
Travels through cavernous sinus: **Travels through lateral wall of cavernous sinus:**

- | | |
|--|---|
| <ul style="list-style-type: none">• Abducens nerve (CN VI)• Carotid plexus (post-ganglionic sympathetic nerve fibres)• Internal carotid artery (cavernous portion) | <ul style="list-style-type: none">• Oculomotor nerve (CN III)• Trochlear nerve (CN IV)• Ophthalmic (V1) and maxillary (V2) branches of the trigeminal nerve |
|--|---|

These nerves, with the exception of CN V2, pass through the cavernous sinus to enter the orbital apex through the superior orbital fissure. The maxillary nerve, division V2 of the trigeminal nerve travels through the lower portion of the sinus and exits via the foramen rotundum. The maxillary branch passes external to, but immediately adjacent to, the lateral wall of the sinus).

A mnemonic exists to remember the orientation of the vertical and horizontal content of the sinus: O TOM CAT. (OTOM are the lateral wall contents from superior to inferior; CAT are the horizontal contents from medial to lateral). The optic nerve lies just above and outside the cavernous sinus, superior and lateral to the pituitary gland on each side, and enters the orbital apex via the optic canal.

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.



CORONAL SECTION SHOWING THE CONTENTS OF THE RIGHT CARVERNOUS SINUS.

Functions of cavernous sinus

Venous drainage

As a venous sinus, the cavernous sinus receives blood from the superior and inferior ophthalmic veins and from superficial cortical veins, and is connected to the basilar plexus of veins posteriorly. The cavernous sinus drains by two larger channels, the superior and inferior petrosal sinuses, ultimately into the internal jugular vein via the sigmoid sinus, also draining with emissary vein to pterygoid plexus.

Clinical significance

Carotid-cavernous fistula

Head trauma resulting in rupture of the cavernous part of the internal carotid artery can produce what is known as a carotid-cavernous fistula. A pulsating exophthalmos can result as the venous pressure in the sinus would increase and reverse the flow of blood in the ophthalmic veins.

Cavernous sinus thrombosis

The sinus also has communicating branches from the sin of the face. Particularly in the 'danger area' (at the nasolabial crease and at the crease between the ala of the nose and the cheek), an infection can spread to the cavernous sinus, which can result in a cavernous sinus thrombosis. This condition can result in internal strabismus (crossed eyes) if the CN VI is damaged, doubled vision while looking downward if CN IV was damaged, or ophthalmoplegia (paralysis or weakness in muscles of movement of the eye).

Complications:

- Septic thrombosis of this area can also cause acute meningitis.
- Fairly rapid changes in mental status (confusion and fatigue)
- Death

Treatment: Empiric antibiotics to include:

- Vancomycin 15 mg/kg IV every 12 hours + ceftriaxone 2 g IV every 12 hours
- If source is dental, add on metronidazole
- Treatment duration is influenced by underlying cause and organism
- Heparin or low-molecular weight heparin at full doses (note: limited data but may be helpful).

Cavernous sinus syndrome

This 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 (from compression of the ophthalmic nerve), and maxillary sensory loss (from compression of the maxillary nerve). A complete lesion of the cavernous sinus disrupts CN III, IV, and VI, causing total ophthalmoplegia, usually accompanied by a fixed, dilated pupil. Involvement of CN V (V1 and variable involvement of V2) causes sensory loss in these divisions of the trigeminal nerve. Horner's syndrome can also occur due to involvement of the carotid ocular sympathetic, but may be difficult to appreciate in the setting of a complete third nerve injury.

Question 2 Discuss the walls of the nose

The human nose is the most protruding part of the face. It bears the nostrils and is the first organ of the respiratory system. It is also the principal organ in the olfactory system.

lateral wall of the nose

The lateral wall of the nasal cavity is a region of the nasopharynx essential for humidifying and filtering the air we breathe in nasally.

