Cavernous Sinus Tumors

- Most common etiology of cavernous sinus syndrome

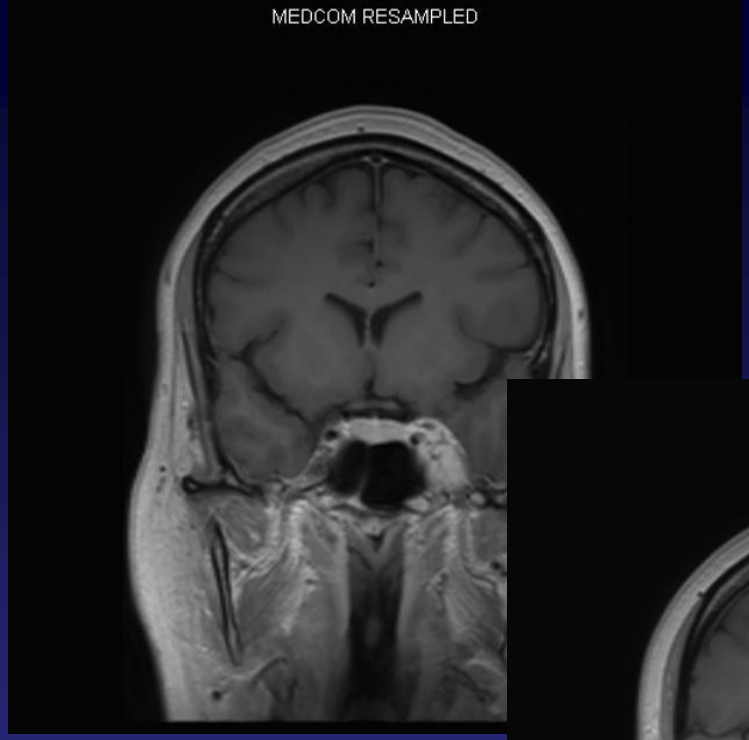
- Primary tumors
  - Schwannoma
  - Neurofibroma
  - Meningioma
  - Hemangioma
  - Lymphoma

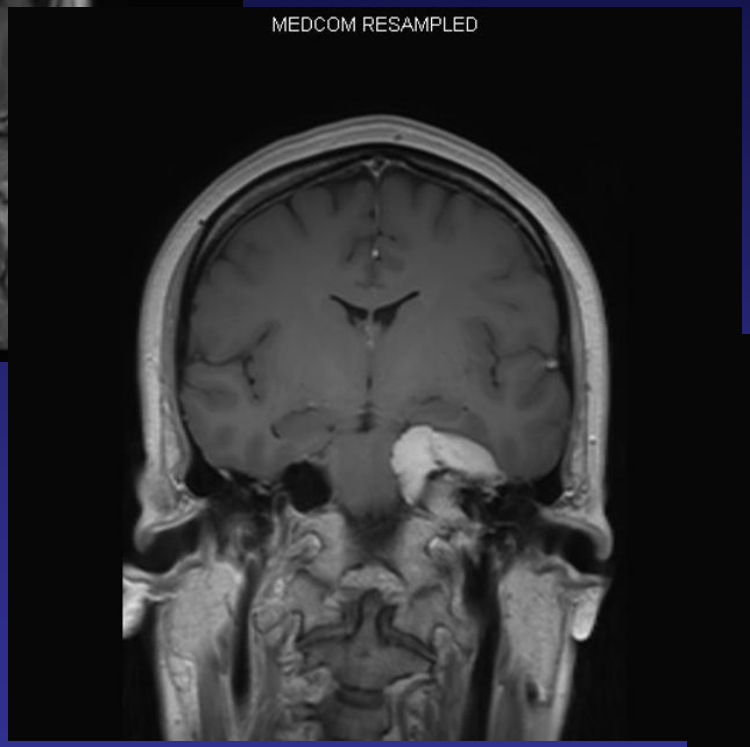
- Secondary involvement/Metastatic disease
  - Pituitary Adenoma
  - Nasopharyngeal carcinoma
  - Perineural spread of tumor through neural foramina
  - Base of skull tumor
    - Chondrosarcoma
    - Osteosarcoma

