



KARNATAKA RADIOLOGY EDUCATION PROGRAM

Cerebral venous anatomy and Applied Radiology - 2

Dural venous sinuses

Dural venous sinuses are venous channels located intracranially between the two layers of the dura mater (endosteal layer and meningeal layer) and can be conceptualised as trapped epidural veins. Unlike other veins in the body, they run alone and not parallel to arteries. Furthermore, they are valveless, allowing for bidirectional blood flow from and into intracranial veins.

Together the dural venous sinuses form the major drainage pathways from the brain, predominantly to the internal jugular veins.

It is important to note that the draining territories of intracranial veins are different from those of arterial territories of the major cerebral arteries.

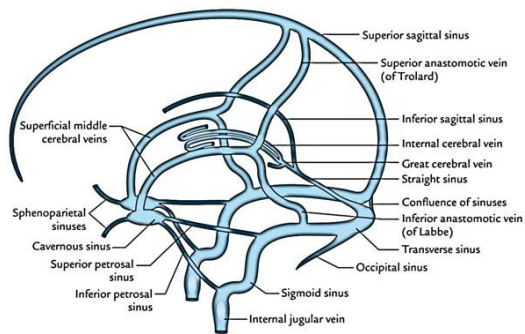
The main dural venous sinuses can be classified as midline unpaired sinuses and bilateral sinuses that often drain to midline vessels:

Unpaired sinuses

- superior sagittal sinus
- inferior sagittal sinus
- straight sinus
- occipital sinus
- intercavernous sinus

Paired sinuses

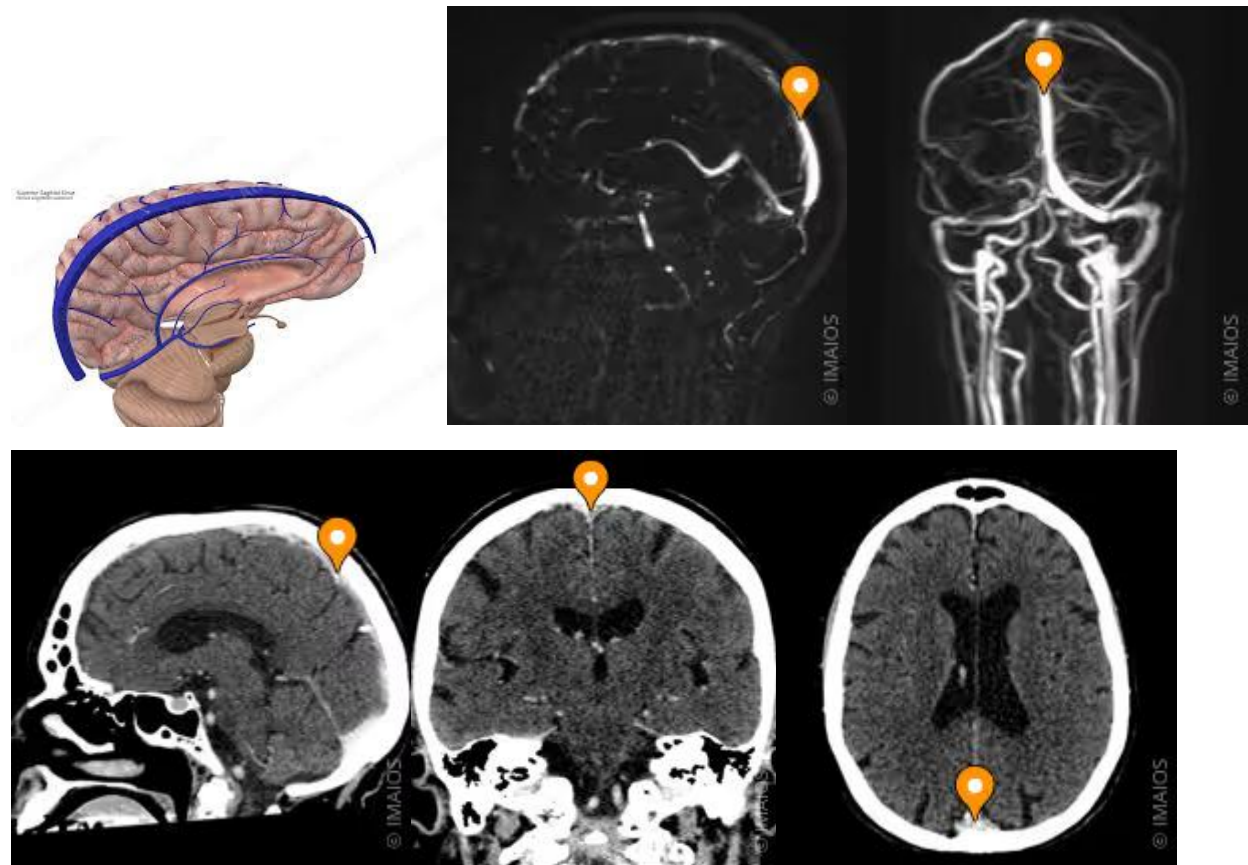
- transverse sinus
- sigmoid sinus
- superior petrosal sinus
- inferior petrosal sinus
- cavernous sinus
- sphenoparietal sinus
- basilar venous plexus