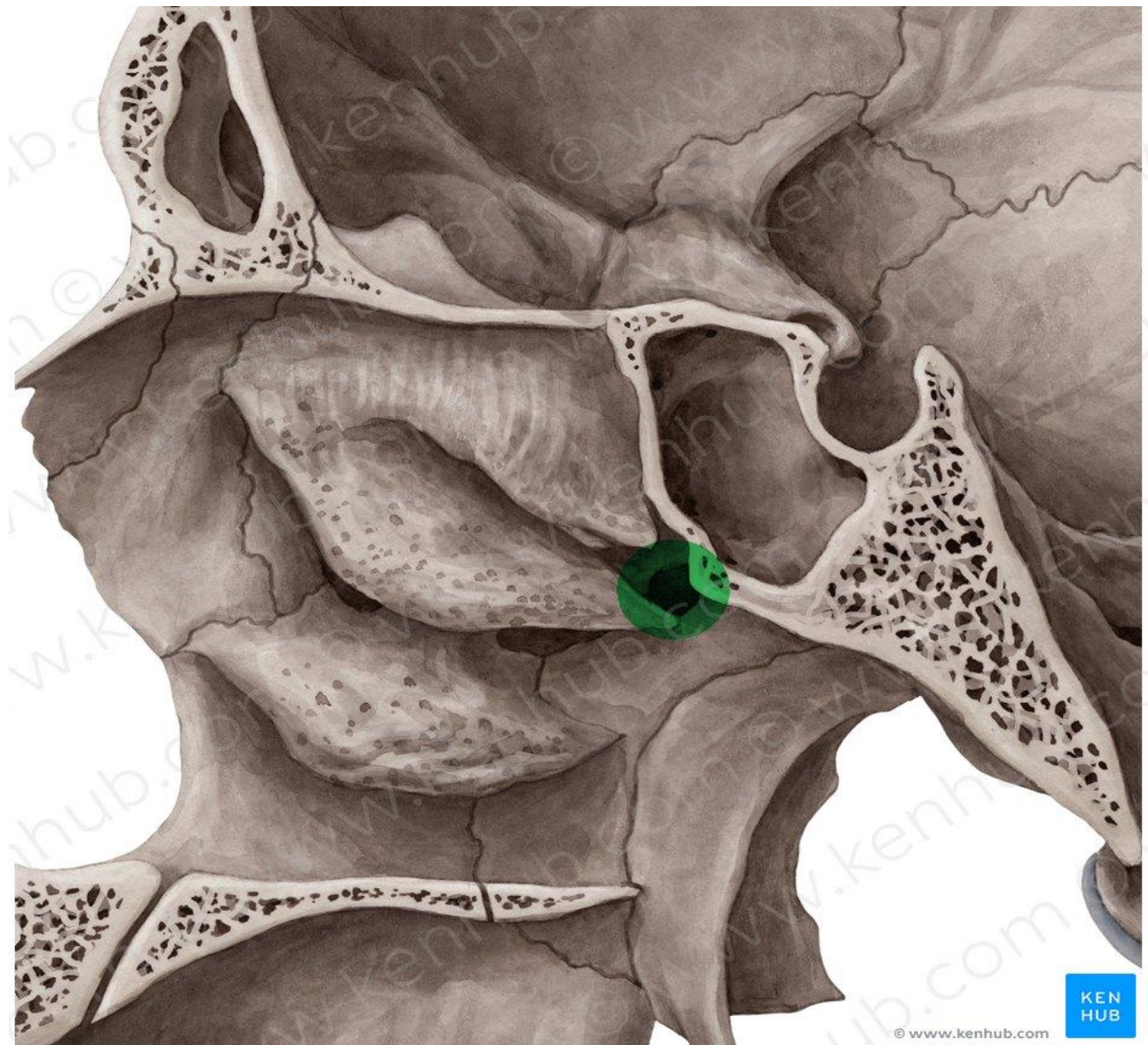


DIAGRAM SHOWING LATERAL WALL OF THE NOSE

Here we can find a structure called agger nasi. The agger nasi is also referred to as the 'nasoturbinal concha' or 'nasal ridge.' It can be described as a small

mound or ridge found in the lateral side of the nasal cavity. The structure is located midway along the anterior aspect of the middle nasal concha. An abnormally enlarged form may restrict the drainage of the frontal sinus by obstructing the frontal recess area.