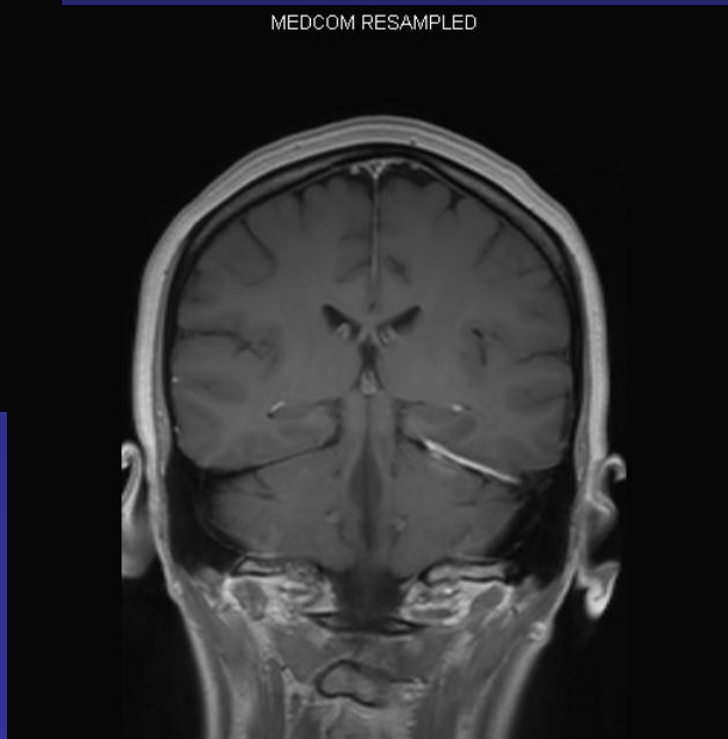
Cavernous Meningioma

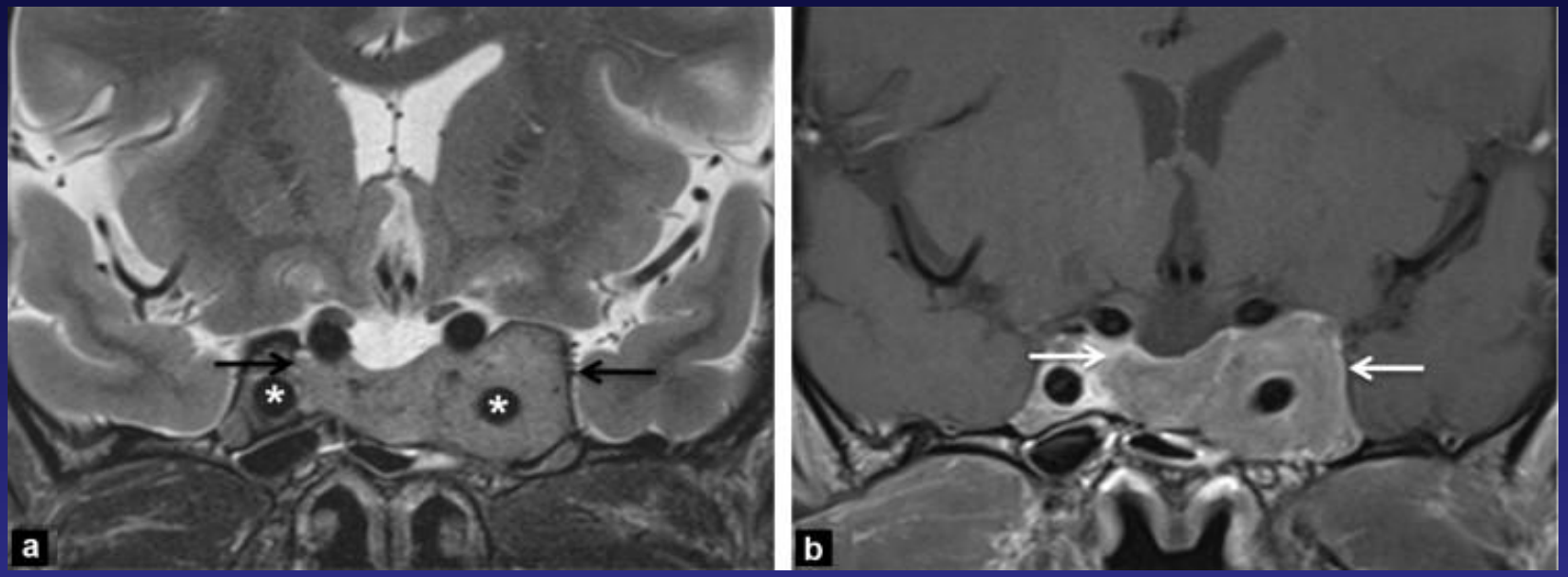
- Most CS meningiomas arise from the lateral dural wall, but sometimes they may be exclusively inside the CS.
- A meningioma is usually hypo- to isointense with respect to gray matter in all MR imaging sequences and enhances intensely.
- A dural tail frequently can be seen extending away from the edge of the tumor and often into the ipsilateral tentorium.
- Meningiomas constrict the lumen of the ICA.
- Meningiomas may extend inside the CS and the Meckel cave and via the porous trigeminus into the prepontine cistern.
- They may have an appearance very similar to schwannomas