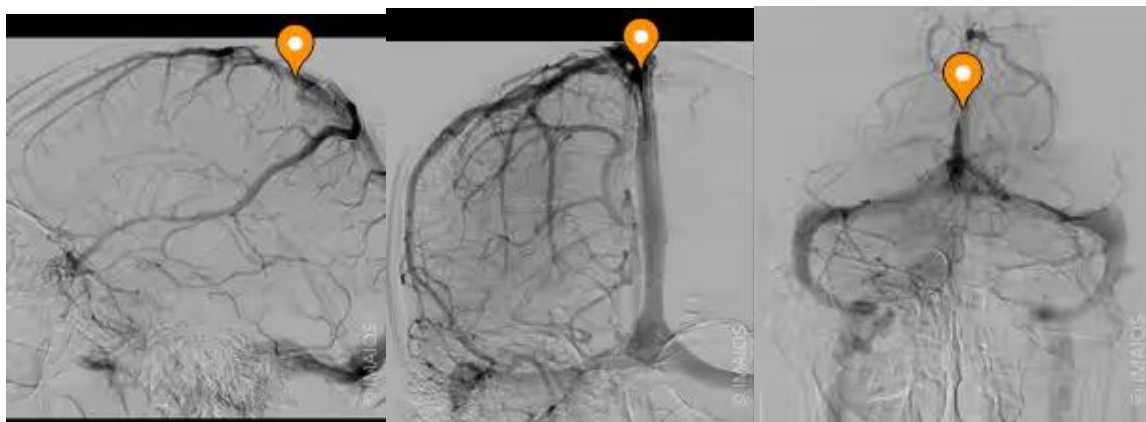
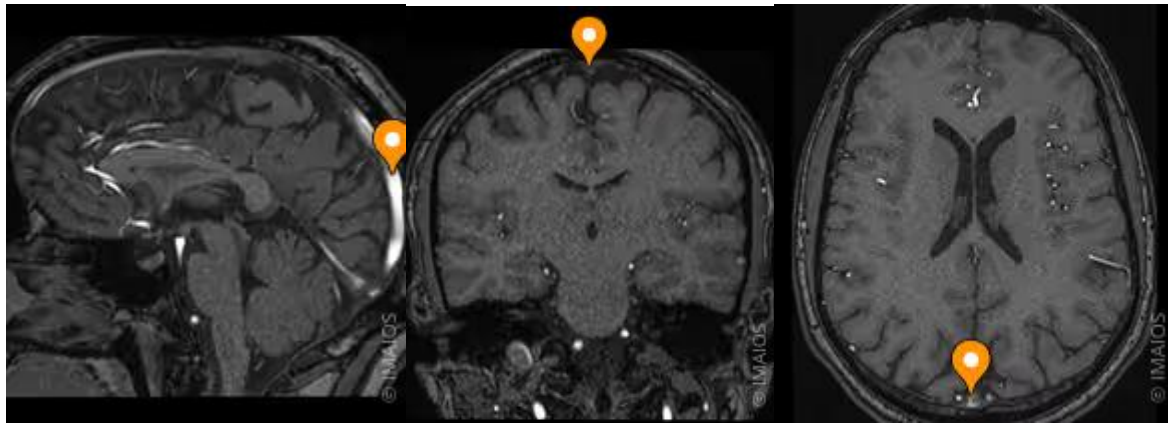


Unpaired Sinuses

Superior sagittal sinus

The superior sagittal sinus (SSS) is the largest dural venous sinus. As the name suggests, it runs in a sagittal plane in the superior aspect of the falx cerebri. It extends from the foramen cecum anteriorly to its termination at the confluence of sinuses at the internal occipital protuberance posteriorly, where it usually proceeds rightward and into the right transverse sinus. It receives venous blood from many and varied veins of the superficial cortical veins of the cerebral hemispheres.

