KREP

2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM

Cerebral venous anatomy and Applied Radiology - 3

Paired sinuses

Transverse sinuses

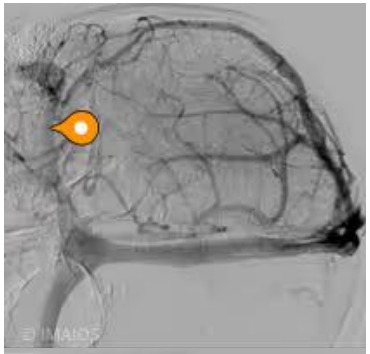
The paired left and right transverse sinuses, or lateral sinuses, are major dural venous sinuses and arise from the confluence of the superior sagittal, occipital and straight sinuses at the torcular herophili (confluence of sinuses).

On each side, the transverse sinus then runs in the lateral border of the tentorium cerebelli and grooves the occipital and squamous temporal bones. In their anterolateral portion they receive the inferior anastomotic vein (of Labbé). They terminate in the sigmoid sinus just as it receives the superior petrosal sinus from the cavernous sinus. In turn, the sigmoid sinuses continue as the jugular bulbs in the skull base.

Variant anatomy

The transverse sinuses exhibit highly variable anatomy, which at times makes imaging evaluation of them, in those with possible dural venous sinus thrombosis, very difficult. For example, one study demonstrated :