Cavernous sinus meningioma







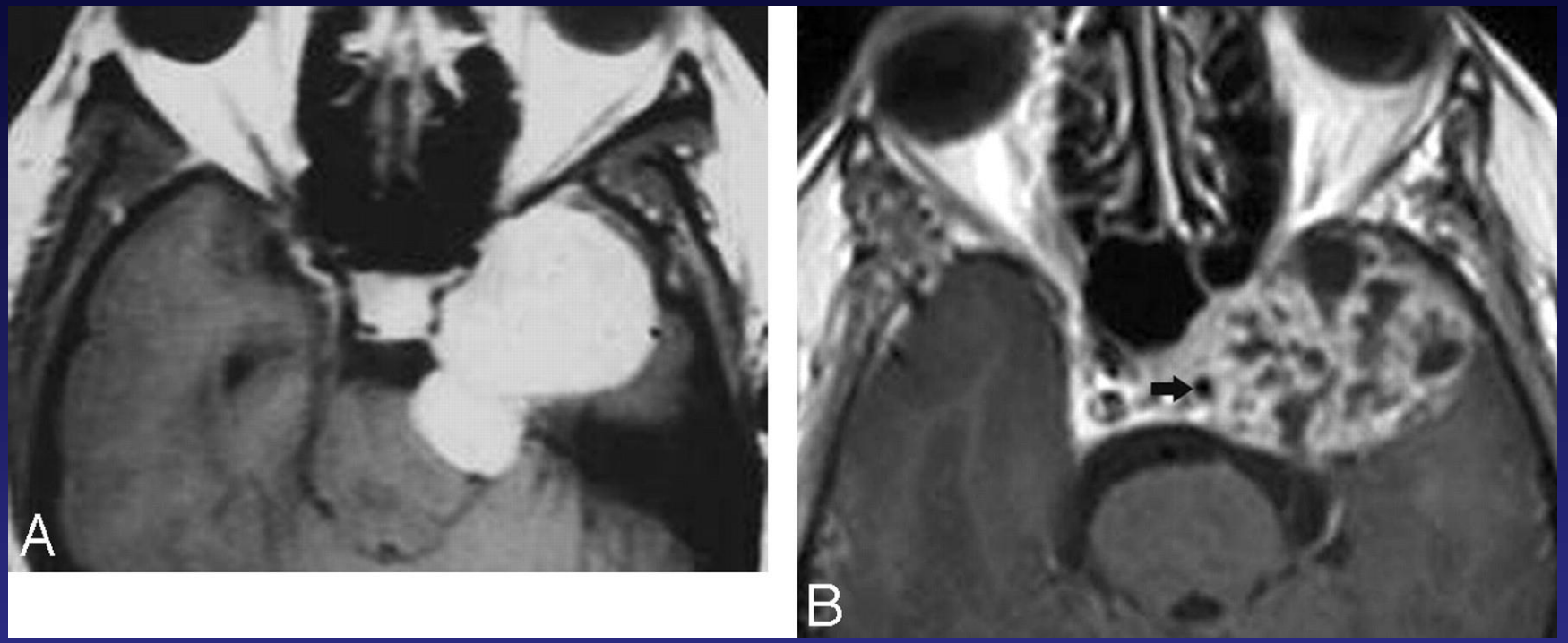


Pituitary adenoma (arrows), appearing hyperintense on T2-wi and invading the left cavernous sinus with an encasement of the left internal carotid artery.

Note the displacement of the arteries by the mass (stars) without stenosis.