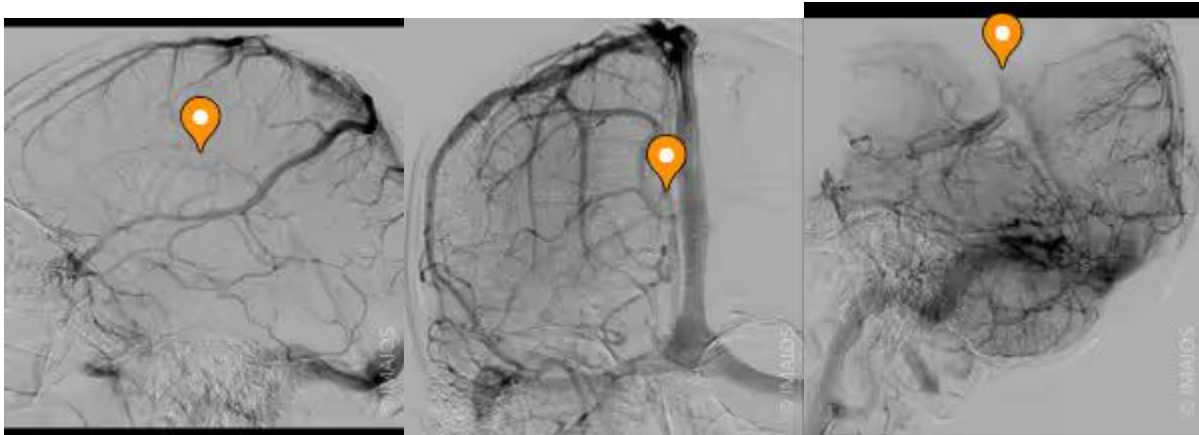
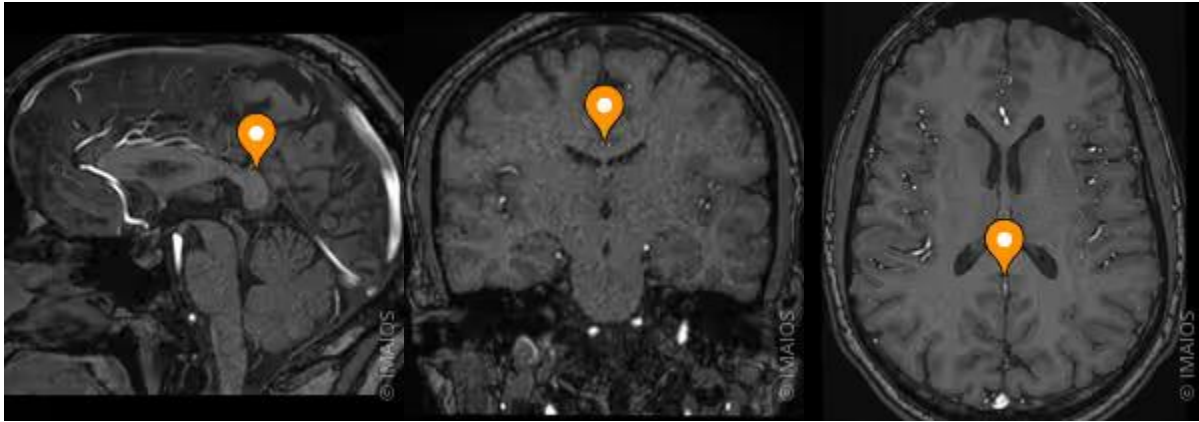
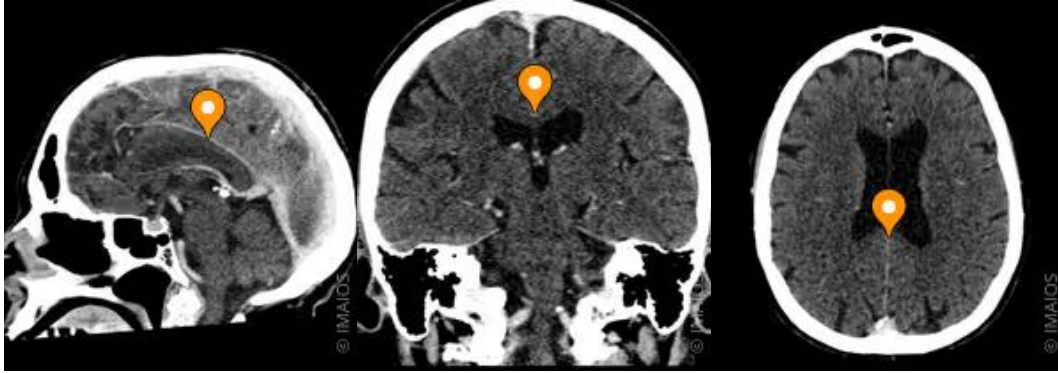
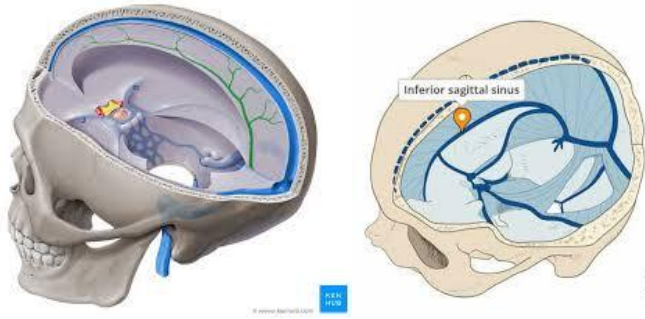


