Cavernous sinus

Since the pioneering work of Parkinson, \(^1\) \(^2\) several studies have described the microsurgical anatomy and surgical procedures involving the cavernous sinus.

The cavernous sinus (CS) (or lateral sellar compartment), is a large collection of thin-walled veins creating a cavity bordered by the temporal bone of the skull and the sphenoid bone, lateral to the sella turcica.

The sinus may be joined by several anastomoses across the midline.

The cavernous sinus contains the carotid artery and some of its branches; The Oculomotor nerve, the trochlear nerve (IV), abducens nerves (VI), ophthalmic nerve (V1); and transmits venous blood from multiple sources.

The lateral wall of the cavernous sinus is formed by the condensation of the sheaths of the third, fourth, and first division of the fifth cranial nerves. This sheath condensation extends anteriorly to join the orbit at the superior orbital fissure.

Certain aspects of a survey are of particular interest: (1) the oculomotor nerve, trochlear nerve, and ophthalmic nerves do not run in the lateral dural wall of the cavernous sinus; (2) venous sinuses of the cavernous sinus flow freely in a medial direction both anterior and posterior to the dorsum sellae; (3) trabeculae in the form of collections of fine areolar tissue extend between the vascular and neural elements. The amount present is variable; (4) the horizontal section of the internal carotid artery within the cavernous sinus runs a variable course in relation to the hypophysis and the lateral dural wall; (5) the oculomotor nerve lies within a meningeal envelope as far anteriorly as the tip of the anterior clinoid process; (6) the ophthalmic nerve communicates with the oculomotor, trochlear, and abducent nerves in the anterior part of the cavernous sinus; (7) the abducens nerve may lie within a meningeal envelope in the posterior part of the cavernous sinus; (8) the greater part of the sympathetic nerve plexus around the vertical part of the internal carotid artery passes into the abducent and ophthalmic nerves. Sympathetic fibres pass into the sheaths surrounding the oculomotor and trochlear nerves. Sympathetic ganglia are suspended from the ophthalmic nerve \(^3\).

Blood supply

The artery of the inferior CS usually branches off into the recurrent meningeal artery, artery of foramen rotundum, and accessory meningeal artery, exiting through the foramen ovale. These often supply the tumor capsule and are important tumor feeders that may have to be devascularized during skull base exposure. Another branch of the cavernous ICA shown is the meningohypophyseal trunk dividing into further branches. The cavernous sinus contains the carotid artery and some of its branches and transmits venous blood from multiple sources.

The cavernous sinus receives blood via the superior ophthalmic vein and inferior ophthalmic vein through the superior orbital fissure and from superficial cortical veins, and is connected to the basilar venous plexus of veins posteriorly.

The internal carotid artery (carotid siphon), and cranial nerves III, IV, V (branches V1 and V2) and VI all pass through this blood filled space. Infection from the face may reach the cavernous sinus through its many anastomotic connections, with severe consequences. The cavernous sinus drains by
two channels, the superior and inferior petrosal sinuses, ultimately into the internal jugular vein via the sigmoid sinus.

1. inflowing veins:
   a) superior & inferior ophthalmic veins
   b) superficial middle cerebral veins
   c) sphenoparietal sinus
   d) superior & inferior petrosal sinus

2. outflow:
   a) sphenoparietal sinus
   b) superior petrosal sinus
   c) basilar plexus (which drains to the inferior petrosal sinus)
   d) pterygoid plexus
   e) the right and left cavernous sinuses communicate anteriorly and posteriorly via the circular sinus

**Triangles**

see Cavernous sinus triangles

For the diagnosis and surgical treatment of diseases around the cavernous sinus (CS), radiologists should achieve complete mastery of the sectional anatomy of the CS, and neurosurgeons need to understand the stereoscopic orientation of the CS and circumjacent structures. However, despite the complicated structure of the CS, the current educational resources for its sectional and stereoscopic anatomy are insufficient. Another problem is that the definition of CS walls varies for each researcher.

The combination of the hexahedron theory, the sectioned images, and the 3D models in this study will enhance the efficiency of studying CS anatomy. The educational resources of a study of Chung et al. can be obtained free of charge by medical students, radiologists, and neurosurgeons requiring knowledge of CS anatomy.

By drilling off the suprameatal tubercle and part of the petrous apex, Meckel's cave may be opened, the trigeminal nerve mobilized, and the tentorium divided. Thus the parasellar region may be exposed and the posterosuperior space of the cavernous sinus approached. Using an endoscope-assisted technique and following cisternal anatomy, the sellar and parasellar region may be explored even if the working space is narrow. The retrosigmoid intradural suprameatal approach provides optimal accessibility to medially located central skull base structures, in particular to the posterior part of the cavernous sinus. Use of the endoscope may remarkably optimize the accessibility.
Cavernous sinus lesion

see Cavernous sinus lesion

Cavernous sinus approaches

see Cavernous sinus approaches