<p>Parts</p>	<p>Nasal septum</p> <ul style="list-style-type: none"> - <i>Cartilages:</i> lesser alar cartilages, greater alar cartilages, lateral nasal cartilage - <i>Bones:</i> anterior nasal aperture (piriform aperture) formed by maxilla <p>Nasal conchae</p> <ul style="list-style-type: none"> - Superior nasal concha - Middle nasal concha - Inferior nasal concha
<p>Bony framework of the nasal cavity</p>	<p>Ethmoid bone</p> <p>Frontal bone</p> <p>Lacrimal bone</p> <p>Nasal bones</p> <p>Palatine bones</p> <p>Sphenoid bone</p>

Nasal conchae

We can find 3 types of nasal conchae in the nasal cavity. Those are:

Inferior nasal concha: It is the longest and broadest of the conchae and is formed by an independent bone (of the same name, inferior concha). The concha 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 and middle nasal conchae: arise from the perpendicular plate of the ethmoid bone. The middle nasal concha is found in between the superior and inferior nasal concha and plays a role in humidifying and clearing inspired air of micro-particles such as dirt. The superior nasal concha is a bony shelf located above the middle nasal concha and below the sphenoidal recess. Similar

to the middle nasal concha the superior concha is itself part of the ethmoid bone.

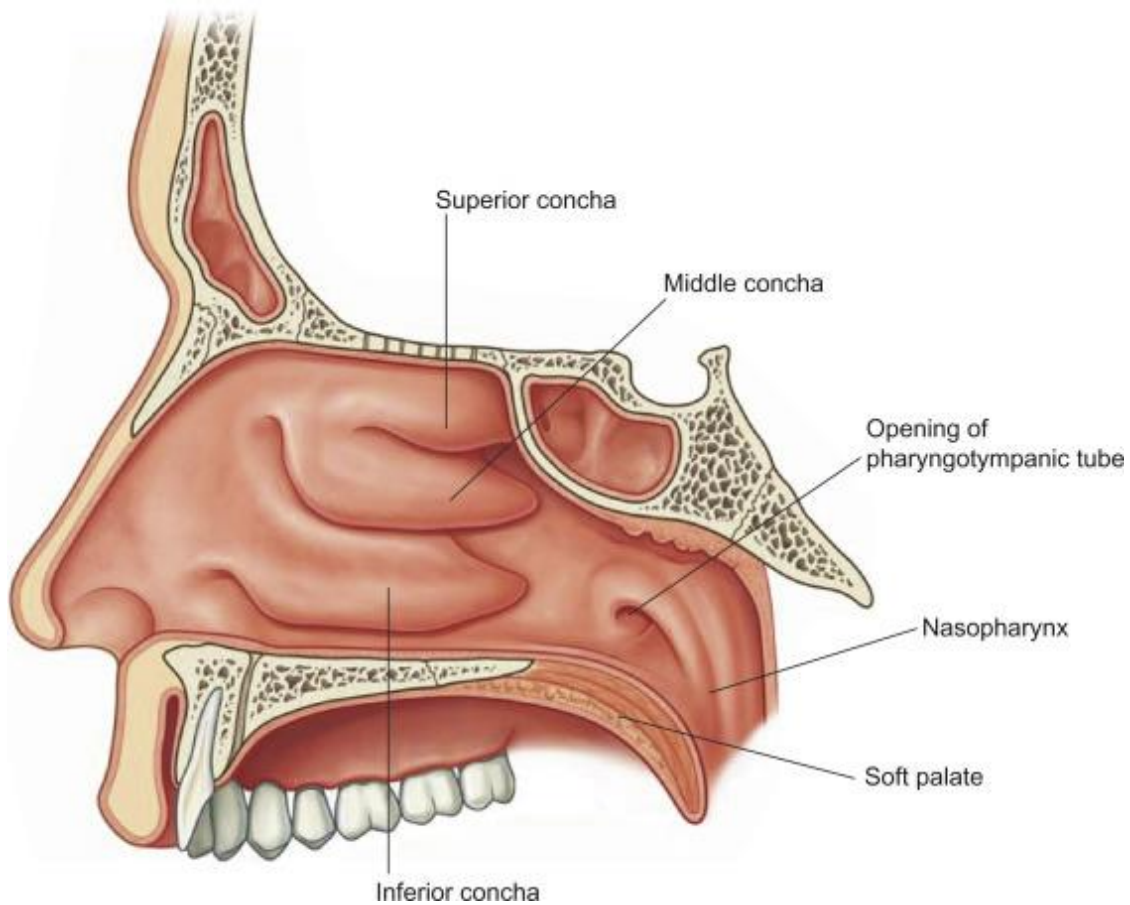
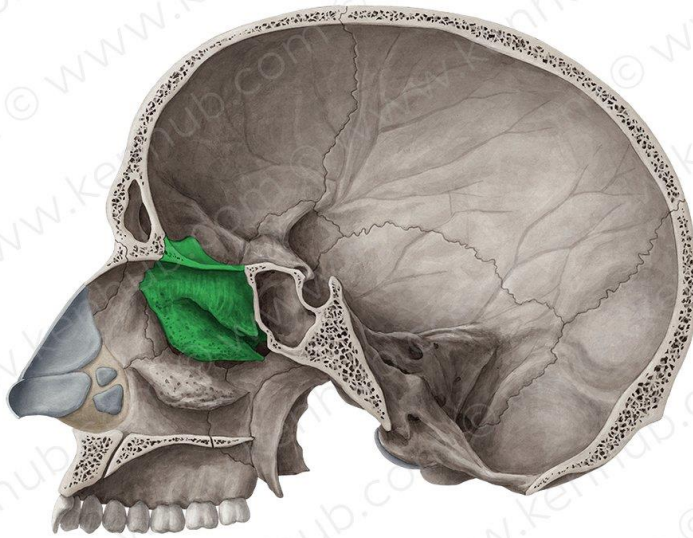


