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Gross Anatomy Assignment 2

Question: Write an essay on the cavernous sinus.

The cavernous sinus within the human head is one of the dural venous sinuses creating a cavity called the lateral sellar compartment bordered by the temporal bone of the skull and the sphenoid bone, lateral to the sella turcica. It takes its source from the middle cerebral vein, sphenoparietal sinus, superior and inferior ophthalmic veins.

It drains to the inferior and superior petrosal sinuses.

The cavernous sinus is one of the dural venous sinuses of the head. It is a network of veins that sit in a cavity, approximately 1 x 2 cm in size in an adult.[2] The carotid siphon of the internal carotid artery, and cranial nerves III, IV, V (branches V1 and V2) and VI all pass through this blood filled space.

Nearby structures to the cavernous sinus

Superiorly: optic tract, optic chiasma, internal carotid artery.

Inferiorly: Foramen lacerum and the junction of the body and greater wing of sphenoid bone.

Medially: Hypophysis cerebri or (pituitary gland) and sphenoidal air sinus.

Laterally: temporal lobe with uncus.

Anteriorly: superior orbital fissure and the apex of the orbit.

Posteriorly: apex of petrous temporal bone

Contents of the cavernous sinus

Apart from the blood which passes through a venous sinus, several anatomical structures, including some cranial nerves and their branches, also pass through the sinus.

Structures within the outer (lateral) wall of the compartment from superior to inferior:

Oculomotor nerve,

Trochlear nerve,

Ophthalmic and maxillary branches of the trigeminal nerve,

Structures passing through the midline (medial) wall:

Abducens nerve,

Internal carotid artery accompanied by the Internal carotid plexus.

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).

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.

Function of the 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

1. It is the only anatomic location in the body in which an artery travels completely through a venous structure. If the internal carotid artery ruptures within the cavernous sinus, an arteriovenous fistula is created (more specifically, a carotid-cavernous fistula). Lesions affecting the cavernous sinus may affect isolated nerves or all the nerves traversing through it.

2. The pituitary gland lies between the two paired cavernous sinuses. An

abnormally growing pituitary adenoma, sitting on the bony sella turcica, will expand in the direction of least resistance and eventually compress the cavernous sinus. Cavernous sinus syndrome 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 sympathetics, but may be difficult to appreciate in the setting of a complete third nerve injury.

2. Discuss the walls of the nose

Each half which is the nasal cavity has a roof, floor, and medial and lateral walls. Each half is separated by the nasal septum.

The lateral wall of each nasal cavity mainly consists of the maxilla. However, there is a deficiency that is compensated for by the perpendicular plate of the palatine bone, the medial pterygoid plate, the labyrinth of ethmoid and the inferior concha. The paranasal sinuses are connected to the nasal cavity through small orifices called ostia. Most of these ostia communicate with the nose through the lateral nasal wall, via a semi-lunar depression in it known as the semilunar hiatus. The hiatus is bound laterally by a projection known as the unciniate process. This region is called the ostiomeatal complex.

The roof of each nasal cavity is formed in its upper third to one half by the nasal bone and more inferiorly by the junctions of the upper lateral cartilage and nasal septum. Connective tissue and skin cover the bony and cartilaginous components of the nasal dorsum.

The floor of the nasal cavities, which also form the roof of the mouth, is made up by the bones of the hard palate: the horizontal plate of the palatine bone posteriorly and the palatine process of the maxilla anteriorly. The most anterior part of the nasal cavity is the nasal vestibule. The vestibule is enclosed by the cartilages of the nose and lined by the same epithelium of the skin (stratified squamous, keratinized). Within the vestibule this changes into the typical respiratory epithelium that lines the rest of the nasal cavity and respiratory tract. Inside the nostrils of the vestibule are the nasal hair, which filter dust and other matter that are breathed in. The back of the cavity blends, via the choanae, into the nasopharynx.

Medial wall also the nasal septum

The nasal cavity is divided in two by the vertical nasal septum. On the side of each nasal cavity are three horizontal outgrowths called nasal conchae (singular "concha") or turbinates. These turbinates disrupt the airflow, directing air toward the olfactory epithelium on the surface of the turbinates and the septum. The vomeronasal organ is located at the back of the septum and has a role in pheromone detection.