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17/MHS01/029

MEDICINE AND SURGERY

300LV

GROSS ANATOMY OF THE HEAD AND NECK

ANA301

QUESTION 1. Write an essay on the carvenous sinus

**CARVENOUS SINUS**

The cavernous sinus, a large venous plexus, is located on each side of the sella turcica on the upper surface of the body of the sphenoid, which contains the sphenoid (air) sinus. The cavernous sinus consists of a venous plexus of extremely thin-walled veins that extends from the superior orbital ﬁssure anteriorly to the apex of the petrous part of the temporal bone posteriorly.

The paired cavernous sinuses are against the lateral aspect of the body of the sphenoid bone on either side of the sella turcica. They are of great clinical importance because of their connections and the structures that pass through them.

Inside each cavernous sinus is the internal carotid artery with its small branches, surrounded by the carotid plexus of sympathetic nerve(s), and the abducent nerve (CN VI). The oculomotor (CN III) and trochlear (CN IV) nerves, plus two of the three divisions of the trigeminal nerve (CN V) are embedded in the lateral wall of the sinus. The artery, carrying warm blood from the body’s core, traverses the sinus ﬁ lled with cooler blood returning from the capillaries of the body’s periphery, allowing for heat exchange to conserve energy or cool the arterial blood. This does not appear to be as important in humans as it is in running animals (e.g., horses and cheetahs) in which the carotid artery runs a longer, more tortuous course through the cavernous sinuses, allowing cooling of blood before it enters the brain. Pulsations of the artery within the cavernous sinus are said to promote propulsion of venous blood from the sinus, as does gravity.

The cavernous sinuses receive blood not only from cerebral veins but also from the ophthalmic veins (from the orbit) and emissary veins (from the pterygoid plexus of veins in the infratemporal fossa). These connections provide pathways for infections to pass from extracranial sites into intracranial locations. In addition, because structures pass through the cavernous sinuses and are located in the walls of these sinuses they are vulnerable to injury due to inflammation. Structures passing through each cavernous sinus are: • the internal carotid artery,

and • the abducent nerve [VI].

Structures in the lateral wall of each cavernous sinus are, from superior to inferior:

• The oculomotor nerve [III],

• The trochlear nerve [IV],

• The ophthalmic nerve [V1],

• The maxillary nerve [V 2].

Connecting the right and left cavernous sinuses are the intercavernous sinuses on the anterior and posterior sides of the pituitary stalk.

Sphenoparietal sinuses drain into the anterior ends of each cavernous sinus. These small sinuses are along the inferior surface of the lesser wings of the sphenoid and receive blood from the diploic and meningeal veins.

**Superior and inferior petrosal sinuses**

The superior petrosal sinuses drain the cavernous sinuses into the transverse sinuses. Each superior petrosal sinus begins at the posterior end of the cavernous sinus, passes posterolaterally along the superior margin of the petrous part of each temporal bone, and connects to the transverse sinus. The superior petrosal sinuses also receive cerebral and cerebellar veins.

The inferior petrosal sinuses also begin at the posterior ends of the cavernous sinuses. These bilateral sinuses pass posteroinferiorly in a groove between the petrous part of the temporal bone and the basal part of the occipital bone, ending in the internal jugular veins. They assist in draining the cavernous sinuses and also receive blood from cerebellar veins and veins from the internal ear and brainstem.

Basilar sinuses connect the inferior petrosal sinuses to each other and to the vertebral plexus of veins. They are on the clivus, just posterior to the sella turcica of the sphenoid bone

QUESTION 2. Discuss the walls of the nose

Each nasal cavity has a floor, roof, **medial wall**, and **lateral wall**

**LATERAL WALL**

The lateral wall is characterized by three curved shelves of bone (conchae), which are one above the other and project medially and inferiorly across the nasal cavity. The medial, anterior, and posterior margins of the conchae are free.

The conchae divide each nasal cavity into four air channels;

• An inferior nasal meatns between the inferior concha and the nasal floor,

• A middle nasal meatus between the inferior and middle concha,

• A superior nasal meatus between the middle and superior concha, and

• A spheno-ethmoidal recess between the superior concha and the nasal roof.

These conchae increase the surface area of contact between tissues of the lateral wall and the respired air.

The openings of the paranasal sinuses, which are extensions of the nasal cavity that erode into the surrounding bones during childhood and early adulthood, are on the lateral wall and roof of the nasal cavities. In addition, the lateral wall also contains the opening of the nasolacrimal duct, which drains tears from the eye into the nasal cavity.

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, superior concha, middle concha and uncinate process,

• The perpendicular plate of the palatine bone,

• The medial pterygoid plate of the sphenoid bone,

• The medial surfaces of the lacrimal bones and maxillae, and

• 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.

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 spheno-ethmoidal 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 uncinate 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 the ethmoidal labyrinth to open into the frontal sinus.

The nasolacrimal duct andm ost 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.

**MEDIAL WALL**

**The medial wall of the nasal cavities is formed by the nasal septum.**

The nasal septum divides the chamber of the nose into two nasal cavities. The septum has a bony part and a soft mobile cartilaginous part. The main components of the nasal septum are the perpendicular plate of the ethmoid, the vomer, and the septal cartilage.

The thin perpendicular plate of the ethmoid bone, 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, a thin ﬂat bone, forms the postero-inferior part of the nasal septum, with some contribution from the nasal crests of the maxillary and palatine bones. The septal cartilage has a tongue-andgroove articulation with the edges of the bony septum.

The medial wall of each nasal cavity is the mucosa-covered surface of the thin nasal septum, which is oriented vertically in the median sagittal plane and separates the right and left nasal cavities from each other.

The nasal septum consists of:

• The septal nasal cartilage anteriorly,

• Posteriorly, mainly the vomer and the perpendicular plate of the ethmoid bone,

• Small contributions by the nasal bones where they meet in the midline, and the nasal spine of the frontal bone, and

• Contributions by the nasal crests of the maxillary and palatine bones, rostrum of the sphenoid bone, and the incisor crest of the maxilla.