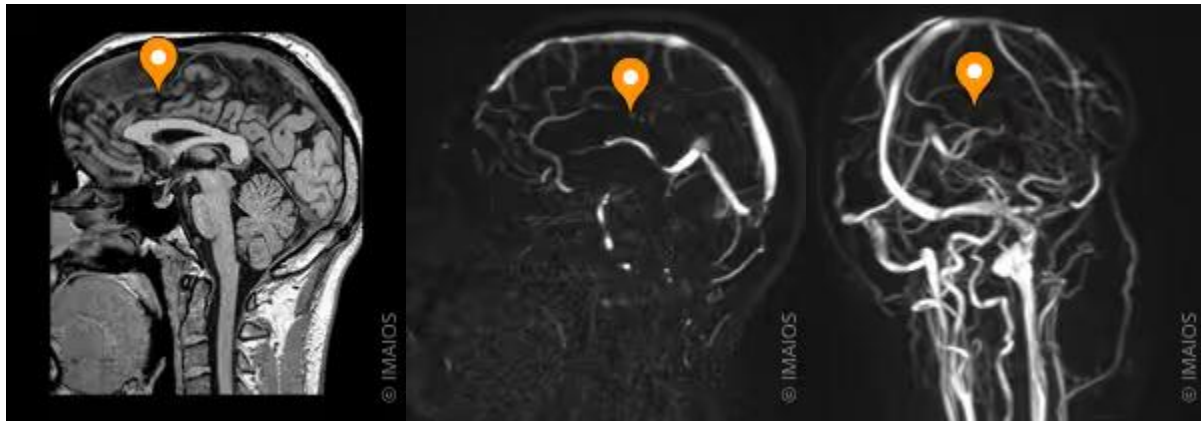


The mean pressure in the superior sagittal sinus (SSS) and in the torcular were 20.9mmHg (SD ± 7.3) and 20.8 mmHg (SD ± 6.8), respectively. The mean LPOP was 22mmHg (SD ± 6.4). Pressure measured in the transverse venous sinus, the torcular, and the SSS correlated with LPOP ($p < 0.001$).

Inferior sagittal sinus

The inferior sagittal sinus is one of the dural venous sinuses and runs along the inferior (free) edge of the falx cerebri ¹. It runs from anterior to posterior, the same as the superior sagittal sinus, and drains into the straight sinus. It receives tributaries from the falx itself as well as some small veins from the medial surface of the cerebral hemispheres.





Straight sinus

The straight sinus is one of the main dural venous sinuses and is found at the junction between the falx cerebri and the tentorium cerebelli and is triangular in cross-section.

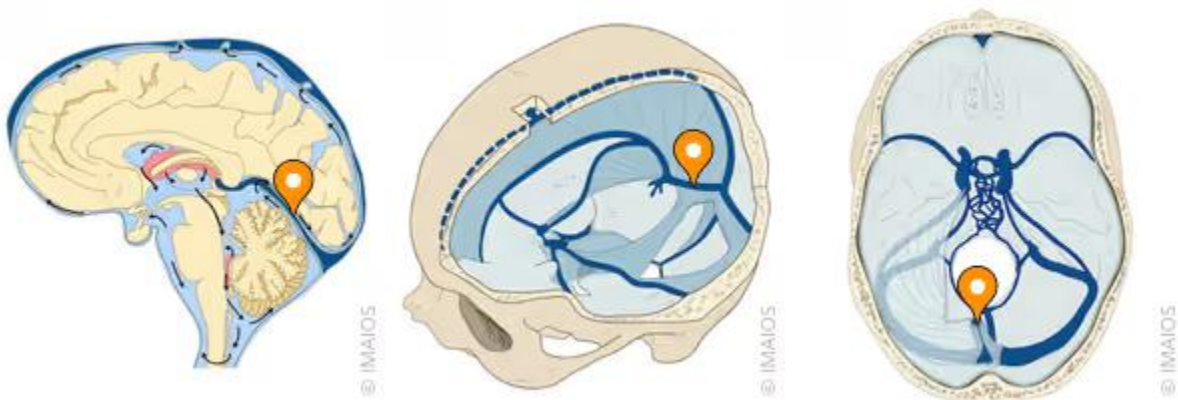
It receives the inferior sagittal sinus and the vein of Galen at its anterior end and some superior cerebellar veins along its course, and runs posteroinferiorly towards the confluence of sinuses, although the exact drainage is variable:

confluence of sinuses (56%)

left transverse sinus (21%)

