Name: EKEADAH Adaeze .c.

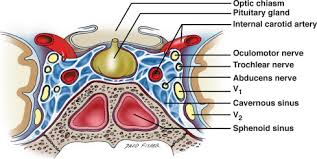
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1. **The carvaneous sinus**

This is a large channel of venous blood creating a "sinus" cavity bordered by the sphenoid bone and the temporal bone of the skull, It is important because of its structure and contents which include the CNIII (oculomotor) nerve, CNIV (trochlear) nerve (parts 1 (the ophthalmic nerve) and 2 (the maxillary nerve) of the CNV (trigeminal) nerve, and CNVI (abducens) nerve.

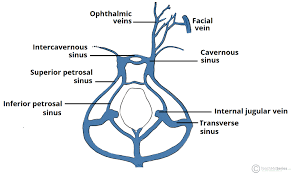


**Structure and Function**

This works as a conduit, the Cranial nerves leaving the brainstem travel through it before entering the **orbit** to innervate extraocular and intrinsic eye muscles. Different venous tributaries also drain into it.

1. The *superior ophthalmic vein* collects venous blood from the **ethmoidal, vorticose, central retinal, and nasofrontal** veins before draining into its anterior part through the superior orbital fissure.
2. The *inferior ophthalmic vein* receives blood from the **lacrimal sac, eyelids, the inferior rectus and inferior oblique muscles, the vorticose** vein, and from the anterior and medial wall of the orbit, It then runs posteriorly toward the lower part of the orbit and divides into two branches:

One joins the cavernous *sinus* while the other one drains into the pterygoid plexus. The *superficial middle cerebral* originates on the lateral surface of the hemisphere, runs in the lateral sulcus, and drains most of the temporal lobe into itself. The *sphenoparietal sinus* receives blood from some branches of the **middle meningeal vein** before draining into the cavernous sinus, the **efferent hypophyseal** veins also drain it. After collecting venous blood from these different veins, the cavernous sinus drains to the **superior and inferior petrosal sinuses** which joins the **sigmoid sinus** to form the **internal jugular vein** which exits the brain through the jugular foramen and connects with the **subclavian vein** to become the right or **left brachiocephalic vein.**



**Arterial Supply and Lymphatics**

The ***common carotid artery*** bifurcates in the *cervical region* and gives rise to the external and internal carotid artery, the internal carotid artery travels superiorly and enters the skull via the **carotid canal**. After entering the canal, the internal carotid makes a 90-degree turn and travels horizontally in the **petrous part of the temporal bone** (I.e. the petrous part of the internal carotid artery), this part enters the cavernous sinus (via the foramen lacerum). In here, the internal carotid artery (**the cavernous part**) travels horizontally and anteriorly until it reaches the anterior limit of the sinus, where it curves vertically, exits the sinus superiorly and becomes the **cerebral part** of the internal carotid artery. It is important to know that the **cavernous part of the internal carotid artery** is the **only** artery in the body that is surrounded completely by **venous blood**.

**Nerves**

1. **The CN III (oculomotor nerve)** exits the midbrain ventrally at the interpeduncular fossa, pierces the dura and enters the cavernous sinus (where it runs on the roof and lateral wall). After exiting it, it goes through the superior orbital fossa. Within the superior orbital fossa, it splits into the superior and inferior division.
2. **The CN IV (trochlear nerve)** is the only nerve exiting the midbrain dorsally from the trochlear nerve nucleus. It crosses the midline and emerges inferior to the inferior colliculus (situated in the posterior part of the midbrain). It then travels anteriorly around the midbrain, pierces and enters the dura mater (near the tentorium cerebelli) and continues its course in the lateral wall of the cavernous sinus. After exiting the sinus, it enters the orbit through the **superior orbital fissure** to innervate the superior oblique muscle.

**The ophthalmic nerve (V1) and the maxillary nerve (V2)** are divisions of the **trigeminal nerve (CN V** that exits the brainstem from the ventrolateral pons and enters the *Meckel’s cave* (where the trigeminal ganglion lies).

The V1 branches of the ganglion pass through the inferior part of the cavernous sinus and after exiting the sinus, they enter the orbit via the superior orbital fissure. Also,

The V2 branches of the ganglion enter the cavernous sinus and exit the skull via the foramen rotundum.

1. **The CN VI (abducens)** exits the brainstem ventrally at the pontomedullary junction, pierces the dura and travels the *longest* intracranial distance of all the cranial nerves. After its long course, it enters the cavernous sinus where it is surrounded by venous blood (like the internal carotid artery)

**CLINICAL ANATOMY**

* *Cavernous sinus thrombosis*: a blood clot within this which causes the cavernous sinus syndrome.
* *Cavernous sinus syndrome:* characterized by edema (swelling) of the eyelids and the conjunctivae of the eyes and paralysis of the cranial nerves which course through it.

1. **The nasal cavity**

It is divided into two lateral compartments separated down the middle by **the nasal septum.** It communicates anteriorly through the nostrils and posteriorly with the nasopharynx through openings (choanae). The nasal cavities and septum are lined with a mucous membrane that are richly vascularized by branches of the **maxillary, facial, and ophthalmic arteries**. The cavity receives innervation via branches of the olfactory [cranial nerve (CN) I], ophthalmic (CN V-1), and maxillary nerves (CN V-2).



**Boundaries of the Nasal Cavity**

It is bordered by the following structures

1. **Roof**: Formed by the nasal, frontal, sphenoid, and ethmoid bones (cribriform foramina, which transmits CN I for smell).
2. **Floor:** Formed by the maxilla and the palatine bones, The incisive foramen transmits branches of the sphenopalatine artery and the nasopalatine nerve for general sensation from the nasal cavity and palate.
3. **Medial wall:** (nasal septum). Formed by the perpendicular plate of the ethmoid bone, the mover bone, and the septal cartilage.
4. **Lateral wall**: Formed by the superior, middle and inferior nasal conchae. In addition, the maxillary, sphenoid, and palatine bones contribute to it with the following openings:

* *Sphenoethmoidal recess:* The space between the superior nasal concha and the sphenoid bone (with openings from the sphenoid sinus)
* *Superior meatus*: The space inferior to the superior nasal concha with openings from the posterior ethmoidal air cells.
* *Middle meatus:* The space inferior to the middle nasal concha with openings for the frontal sinus via the nasofrontal duct, the middle ethmoidal air cells on the ethmoidal bulla, and the anterior ethmoidal air cells and maxillary sinus in the hiatus semilunaris.
* *Inferior meatus*. The space inferior to the inferior nasal concha, with an opening for the nasolacrimal duct, which drains tears from the eye into the nasal cavity.
* *Sphenopalatine foramen*: An opening posterior to the middle nasal concha receives the nasopalatine nerve and the sphenopalatine artery from the pterygopalatine fossa into the nasal cavity.