39% hypoplasia of the left sinus
31% symmetric
20% aplasia of the left sinus
6% hypoplasia of the right sinus
4% aplasia of the right sinus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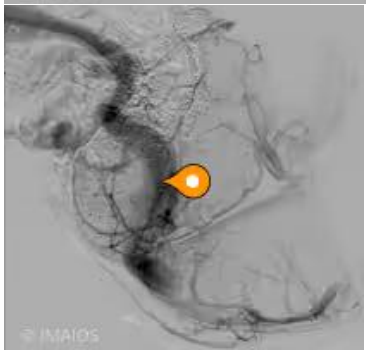
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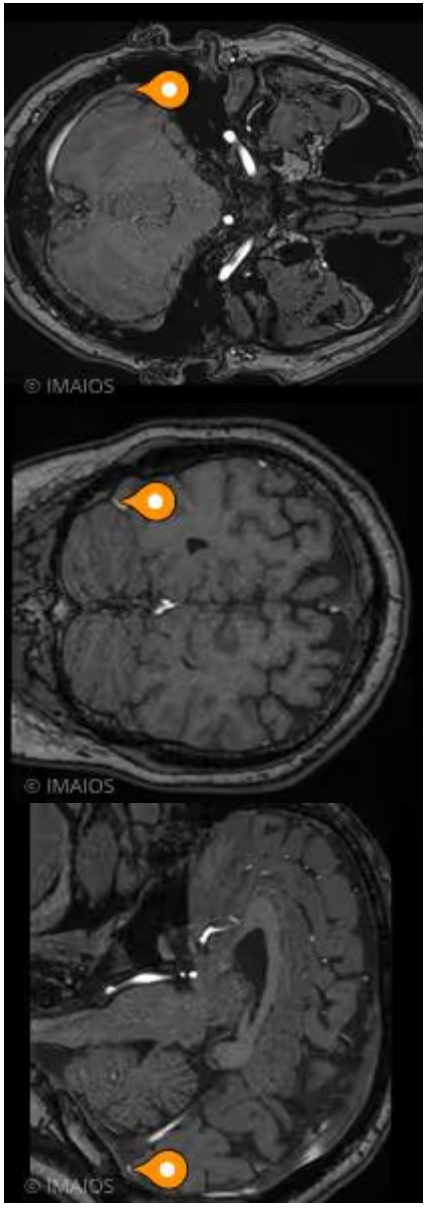
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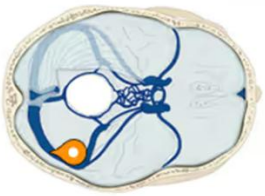
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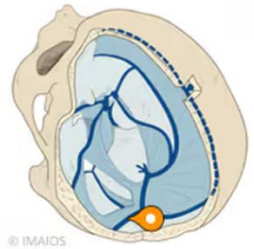
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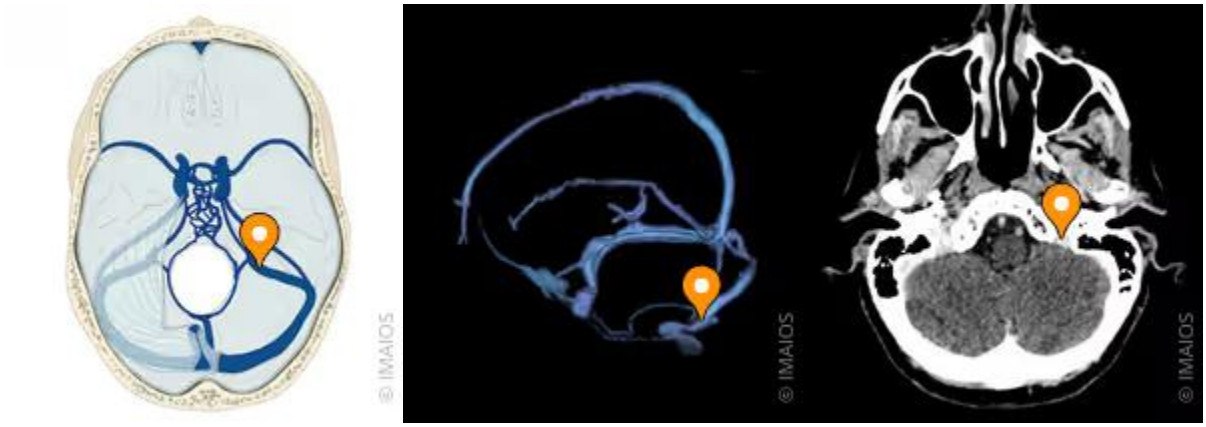
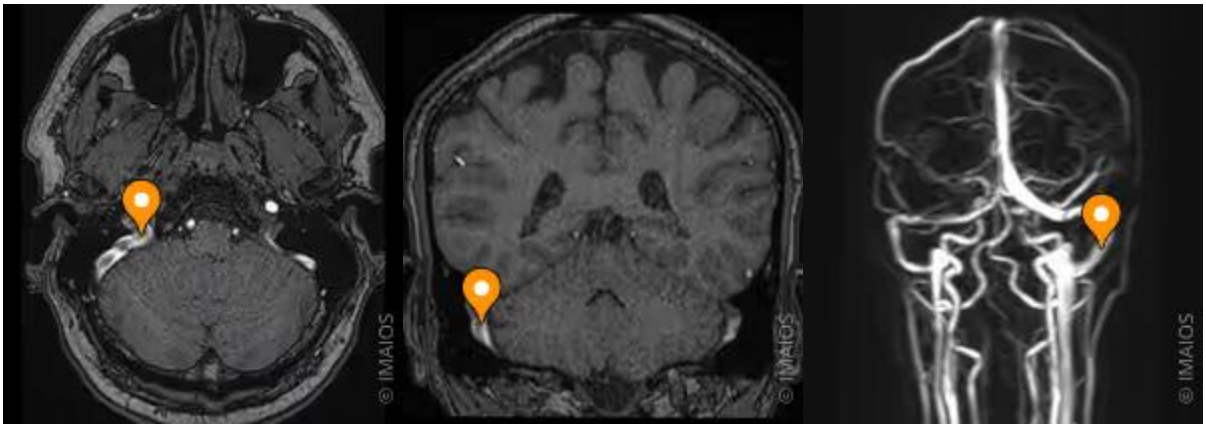
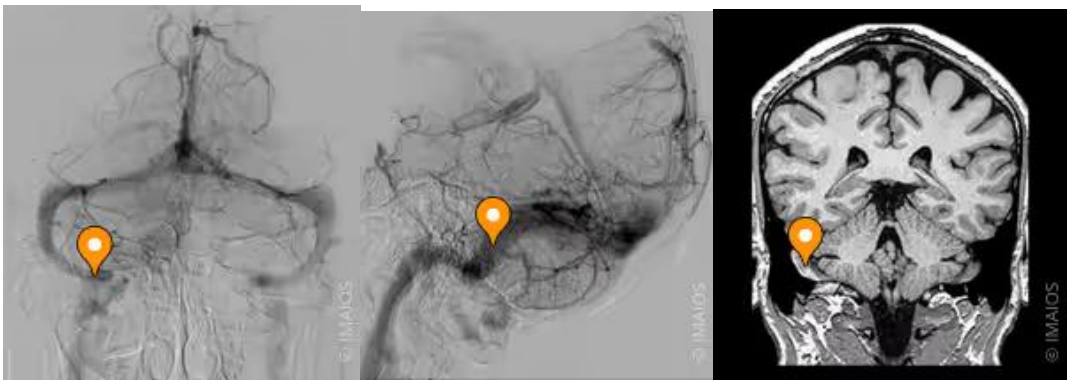
Sigmoid Sinuses