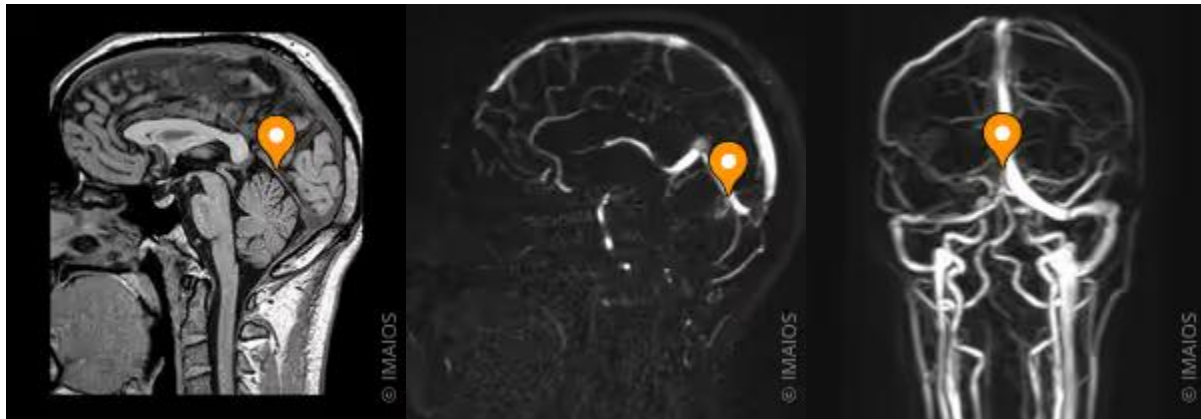
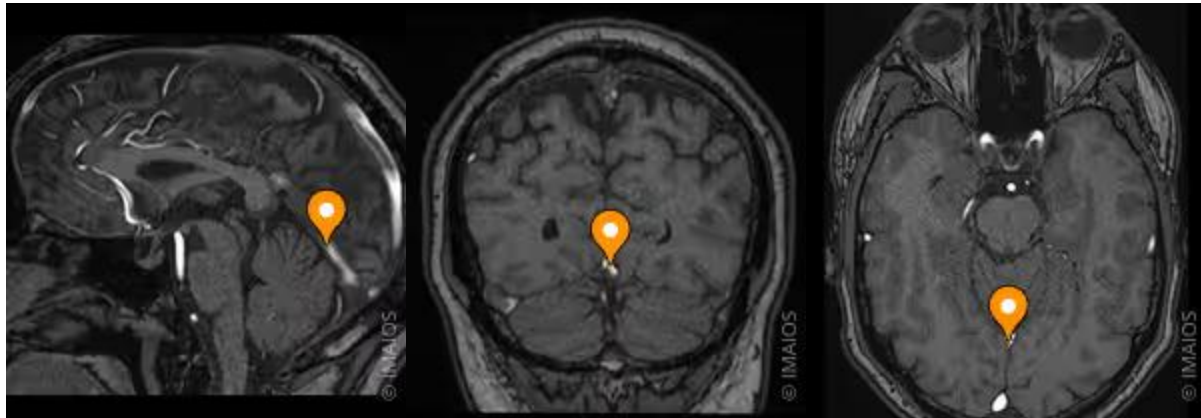
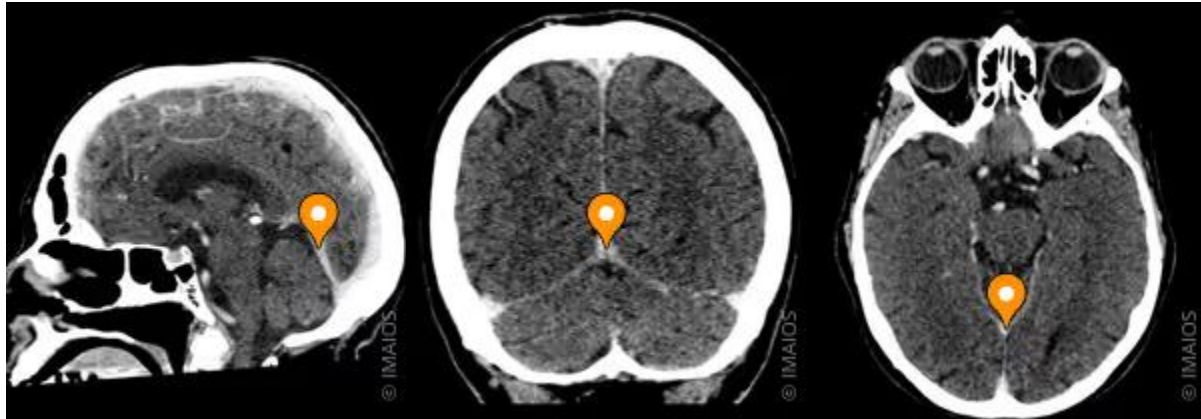
right transverse sinus (13%)

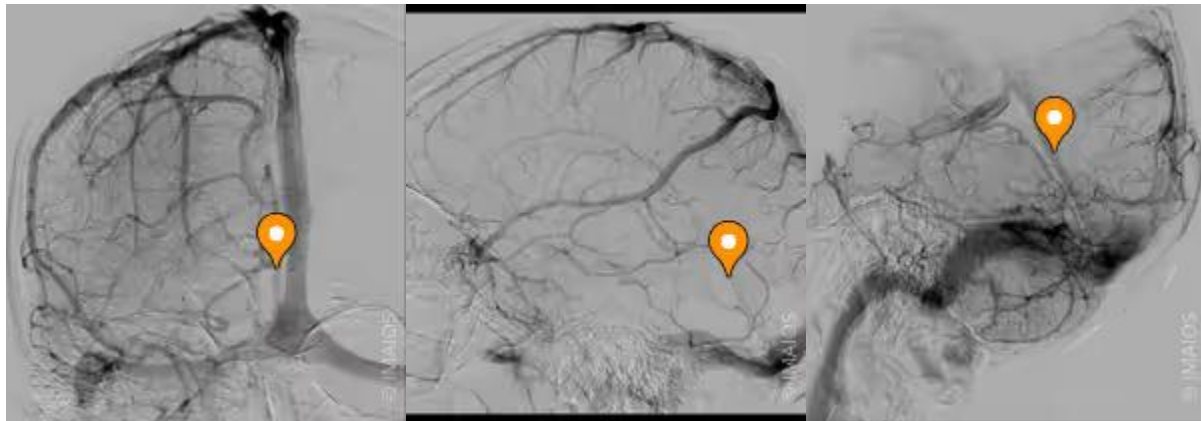
It is occasionally duplicated or hypoplastic. When absent a persistent falcine sinus is usually identified, draining directly into the superior sagittal sinus.



