

Why the Internal Carotid Artery Present within Cavernous Sinus?

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Many venous sinuses are present within the dura matter inside the cranial cavity; one of them is the cavernous sinus. It appears as a network of veins that sit in a cavity, nearly 1 x 2 cm in size in an adult. Cavernous sinus is important clinically because of the presence of many structures within and nearby the sinus like the internal carotid artery, and number of cranial nerves III, IV, V (branches V1 and V2) and VI as well as its communications with number of veins and venous plexuses inside and outside of the skull. The following structures are the boundaries of the sinus [1,2]:

- **Above:** Optic tract, optic chiasma, internal carotid artery.
- **Inferiorly:** Foramen lacerum with the union of the body and greater wing of sphenoid.
- **Medially:** Pituitary gland and sphenoidal air sinus within the body of the sphenoid.
- **Laterally:** Temporal lobe of the brain with uncus.
- **Anteriorly:** Superior orbital fissure that leads to the orbit.
- **Posteriorly:** Petrous part of temporal bone.

The venous blood come to the cavernous sinus via [1,2]:

- Ophthalmic veins (both superior and inferior).
- Middle and Inferior cerebral veins, superficial cortical veins and sphenoparietal sinus which located at the posterior end of lesser wing of sphenoid.

The venous blood leaves the sinus via two larger channels superior and inferior petrosal sinuses as well as via the emissary veins through the foramina of the skull (mostly foramen ovale), ultimately into the internal jugular vein via the sigmoid venous sinus. There are also connections with the pterygoid venous plexus via

inferior ophthalmic vein, deep facial vein, the basilar venous plexus posteriorly, and emissary veins.

The structures within the outer wall of the compartment from above downward [2]:

- Oculomotor nerve (III).
- Trochlear nerve (IV).
- Ophthalmic and maxillary branches of the trigeminal nerve (V1 and V2).

The structures passing through the midline of the sinus are [1,2]:

- Abducens nerve (VI).
- Internal carotid artery with the sympathetic plexus that covered it.

The artery travels completely through a venous structure. If the internal carotid artery ruptures within the cavernous sinus, a carotid-cavernous fistula is created. Lesions affecting the cavernous sinus may affect isolated structure or all the structures traversing through it.

The pituitary gland lies in sella turcica on the body of the sphenoid between the two paired cavernous sinuses. An abnormally growing pituitary adenoma will expand and eventually invade the cavernous sinus [3].

The presence of internal carotid artery within the cavernous sinus may facilitate the movement of the venous blood by the pulsation that present within the artery which makes a vibration inside the sinus. This fact also explains why the artery accompanied the

vein in the body. We also seen in anatomy artery have relatively the same size of the vein to prevent any damage from the pulsation of artery to the adjacent vein.

In subarachnoid space also we found the cerebral arteries may facilitate by pulsation the movement of cerebral spinal fluid (CSF) towards the superior sagittal sinus.

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