The sigmoid sinus (plural: sigmoid sinuses) is a paired structure and one of the dural venous sinuses. It is the continuation of the transverse sinus (which is similarly variable in size) and becomes the sigmoid sinus as the tentorium cerebelli ends. It is here that the sinus receives the superior petrosal sinus.

It passes inferiorly in an "S"-shaped groove posteromedial to the mastoid air-cells to the jugular foramen, where it ends in the jugular bulb, in the posterior half of the foramen (pars vascularis). It has connections via mastoid and condylar emissary veins with pericranial veins.

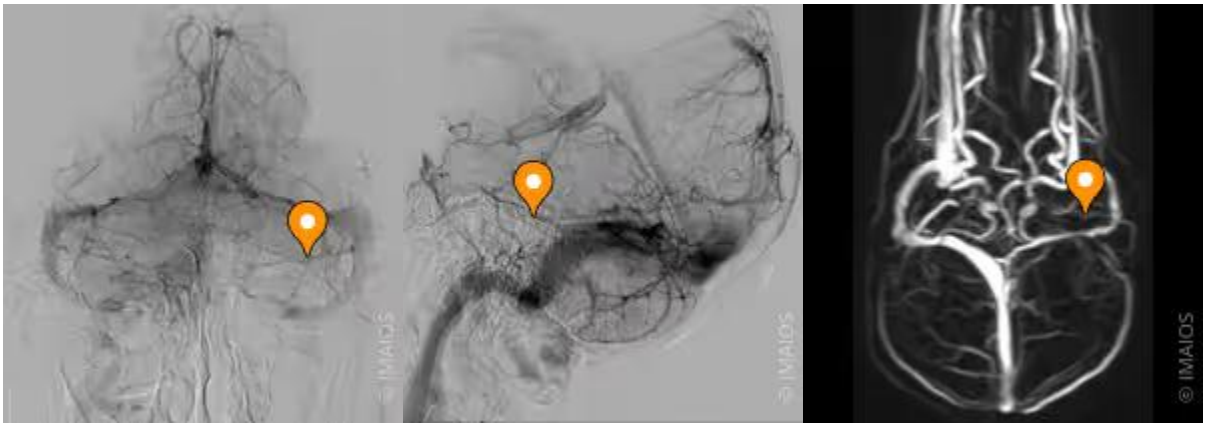






Superior petrosal sinus

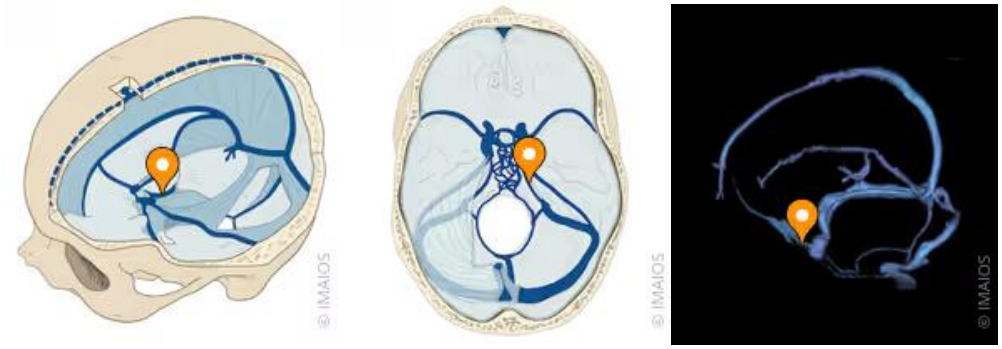
The superior petrosal sinus is one of the dural venous sinuses and drains the cavernous sinus. It courses posterolaterally to drain into the sigmoid sinus at the continuation of the transverse sinus. It runs along the superior aspect of the petrous temporal bone