It is triangular in section, increases in size as it proceeds backward, and runs downward and backward from the end of the inferior sagittal sinus to the transverse sinus of the opposite side to that into which the superior sagittal sinus is prolonged. Its terminal part communicates by a cross branch with the confluence of the sinuses. Besides the inferior

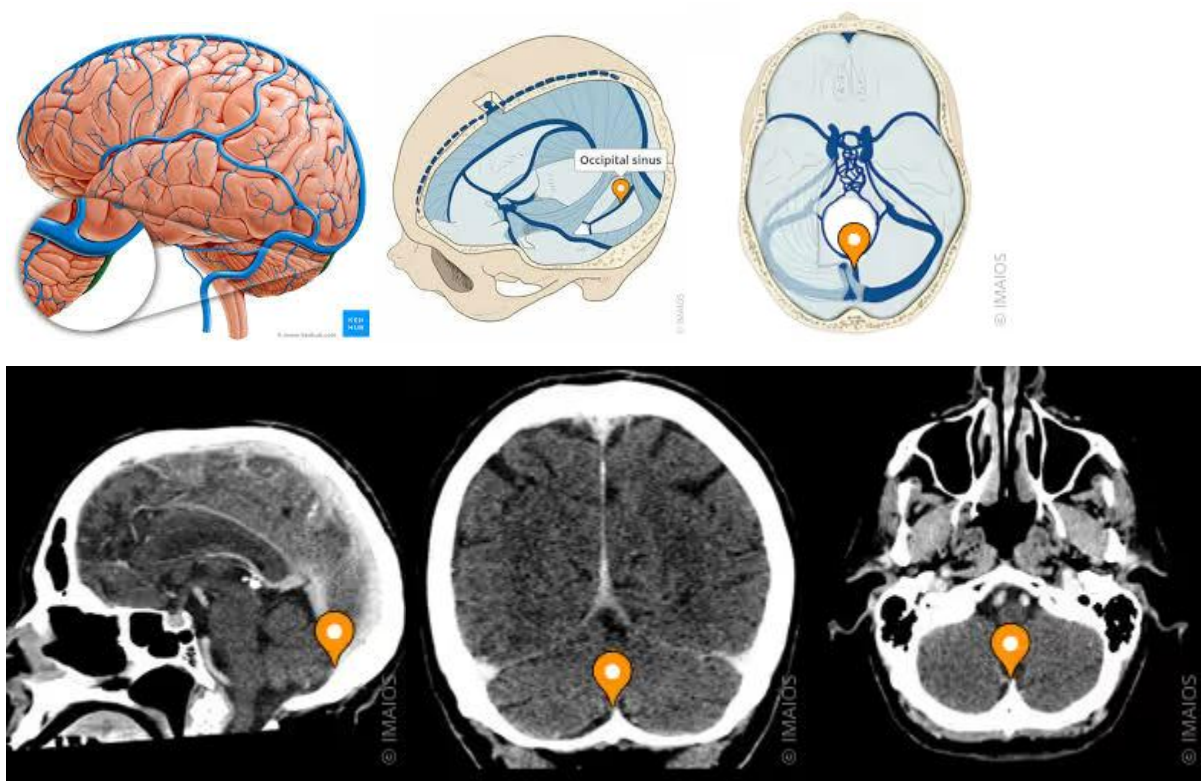
sagittal sinus, it receives the great cerebral vein (great vein of Galen) and the superior cerebellar veins. A few transverse bands cross its interior.