DIAGRAM SHOWNG THE NASAL CONCHAE

Associated structures

- The nasal surface of the maxilla
- The medial plate of the pterygoid process
- The limen nasi
- The sphenoethmoidal recess
- The sphenoidal sinus
- The nasal vestibule
- The inferior nasal meatus

Ethmoid bone



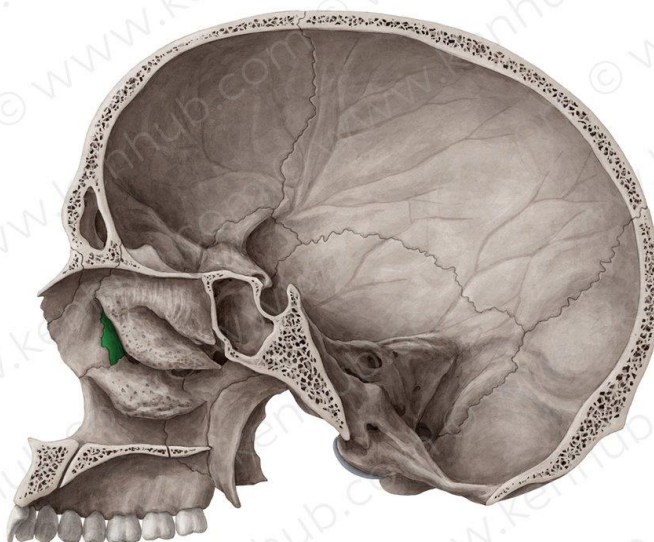
The ethmoid bone is located on the roof of the nose between the two orbits and is lightweight and spongy. It has three parts:

- cribriform plate which is pierced by fibres of the olfactory nerve;
- ethmoidal labyrinth which consists of numerous thin walled hollow cavities;
- perpendicular plate which forms part of the posterior nasal septum and gives rise to the superior and middle nasal conchae.

Frontal bone

The bone contains the frontal sinus, which in sinusitis and nasal infections can become filled with fluid.

Lacrimal bone



The lacrimal bone is the smallest bone of the face and forms part of the posterior nasal skeleton. The bone has a crest known as the 'sulcus lacrimalis' on its lateral surface. It contains the lacrimal sac, which drains into the nasolacrimal duct

Nasal bones

The paired nasal bones form the bridge of the nose and with the frontal process of the maxilla laterally and the nasal process of the frontal bone superiorly.

