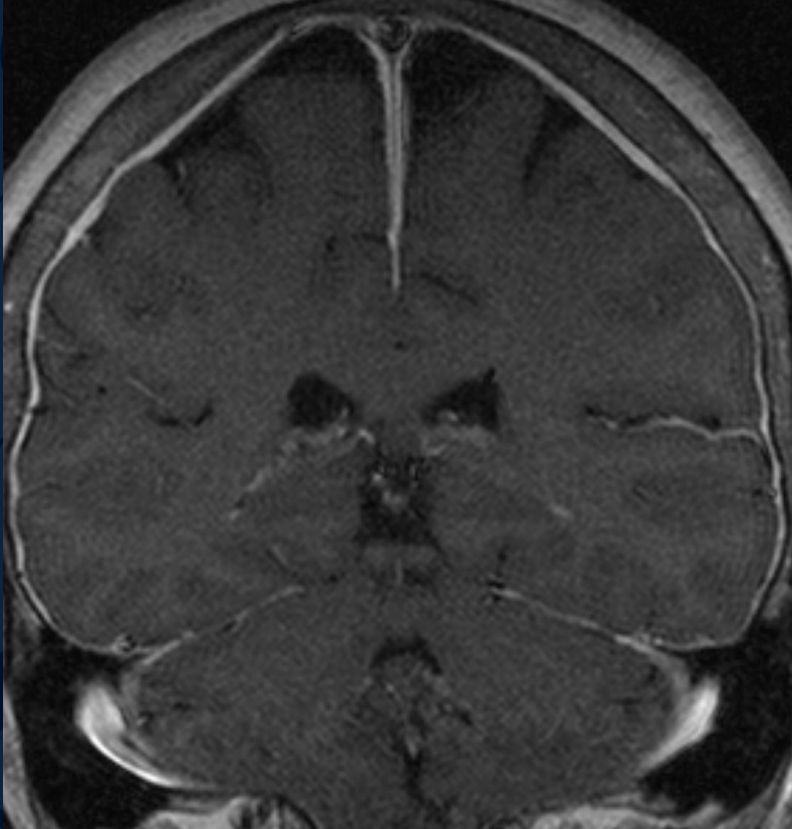


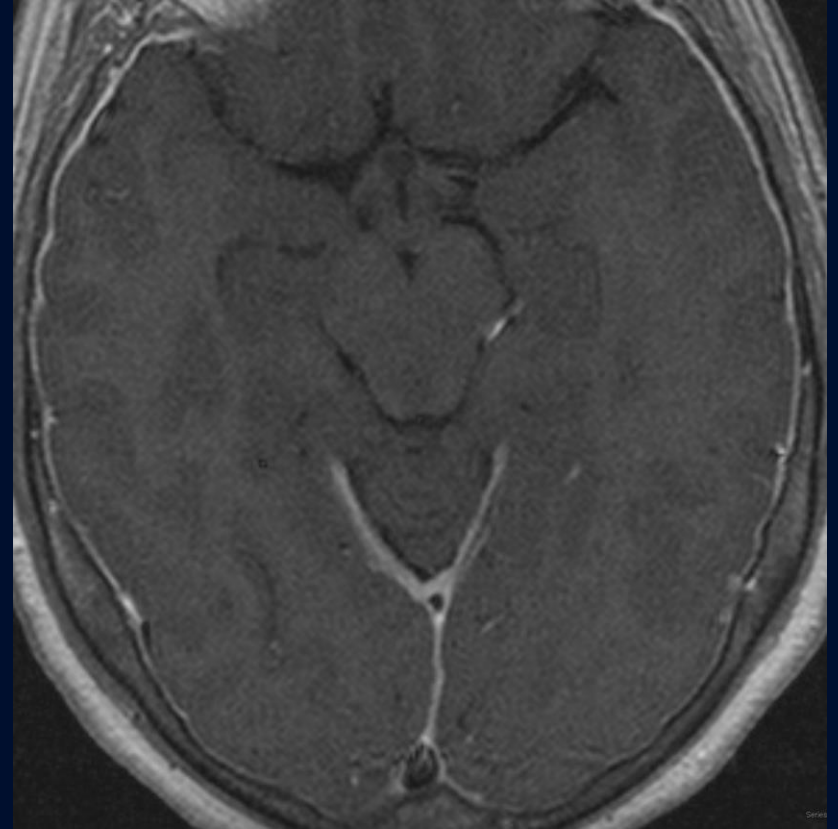
53-year-old female with tinnitus and vertigo