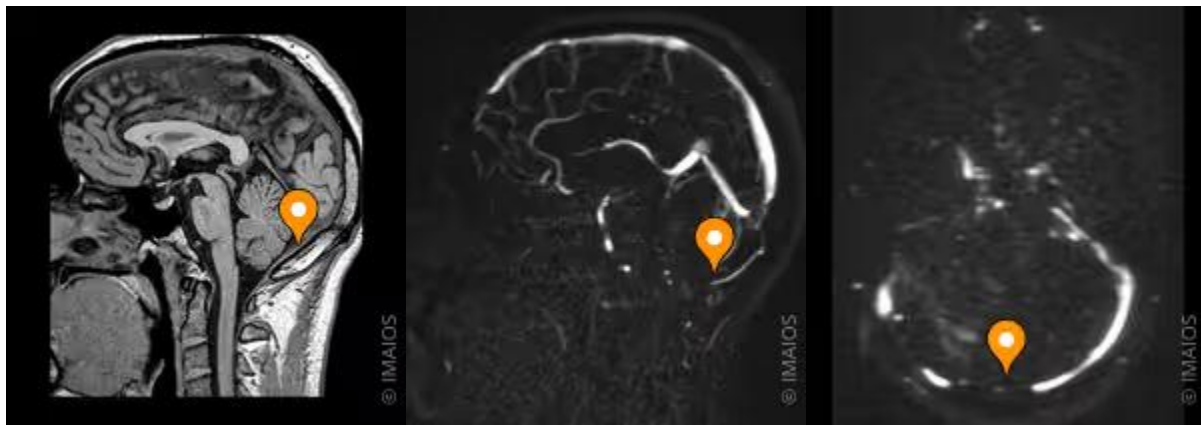
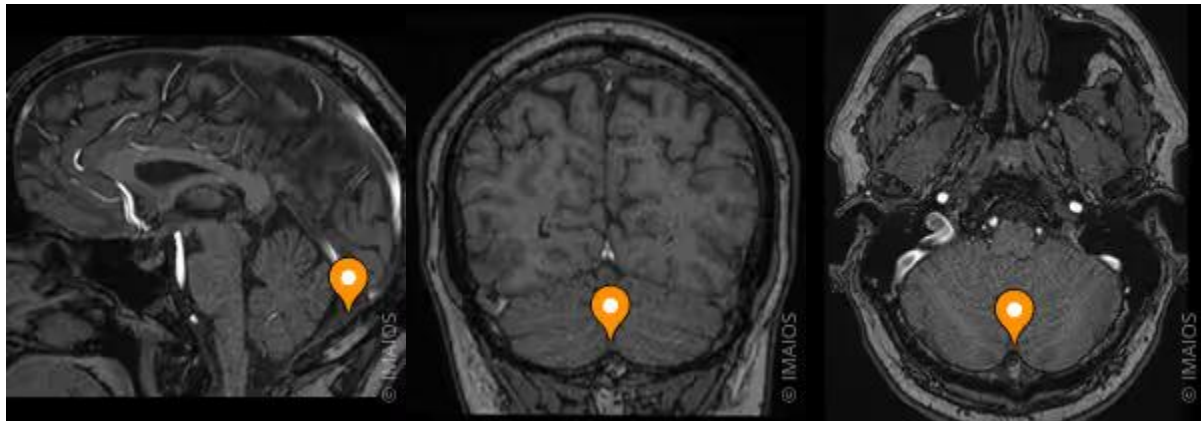




Occipital sinus

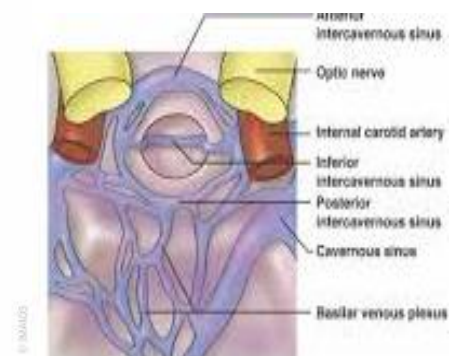
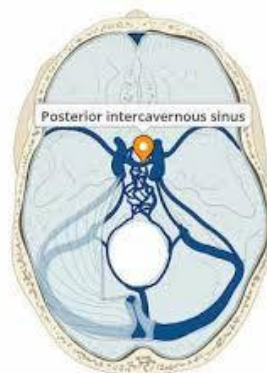
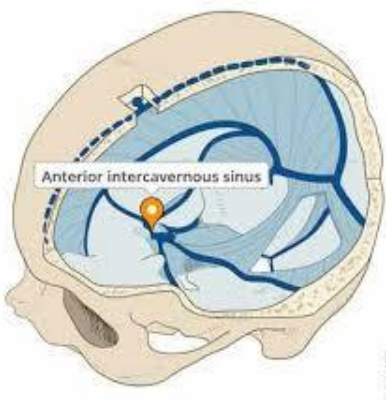
The occipital sinus is one of the smallest dural venous sinuses and lies, as its name suggests, on the inner surface of the occipital bone. Tributaries from the marginal sinus of the foramen magnum, some of which connect with both the sigmoid sinus and vertebral venous plexus, coalesce to pass in the attached margin of the falx cerebelli to drain posterosuperiorly at the confluence of the sinuses. The occipital sinus is worth mentioning when reporting posterior fossa masses or conditions that will require a posterior fossa craniotomy, as the sinus may be large or, more importantly, off midline.





Intercavernous sinus

The intercavernous sinuses (anterior, posterior, and inferior) are variable dural venous sinuses that connect the left and right cavernous sinuses. Some authors also include in this group the basilar venous plexus (basilar sinus) and sinus of the dorsum sellae . The anterior, posterior, and inferior intercavernous sinuses lie in the anterior, posterior, and inferior borders of the sella turcica. These venous sinuses, especially the anterior and inferior intercavernous sinuses, are prone to bleeding during transsphenoidal surgery of the sellar region.



Origin : The intercavernous sinus is unpaired sinus which lies within the attached border of the diaphragma sellae.

Course: The intercavernous sinus forms a complete circular venous sinus around the sella turcica.

Tributaries: Small irregular sinuses inferior to the pituitary gland drain into the intercavernous sinuses.

Structures Drained: The intercavernous sinus connects the two cavernous sinuses situated on either side of the sella turcica. Like other venous sinuses, the connection is valveless and the blood can flow between the two cavernous sinuses in a bidirectional fashion.