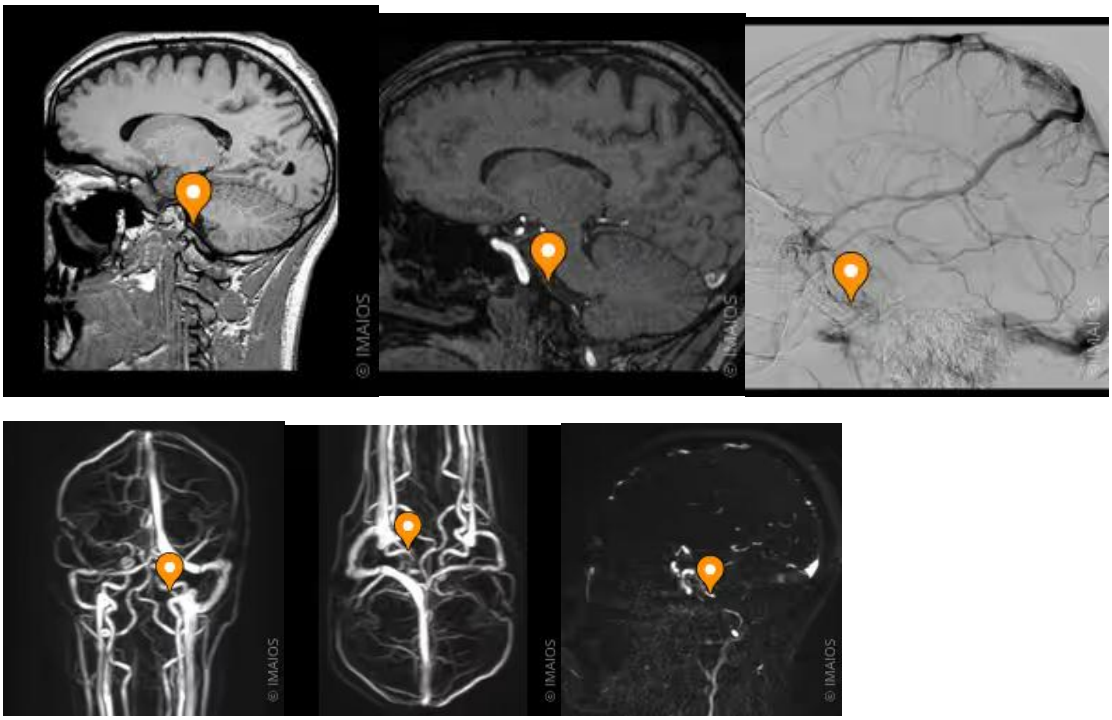


Inferior Petrosal Sinuses

The inferior petrosal sinus is one of the dural venous sinuses. It is often a plexus of venous channels rather than a true sinus and drains blood from the cavernous sinus to the jugular bulb through the jugular foramen (pars nervosa) or sometimes via a vein which passes through the hypoglossal canal to the suboccipital venous plexus. The inferior petrosal sinus is usually larger than its superior counterpart and empties the majority of the blood from the cavernous sinus.

It leaves the posterior wall of the cavernous sinus under the petroclinoid ligament, inferior to the superior petrosal sinus and runs in a shallow groove between the petrous temporal bone and basilar occipital bone (on either side of the clivus). It is connected across the midline by the basilar plexus.
Along with the cavernous sinus, it receives tributaries from the medulla oblongata, pons, and inferior surface of the cerebellum as well as labyrinthine veins (via the cochlear canaliculus and the vestibular aqueduct).