Keerthana Sharma Anand, MBBS

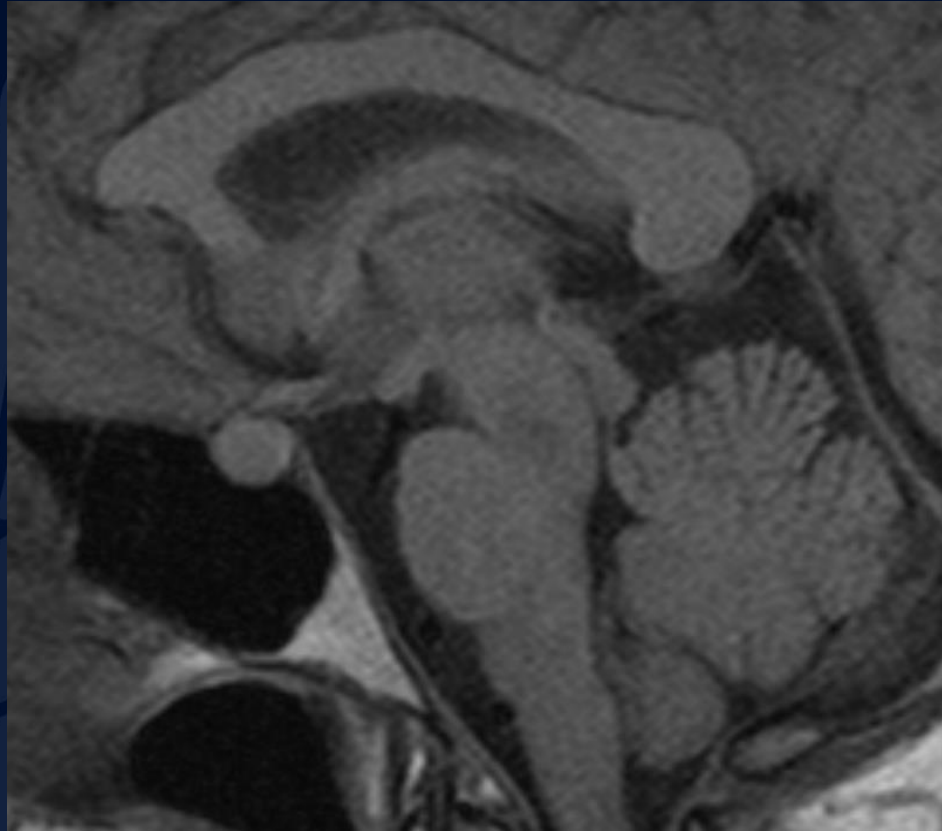
Clifford Yang, MD



T1 Coronal Post-contrast



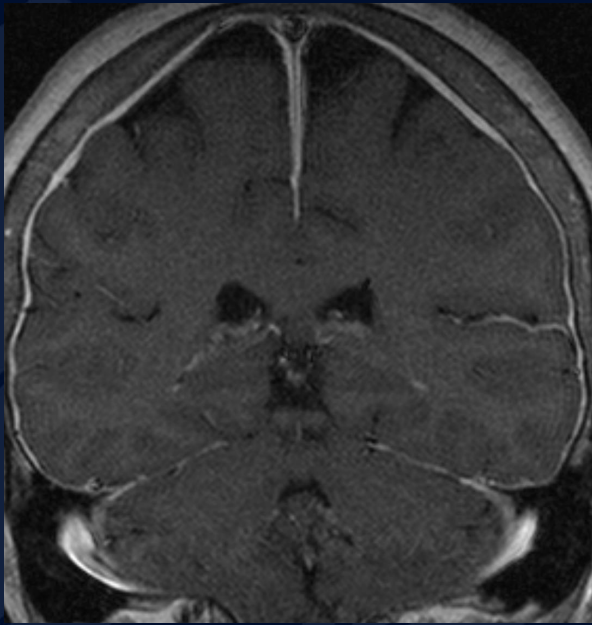
T1 Axial Post Contrast



T1 Sagittal