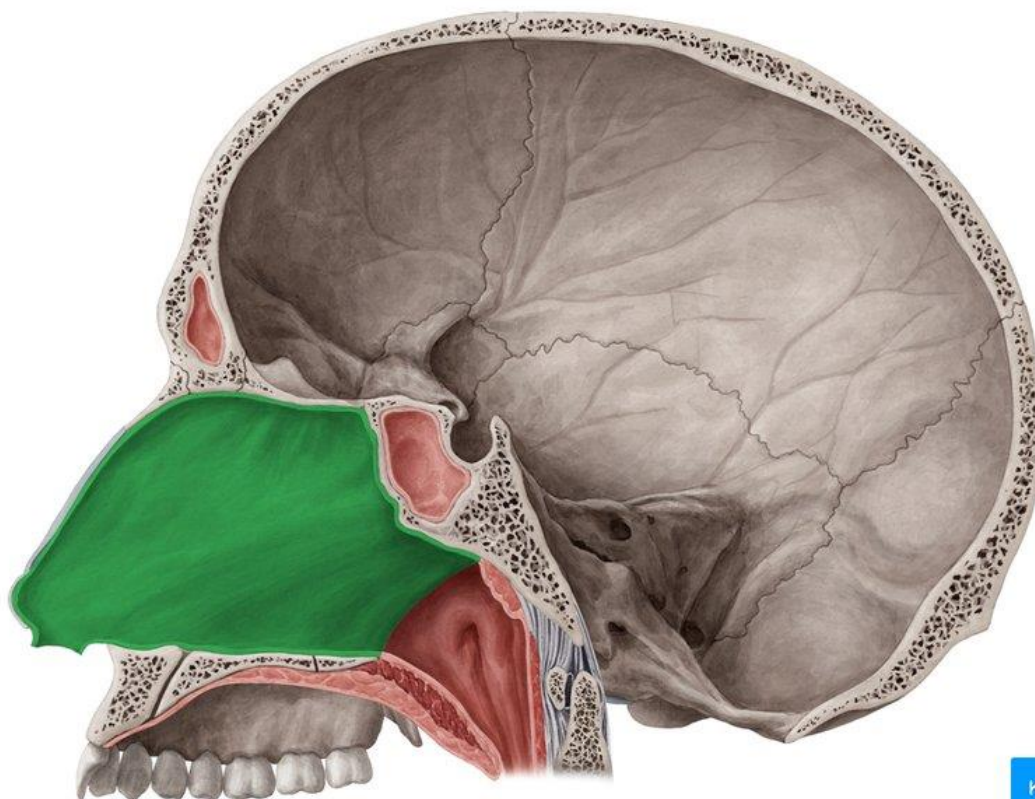
Medial wall of the nose

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

Nasal skeleton

The nasal septum is a structure consisting of both bony and cartilaginous components. The bony components are the:

- perpendicular plate of the ethmoid superoinferiorly
- the vomer posteroinferiorly
- the crests of the maxillary bone anteroinferiorly
- the crest of the palatine bone inferior to the vomer