Cavernous Sinuses

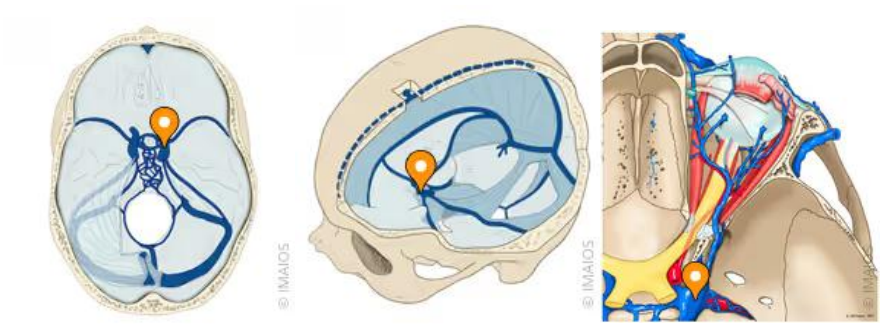
The cavernous sinuses (sinus cavernosus) are so named because they present a reticulated structure, due to their being traversed by numerous interlacing filaments.

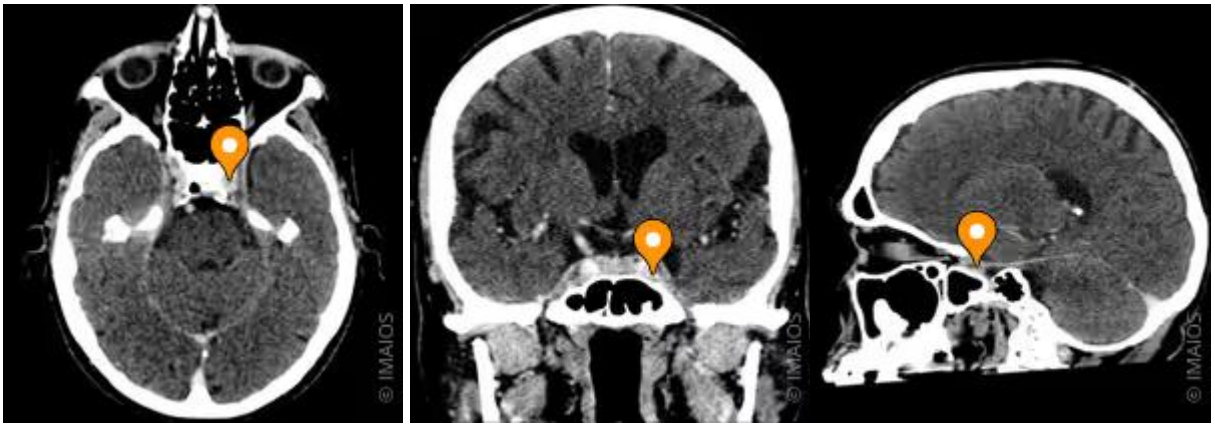
They are of irregular form, larger behind than in front, and are placed one on either side of the body of the sphenoid bone, extending from the superior orbital fissure to the apex of the petrous portion of the temporal bone. Each opens behind into the petrosal sinuses.

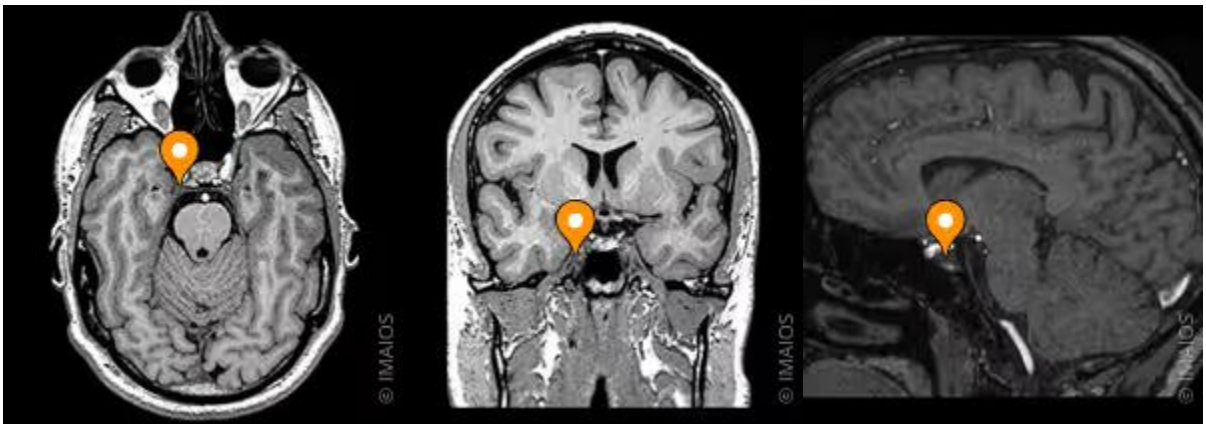
On the medial wall of each sinus is the internal carotid artery, accompanied by filaments of the carotid plexus; near the artery is the abducent nerve; on the lateral wall are the oculomotor and trochlear nerves, and the ophthalmic and maxillary divisions of the trigeminal nerve. These structures are separated from the blood flowing along the sinus by the lining membrane of the sinus.