Cavernous Hemangioma

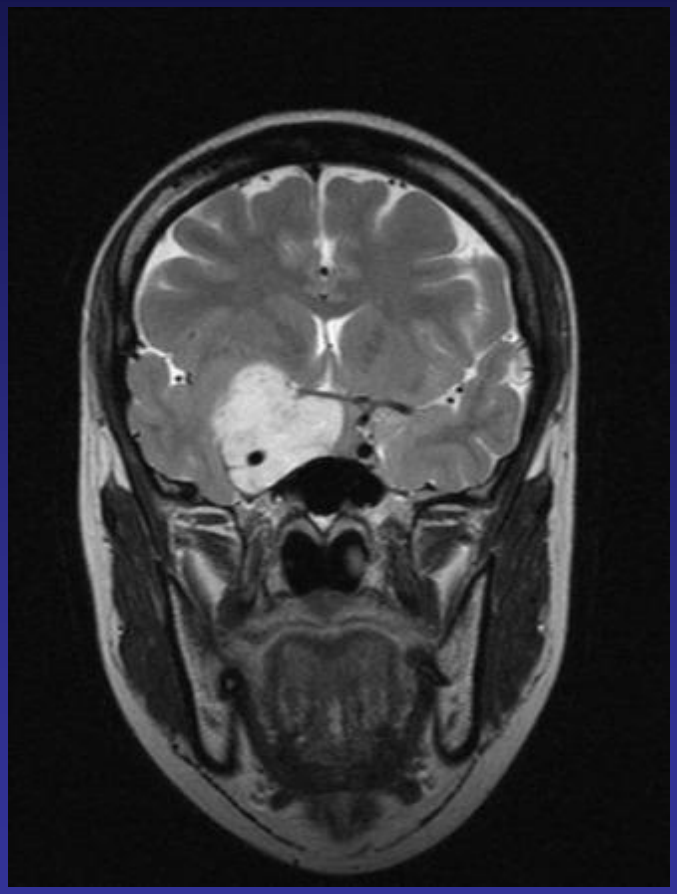
- More commonly seen during the fifth decade of life in female patients.
- Most common primary CS tumors along with schwannoma and meningioma.
- Formed by sinusoidal spaces with endothelial lining that contain slow-flowing or stagnant blood.
- Propensity to bleed at the time of resection.
- Nearly hyperintense on T1- and T2-weighted images and are attached to the outer wall of the CS, and their diagnosis may be suggested when they show progressive “filling in” after contrast administration.
- Other times, they show nonspecific intense homogeneous or heterogeneous contrast enhancement

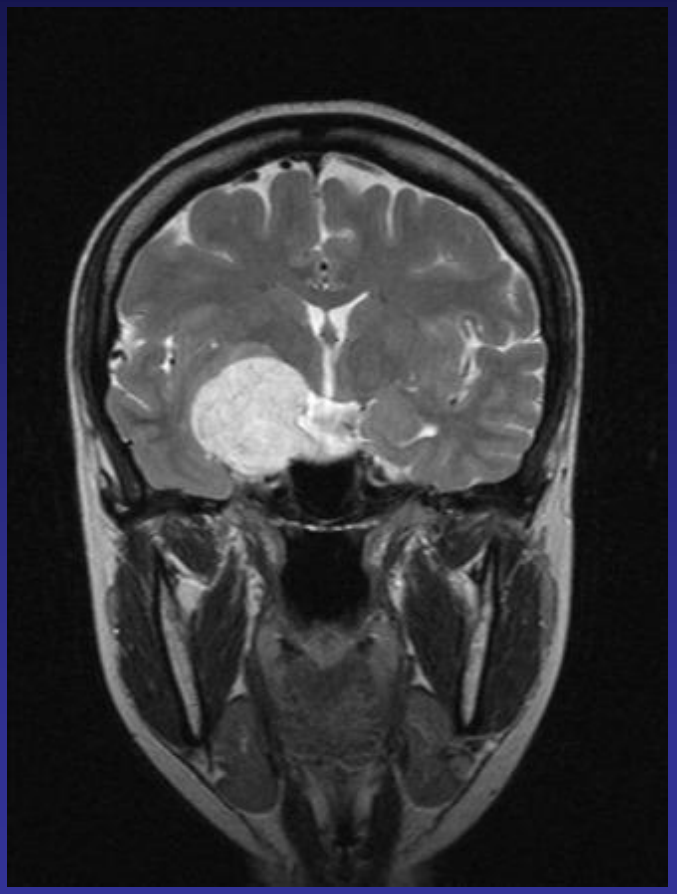


Axial postcontrast T1-weighted image shows a large and homogeneously enhancing mass arising from the lateral wall of the left CS.

Axial postcontrast T1-weighted image in a different cavernoma, which showsinhomogeneous contrast enhancement but also arises from the lateral wall of the CS, pushing the ICA (*arrow*) medially.