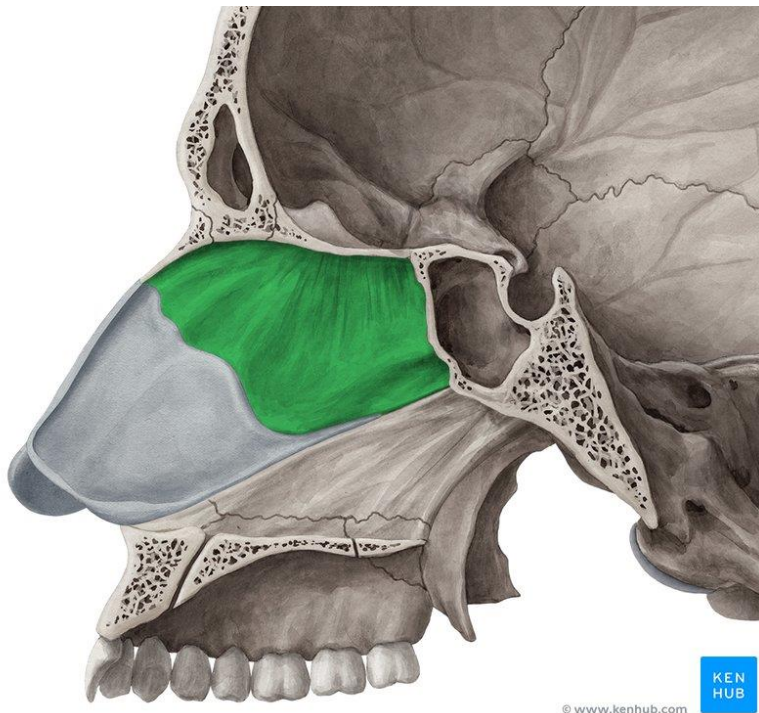


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DIAGRAM SHOWING MEDIAL VIEW OF NASAL SEPTUM

Ethmoid bone



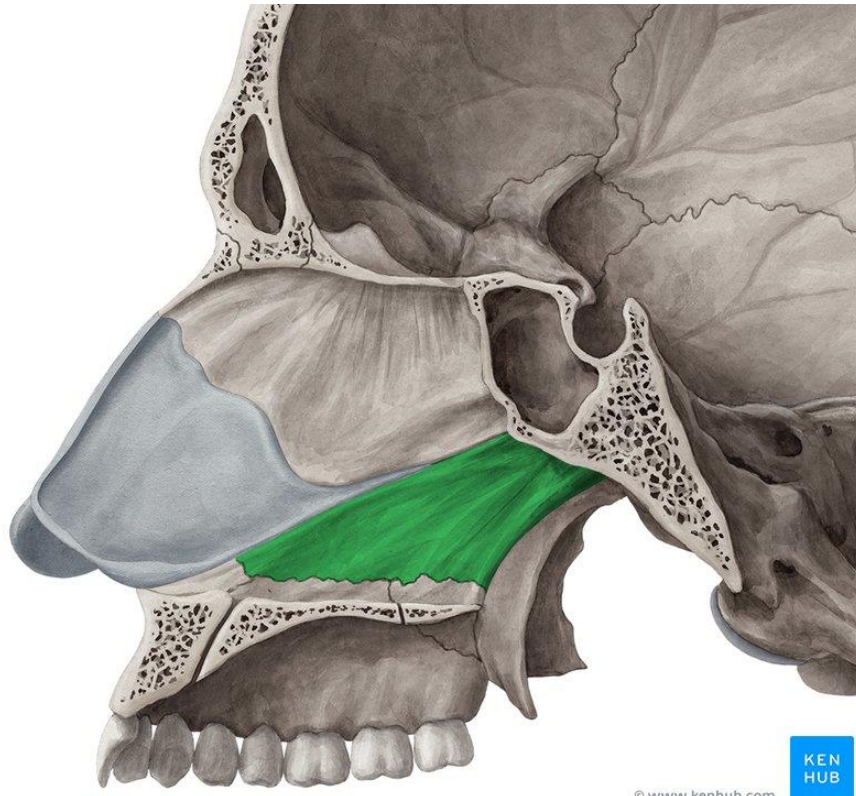
The medial wall of the nasal cavity is formed by both bony elements and cartilage. Posteriorly the perpendicular plate of the ethmoid bone forms the superoposterior part of the bony nasal septum and articulates superiorly with the cribriform plate. The posterior border articulates superiorly with the 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 palatine bone complete the posterior septum. The anterior septum is formed entirely of the quadrangular cartilage which divides the cavity in the midline. The nasal septum can be deviated in some and is a sign of nasal trauma or abnormal growth.

Vomer

The vomer is 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 bones and both maxillary bones.



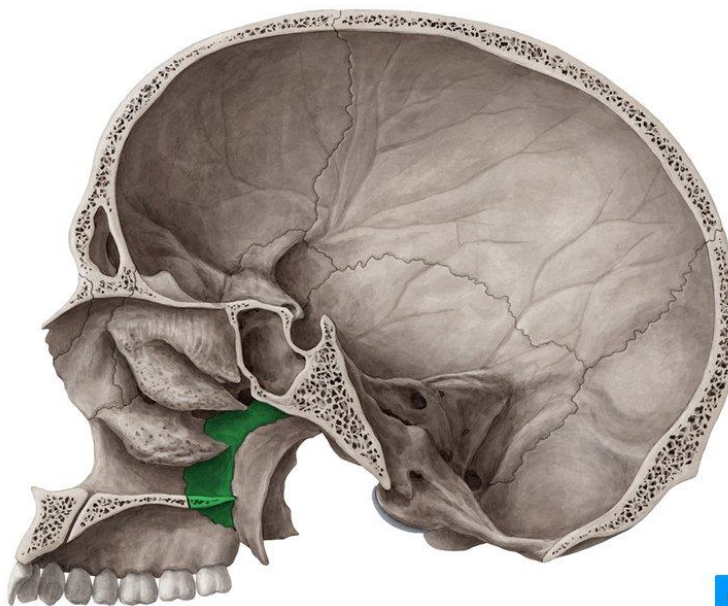
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DIAGRAM SHOWING THE MEDIAL VIEW OF THE VOMER

Palatine bone

The horizontal plate of the palatine bone is a rectangular shaped bone that projects medially and forms a right angle with the perpendicular plate of the



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ethmoid. 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 superior portion of the plate 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.