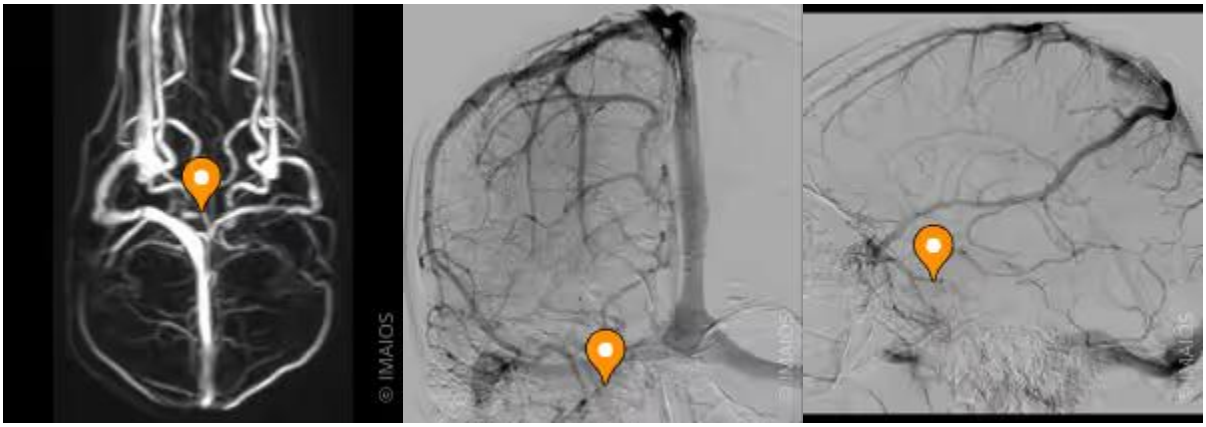
The cavernous sinus receives the superior ophthalmic vein through the superior orbital fissure, some of the cerebral veins, and also the small sphenoparietal sinus, which courses along the under surface of the small wing of the sphenoid.

It communicates with the transverse sinus by means of the superior petrosal sinus; with the internal jugular vein through the inferior petrosal sinus and a plexus of veins on the internal carotid artery; with the pterygoid venous plexus through the foramen Vesalii, foramen ovale, and foramen lacerum, and with the angular vein through the ophthalmic vein.
The two sinuses also communicate with each other by means of the anterior and posterior intercavernous sinuses.