When a mass arises in the lateral wall of a CS, the most important differential diagnosis is that of meningioma versus cavernoma.





Schwannoma

- A trigeminal nerve schwannoma commonly involves the CS and, in 50% of instances, has a typical dumbbell-shape with bulky tumor in the Meckel cave and the prepontine cistern with a waist at the porous trigeminus.
- Conversely, it may be found only involving the Meckel cave
- It may be solid or have variable cystic or hemorrhagic components with occasional fluid levels.
- Small tumors tend to be homogeneous, whereas large ones are frequently heterogeneous in appearance.

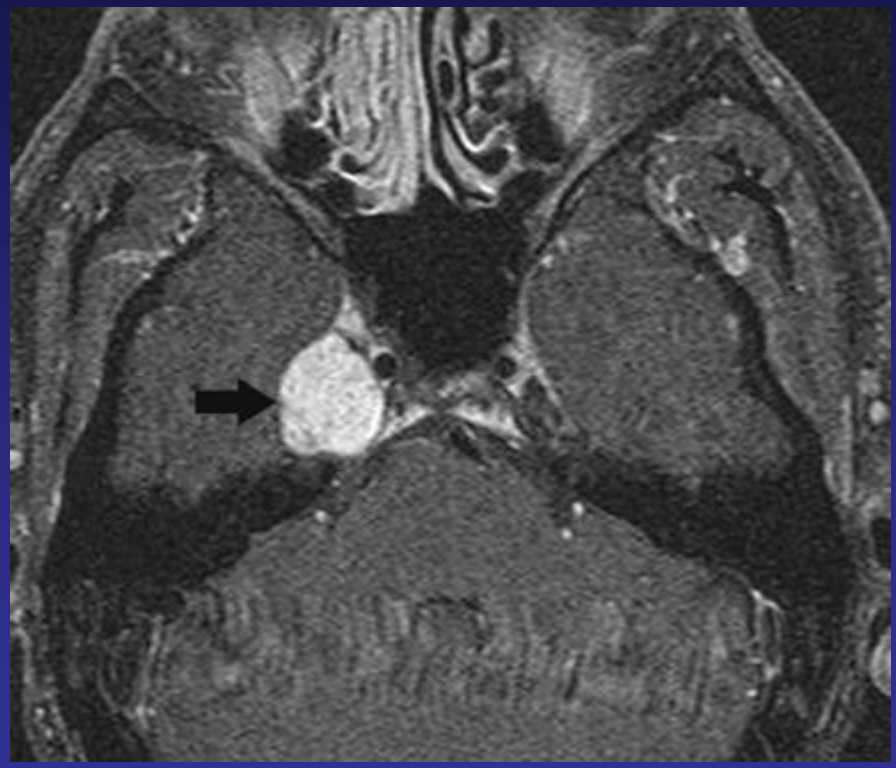
Schwannoma

- Schwannomas are isointense-to-hypointense masses on T1 images, mostly T2 hyperintense, and show contrast enhancement.
- A clue to the diagnosis is that they follow the expected course of the nerves from which they arise.
- Schwannomas may arise from other cranial nerves in the CS, particularly cranial nerve III.
- Multiple CS schwannomas and bilateral acoustic ones are seen in patients with neurofibromatosis type