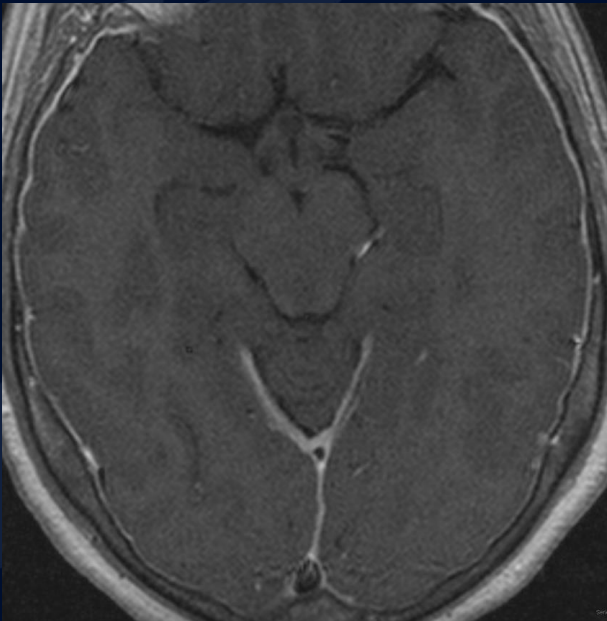


Spontaneous Intracranial Hypotension (SIH)

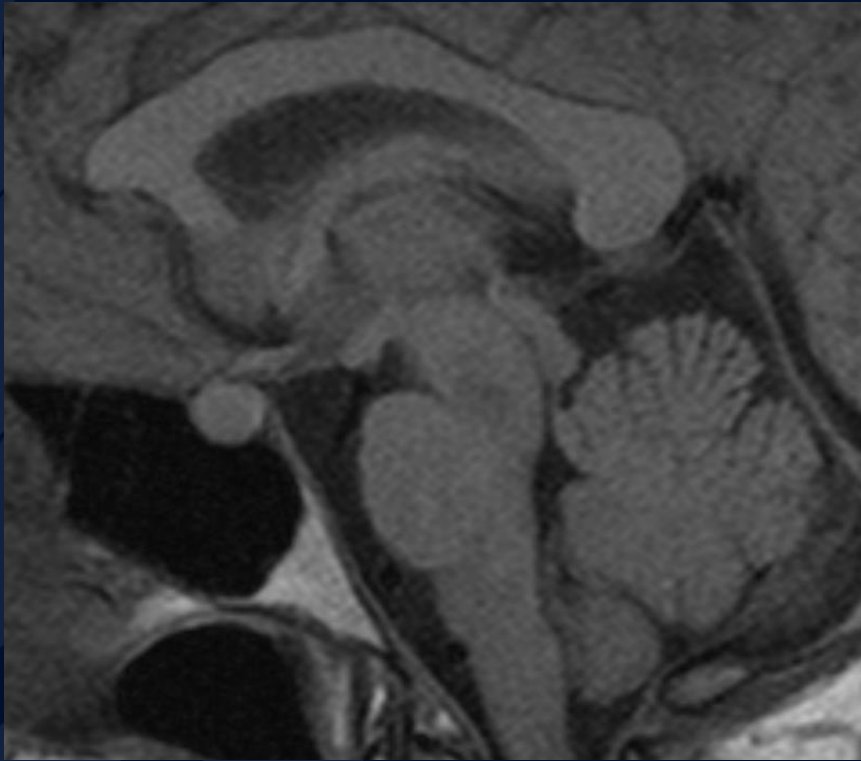


T1 Post Contrast

Diffuse meningeal enhancement is seen with **smooth dural thickening**.