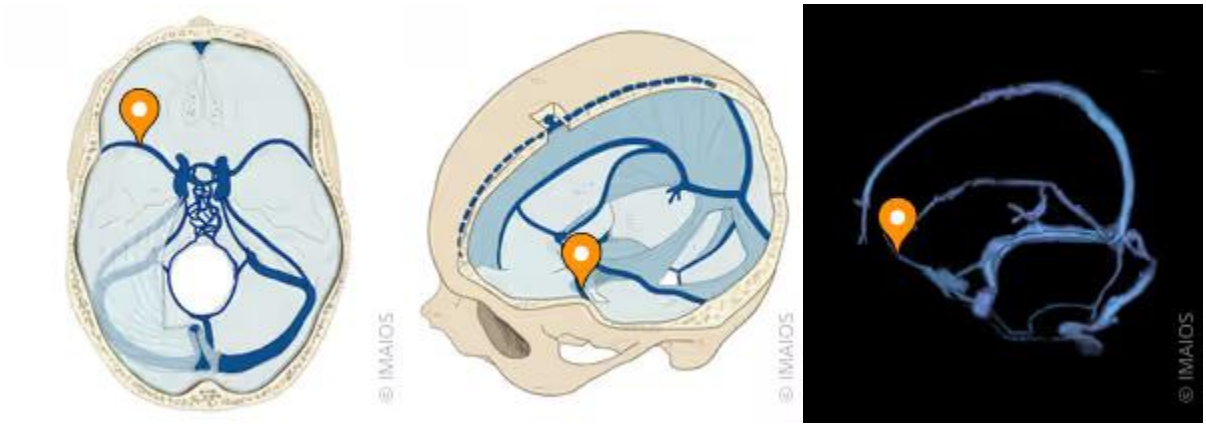


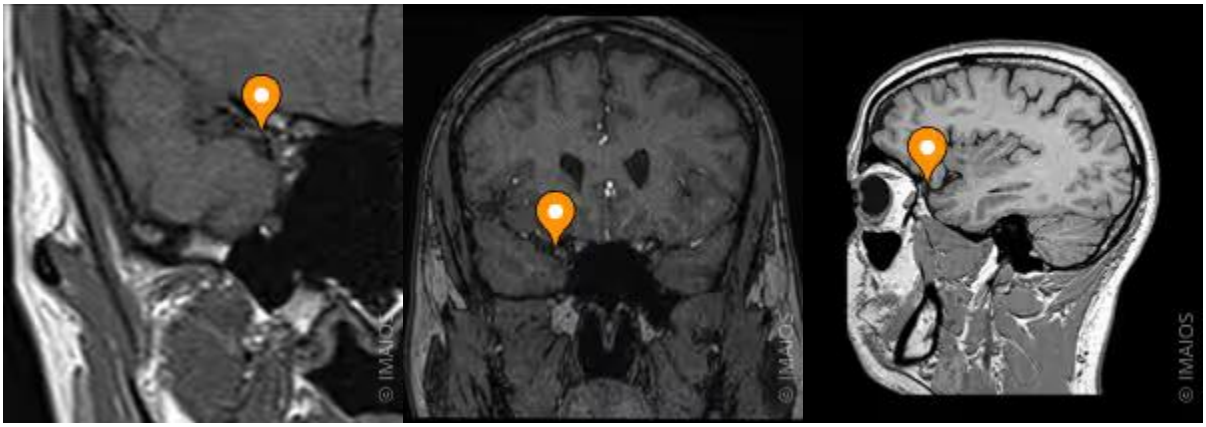




Sphenoparietal Sinuses

The sphenoparietal sinus is an inconsistent 1 dural venous sinus, that is located along the posteroinferior ridge of the lesser wing of the sphenoid bone. It forms as the confluence of the sinus of the lesser sphenoid wing and of the parietal portion of the frontal ramus of the middle meningeal vein. It drains into the cavernous sinus and receives tributaries from:
superficial middle cerebral vein (also known as Sylvian vein)
middle meningeal vein (frontal ramus)
anterior temporal diploic vein.