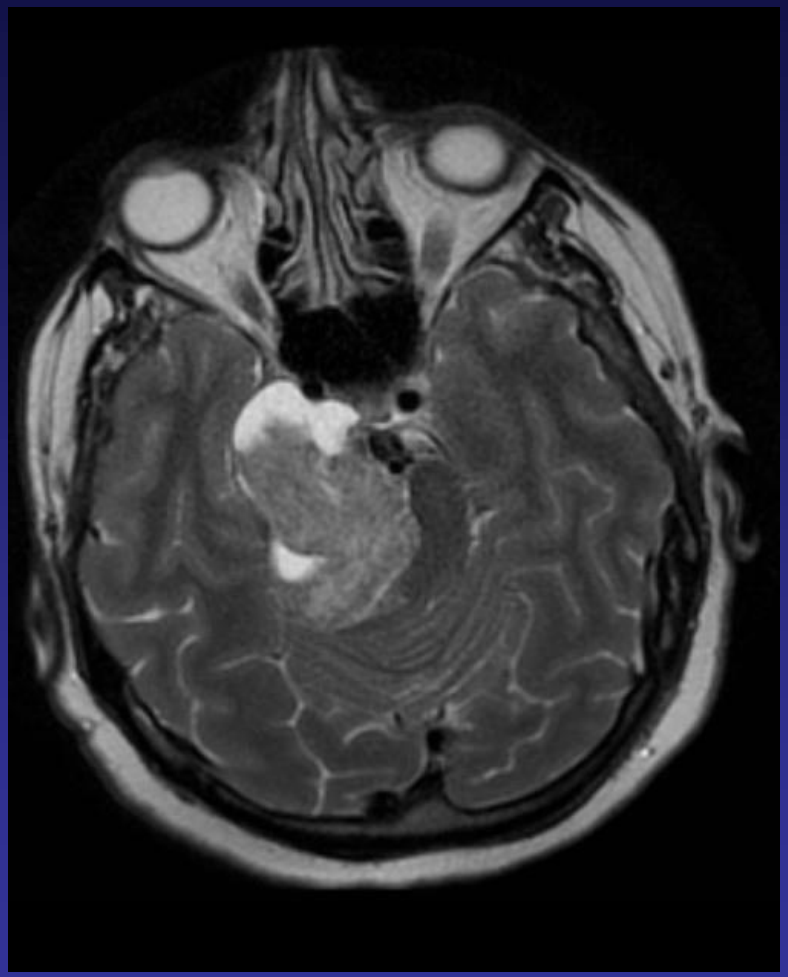
Meckel cave Schwannoma

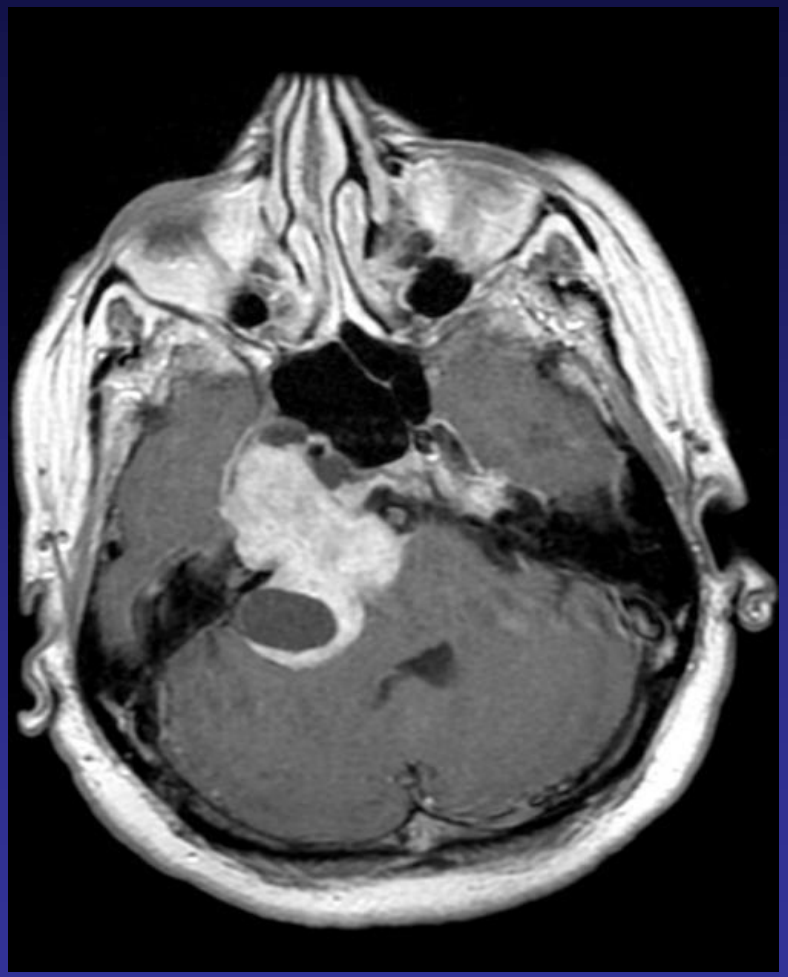
- Well-defined enhancing mass (*arrow*) involving the Meckel cave on the right.