Diffuse dural enhancement in intracranial hypotension is due to expansion of the dural vascular structures.



T1 Sagittal

The pituitary gland was enlarged at 12 mm.

Pituitary gland enlargement is commonly observed in Spontaneous Intracranial Hypotension and is thought to be due to dilation of pituitary sinusoids.



T1 Sagittal Sections

The pontomesencephalic angle was reduced at 40.6° .

The mammillopontine distance was also slightly decreased at 5mm.



Qualitative signs of SIH include;

- Pontomesencephalic angle $< 50^\circ$
- Mammillopontine distance $< 5.5\text{mm}$
- Interpeduncular angle $< 40.5^\circ$ at the level of the mammillary bodies

Intracranial Hypotension

Terminology:

Intracranial hypotension is defined as cerebrospinal pressure $<6\text{cm H}_2\text{O}$. The classic syndrome consists of orthostatic headache, low CSF pressure, and diffuse meningeal enhancement on MRI.

Categories:

- Primary or Spontaneous Intracranial Hypotension (SIH): no immediately identifiable cause
- Secondary: Iatrogenic (lumbar puncture or surgery), over-shunting or traumatic

Pathology: Decrease in the CSF volume leads to **compensatory dilatation of the vascular spaces of the brain as per the Monro-Kellie hypothesis.**

This accounts for some of the common findings of SIH such as subdural collections, dural enhancement and dural venous sinus distension.

Imaging Findings

Location of CSF leak: SIH is almost always caused by spinal leaks. A few occur at the skull base (petrous or ethmoidal regions).

Classic Imaging Quintet of Intracranial Hypotension:

- S:** Sagging brain
- E:** Enhancement of pachymeninges
- E:** Enlargement of veins and dural sinuses
- P:** Pituitary enlargement
- S:** Subdural hygromas/hematomas

MRI: Contrast enhanced MR is the modality of choice for Dx.

- Dural enhancement can be seen in T2 and T1 C+ images, and may sometimes extend into CP angles
- T1WI sagittal scans may show **signs of brain descent**; tonsillar ectopia, draping of hypothalamus over the sella and sagging midbrain seen below dorsum sellae.

CT: Relatively insensitive. May be useful to evaluate for skull base defects.

Clinical features:

- Orthostatic headache is usually seen, and is due to traction on pain-sensitive intracranial and meningeal structures by the sagging brain.
- **Can occasionally present without headache** but with other prominent symptoms such as nausea or vomiting, neck pain, tinnitus, vertigo, change in hearing and dizziness.
- Severe cases can have encephalopathy or coma.

Management:

- Site of leak can be identified by spinal imaging using digital subtraction or dynamic CT myelography.
- Search for actual leakage site should be carried out **only if 2 blood patches fail**, or if traumatic leak is suspected.
- Non-targeted epidural blood patch is used for SIH treatment as most leaks are spinal.
- If this fails, targeted epidural patch is performed after localization of CSF leak.

Differential Diagnoses

The following can also show meningeal enhancement;

- Meningitis: Pia-subarachnoid enhancement more common than dura-arachnoid
- Meningeal carcinomatosis: thicker and irregular/lumpy enhancement
- Post-surgical: look for post-surgical changes
- Chronic subdural hematoma: Meningeal thickening is associated with blood products. Intracranial hypotension leads to subdural hematoma in <10%

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