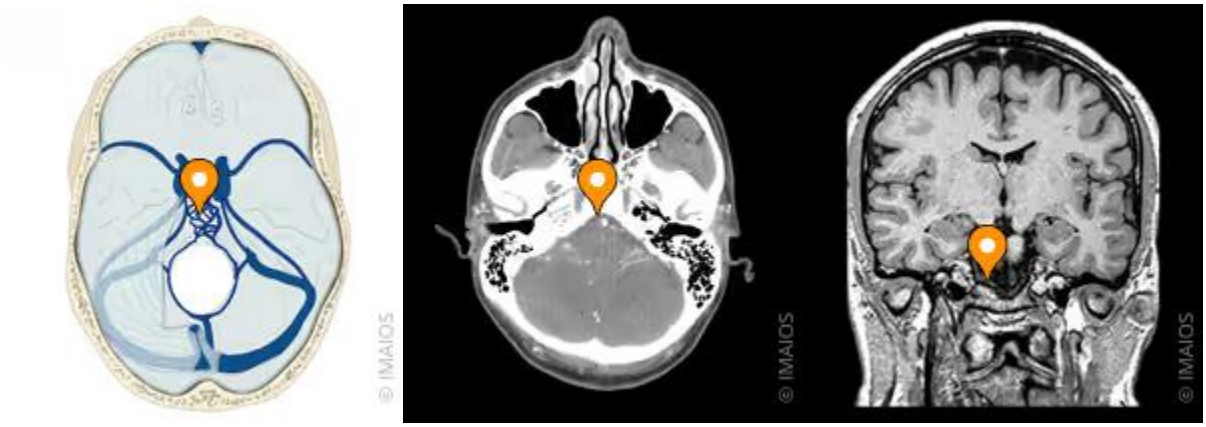


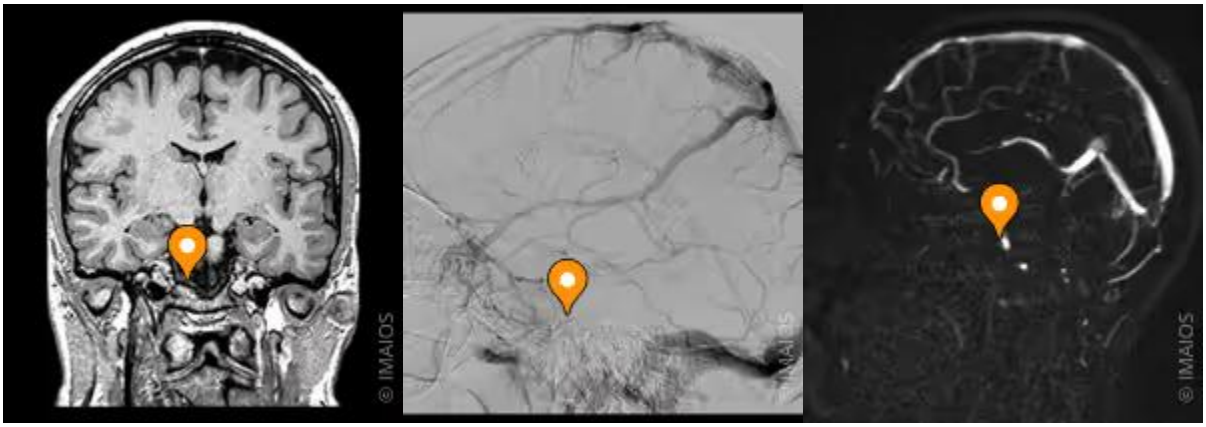
Basilar Venous Plexus

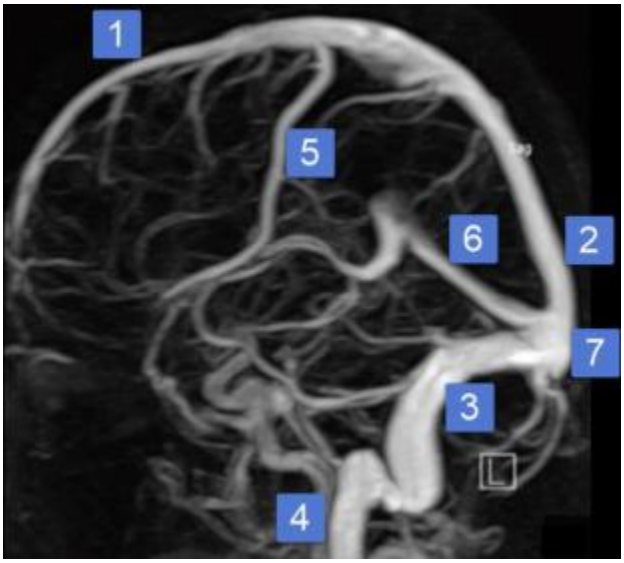
The basilar venous plexus lies between the endosteal and meningeal layers of the dura on the inner surface of the clivus and connects numerous regional venous structures:

- **superiorly**
  - **cavernous sinuses (superolaterally)**
  - **superior petrosal sinuses (superolaterally)**
  - **intercavernous sinuses (superiorly)**
- **laterally: inferior petrosal sinuses**
- **anteriorly: clival diploic veins**
- **inferiorly**
  - **vertebral venous plexus**
  - **marginal sinus**

The plexus can be prominent and can appear to erode the posterior surface of the clivus mimicking a clival mass.







Major venous vasculature. 1, Superior sagittal sinus; 2, superior sagittal sinus; 3, transverse sinus; 4, internal jugular vein; 5, superior vein of Trolard; 6, straight sinus; and 7, confluence of sinuses.

The confluence of sinuses is also known as torcular Herophili, or torcula. It is the connecting point of the superior sagittal sinus, the straight sinus, the occipital sinus, and the two transverse sinuses. It drains blood from the brain to the transverse sinuses.

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