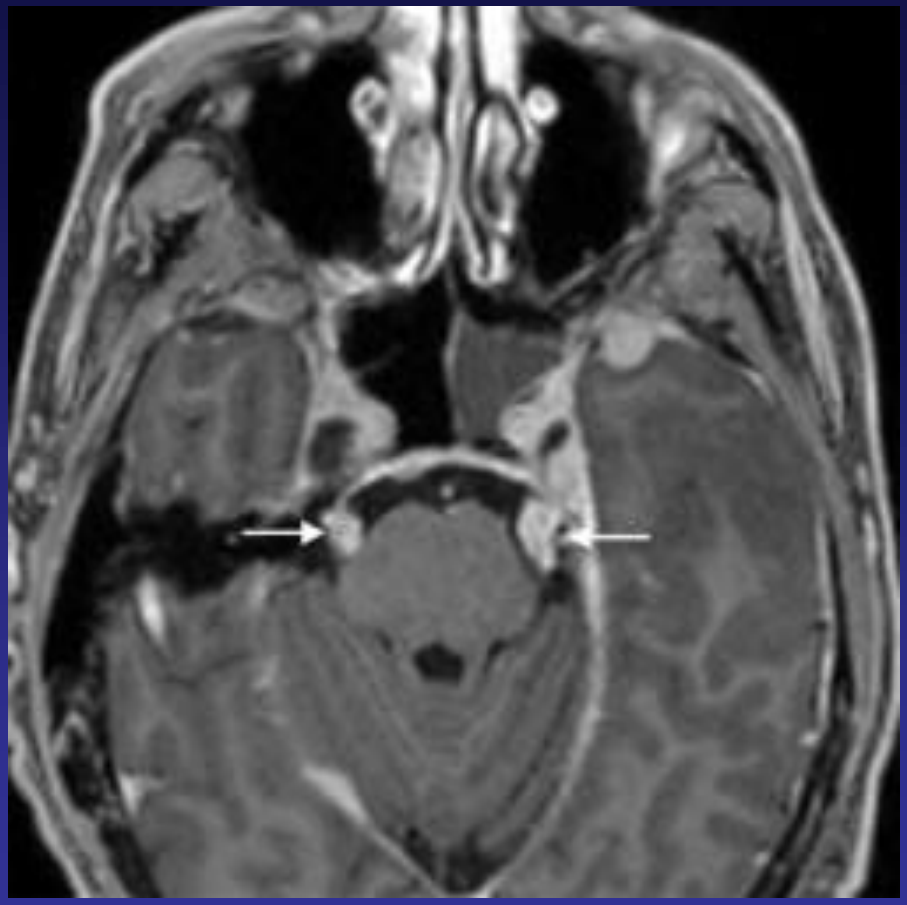
- Although the findings are nonspecific, the most common mass in this location is a schwannoma.



Trigeminal schwannoma







Schwannomas of the trigeminal nerves and can be seen in type II neurofibromatosis.

Plexiform Neurofibroma

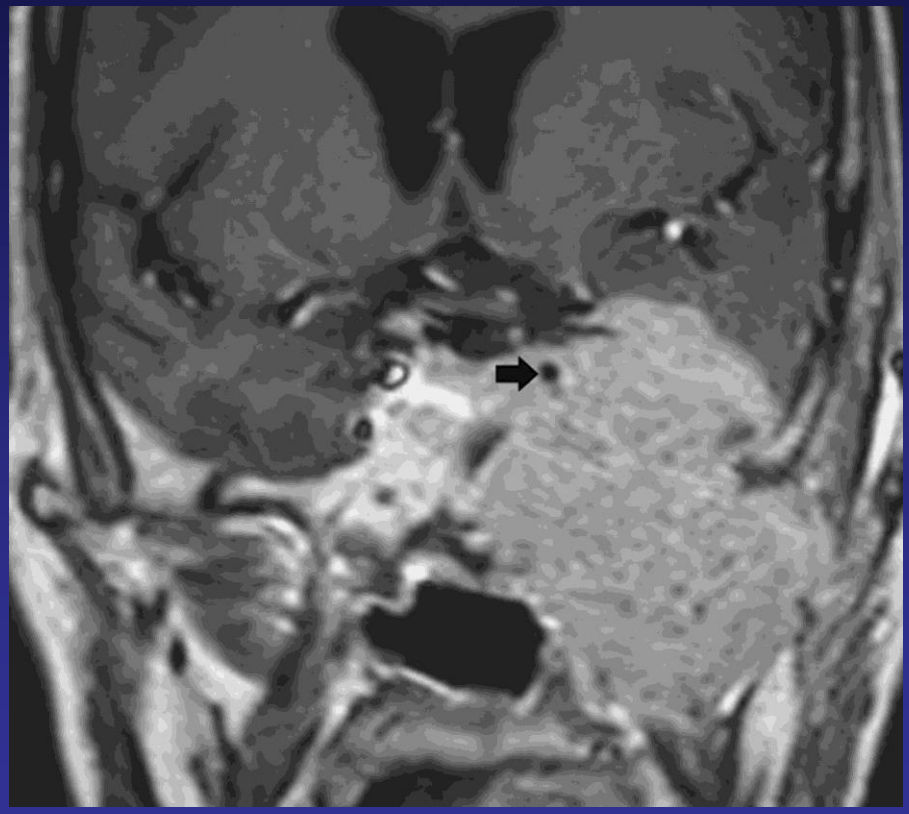
- Plexiform neurofibromas most commonly involve the trigeminal nerve, especially its first and second branches.
- A suggestive imaging feature is a tortuous or fusiform enlargement of the nerves that exhibit heterogeneous signal intensity.
- Unlike schwannomas, neurofibromas are less likely to extend to the Meckel cave.
- They are seen in 30% of patients with neurofibromatosis type 1 but are extremely rare outside this disease.

