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COURSE: GROSS ANATOMY OF THE HEAD AND NECK

DEPARTMENT: MEDICINE AND SURGERY

ASSIGNMENT

- 1) Write an essay on the cavernous sinus.
- 2) Discuss the walls of the nose.

ANSWER

1. CAVERNOUS SINUS:

The cavernous sinus is a paired Dural venous sinus located on either side of the pituitary fossa and body of the sphenoid bone between the endosteal and meningeal layers of the dura in the middle cranial fossa. It spans from the apex of the orbit to the apex of the petrous temporal bone. It is divided by numerous fibrous septa-trabeculae into a series of small caverns.

Borders

- 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.

Relations

- Superiorly: middle cerebral artery, optic chiasm.
- Anteriorly: apex of the orbit.
- Posteriorly: cerebral peduncle.
- Medially: pituitary fossa, pituitary gland.
- Laterally: temporal lobe (medial surface), Meckel's cave (posteroinferiorly).
- Inferiorly: sphenoid sinus.

Contents

In the lateral wall from superior to inferior:

- Oculomotor nerve (CN III).
- Trochlear nerve (CN IV).
- Trigeminal nerve (CN V):
 - ophthalmic division
 - maxillary division: within the very inferolateral aspect of the cavernous sinus wall or even outside the sinus rather than truly within it.

Travels through cavernous sinus:

- Abducens nerve (CN VI).
- Carotid plexus (post-ganglionic sympathetic nerve fibres).
- Internal carotid artery (cavernous portion).

Vascular connections

It receives venous blood from:

- Inferior and superior ophthalmic veins.
- Inter-cavernous sinus.
- Spheno-parietal sinus.
- Superficial middle cerebral vein.

Occasionally from:

- Central retinal vein.
- A frontal tributary of the middle meningeal vein.

Drainage of the cavernous sinus is via:

- Superior petrosal sinus to the transverse sinus.
- Inferior petrosal sinus directly to the jugular bulb.
- Venous plexus on the internal carotid artery (ICA) to the clival (basilar) venous plexuses.
- Emissary veins passing through the;

-Foramen Vesali.

-Foramen ovale: communicates between the CS and pterygoid venous plexus.

-Foramen lacerum.

- Depending on relative pressures the superior ophthalmic veins either drain to or from the cavernous sinus.

Additionally, the cavernous sinuses connect to each other via the inter-cavernous sinuses.

2. WALLS OF THE NOSE:

The nose is a prominent structure between the eyes which serves as an olfactory and respiratory organ. It is the part of the respiratory tract found above the hard palate. It provides air for respiration, serves the sense of smell, conditions the air by filtering, warming, and moistening it, and cleans itself of foreign debris extracted from inhalations. It is composed of the external nose and the nasal cavity.

The nasal cavity is subdivided into left and right halves by the nasal septum. Each half has a roof, a floor and medial and lateral walls (**Walls of the nose**)

Medial Wall

The medial wall of the nasal cavity comprises of the nasal septum.

Nasal Septum- It is a median Osseo-cartilaginous partition between the two halves of the nasal septum. It is covered by mucoperiosteum. the nasal septum is a structure consisting of both bony and cartilaginous components. The bony components are the:

- Perpendicular plate of the ethmoid - forming the superior part of the nasal septum, descends from the cribriform plate and is continued superior to this plate as the crista galli.
- The vomer posteroinferiorly- Located inferior and slightly posterior to the perpendicular plate of the ethmoid. It is attached inferiorly to the nasal crest of the maxilla and palatine bone.
- The crests of the maxillary bone antero-inferiorly.
- The crest of the palatine bone inferior to the vomer.

The cartilaginous part is formed by:

- **Septal cartilage-**This is the most anterior portion of the septum. It contains the Kiesselbach plexus. 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 the 'footplate' which is 4-8mm wide. This foot plate lies in free contact with the membranous septum. The cartilage is firmly adhered to the nasal bone by taut collagen fibres.
- The septal process of inferior nasal cartilages.

Lateral Wall

The nasal cavity's lateral wall has three medially projecting inferiorly curved bones called conchae. The conchae increase the surface area of the nose for effective air-conditioning of the inspired air. There are three conchae – inferior, middle and superior.

- 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 sphenoid-ethmoidal recess. Like the middle nasal concha, the superior concha is itself part of the ethmoid bone.

These conchae, when covered by mucosa, are termed turbinates. The turbinate's augment the surface area of the nasal cavity to aid in its functions of humidifying, warming, and humidifying the air. The turbinates create four channels. Three of these channels are termed meatuses, and the fourth is the sphenoid-ethmoidal recess.

- Sphenoid-ethmoidal Recess: Located superior to the superior turbinate and inferior to the nasal cavity roof, which is the drainage site of the sphenoid sinus.

Meatuses

- Superior Meatus: located inferior to the superior turbinate and superior to the middle turbinate; this is the drainage site of the posterior ethmoid sinus.
- Middle Meatus: located inferior to the middle turbinate and superior to the inferior turbinate - there are several structures within this meatus. This is the drainage site of the frontal, anterior ethmoid, and maxillary sinuses.
- Inferior Meatus: Located inferior to the inferior turbinate and superior to the floor of the nasal cavity. The nasolacrimal duct drains tears from the lacrimal sac at the medial aspect of the eye into the anterior portion of this meatus via Hasner's valve.

The skeleton of the lateral wall is partly bony, partly cartilaginous and partly made up of soft tissues.

Bones of the lateral wall:

- Nasal bone
- Ethmoid bone
- Perpendicular plate of the palatine bone
- The medial plate of the pterygoid process of the sphenoid bone

- Medial surface of the lacrimal and maxillary bones
- Inferior concha made up of only spongy bone.

The cartilaginous part is formed by:

- Superior nasal cartilage.
- Inferior nasal cartilage
- 3 or 4 small ala cartilages.