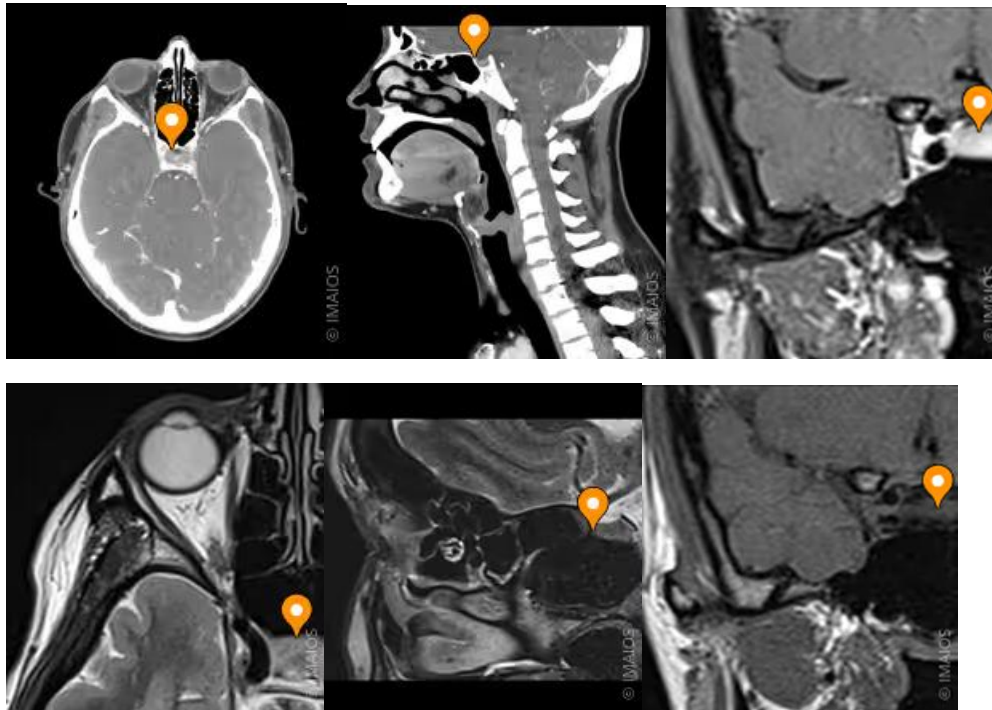
The intercavernous sinuses are three in number:

The anterior intercavernous sinus passes in front of the hypophysis cerebri. The anterior one is usually the larger of the three.

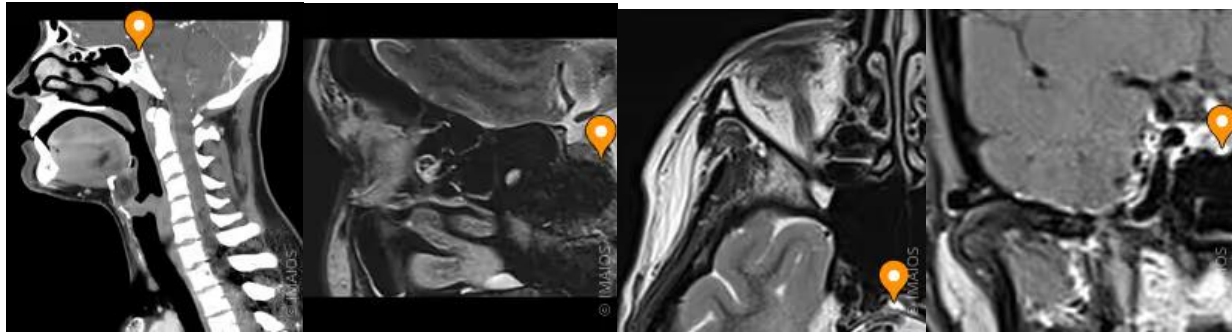
The posterior intercavernous sinus passes in behind of the hypophysis cerebri .

The inferior intercavernous sinus is located below the pituitary gland in the sella turcica. Its presence has been controversial among anatomists because it is not always found on radiological imaging or during cadaveric dissections (in 26 % of specimens for Wahl et al.).

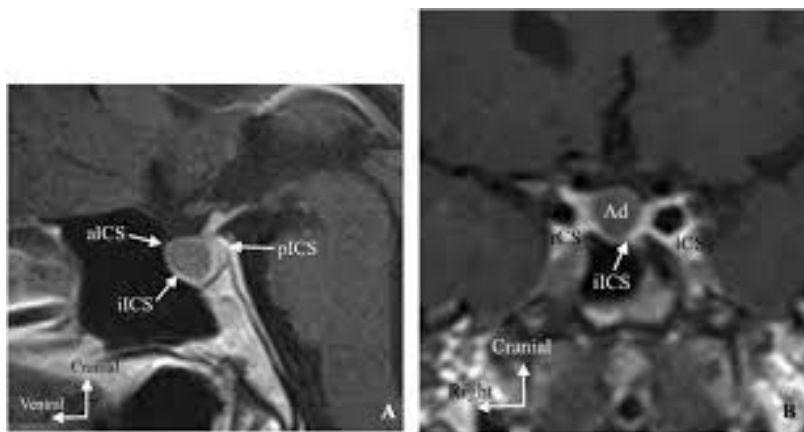
Anterior intercavernous



Posterior intercavernous



Inferior intercavernous



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