Malignant Peripheral Nerve Sheath Tumor

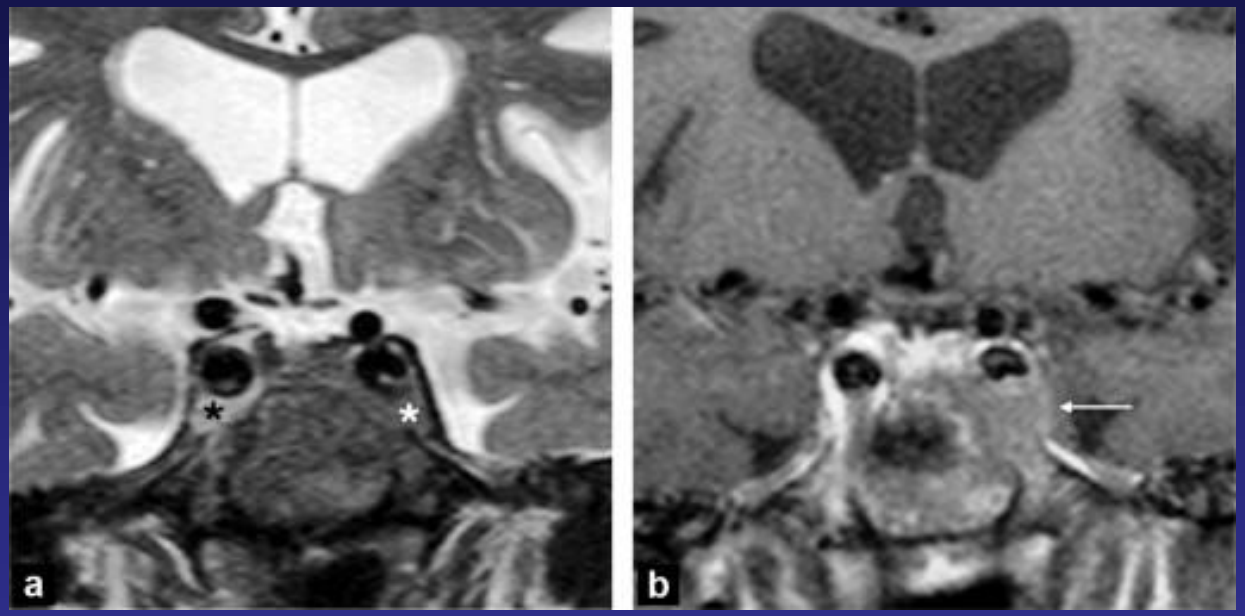
- Malignant peripheral nerve sheath tumor is a high-grade sarcoma that may infiltrate the CS.
- Large tumor size (>5 cm), ill-defined infiltrative margins, rapid growth, tumor signal-intensity heterogeneity, and erosion of the skull base foramina out of proportion to tumor size suggest its underlying malignant nature (Fig 3).[9,15]
- Its imaging findings are nonspecific, and the diagnosis is made by histology

Malignant peripheral nerve sheath tumor

- Large aggressive-appearing mass
- Involves the left CS, surrounds the ICA (*arrow*)
- Erodes the middle cranial fossa floor, and extends into the infratemporal region.



Leukemia



- Lesion of the left cavernous sinus (white star), hypointense on T2-wi in comparison with the right cavernous sinus (black star).
- The lesion encases the intracavernous carotid artery without narrowing it.