An Ongoing Headache: Intracranial Hypertension as a Complication of Gamma Knife Radiosurgery for a Left Occipital Arteriovenous Malformation

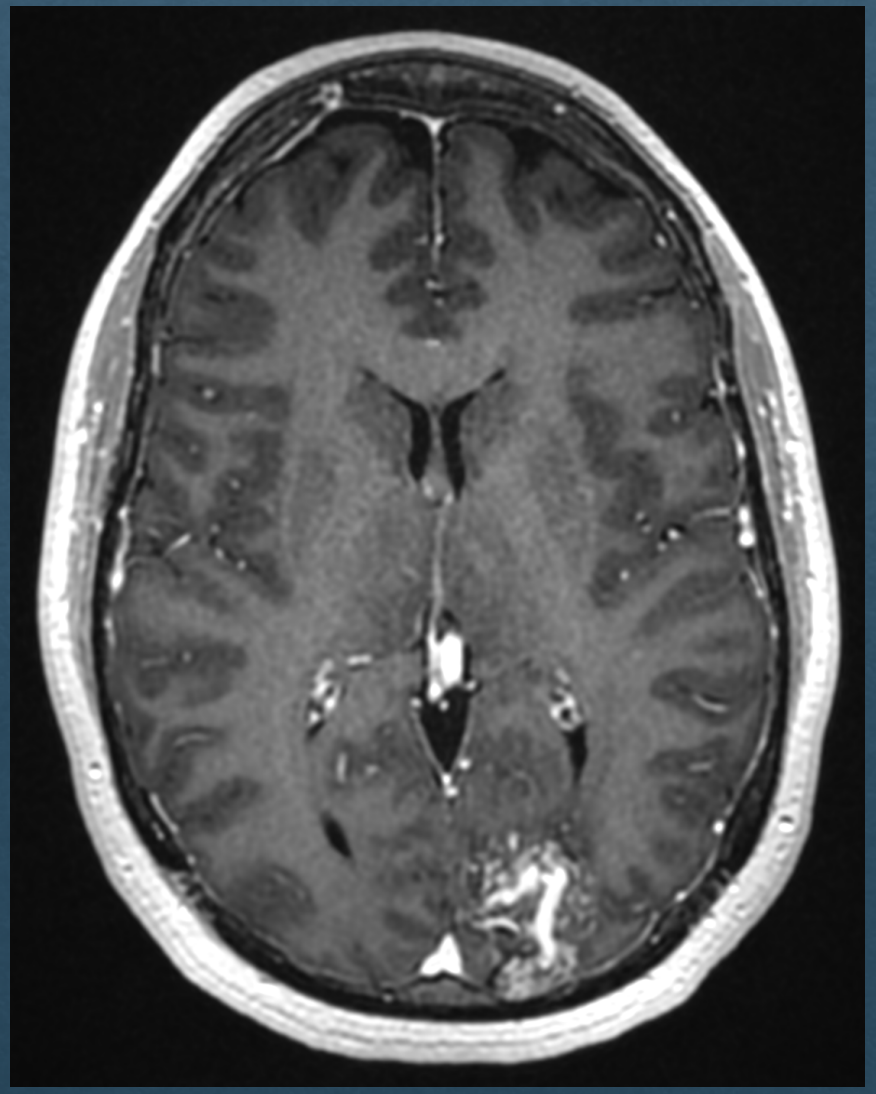
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30F Presenting With Headache

- PMHX of migraines.
- Multiple episodes of severe left sided headaches.
- Associated blurry vision, paresthesias of the face, upper and lower extremities, sensation of left ear fullness.



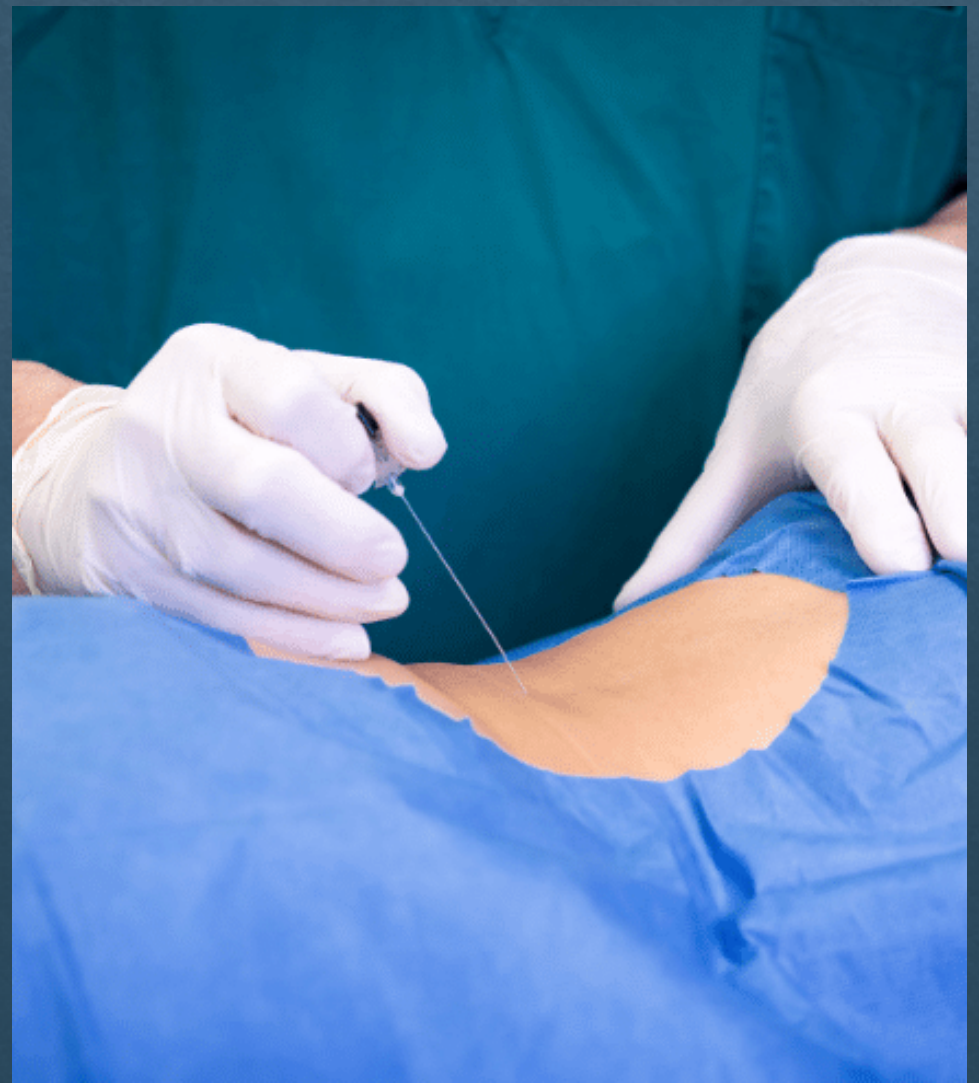
Clinical Presentation





Clinical Presentation

- She had a lumbar puncture at that time with a normal opening pressure.



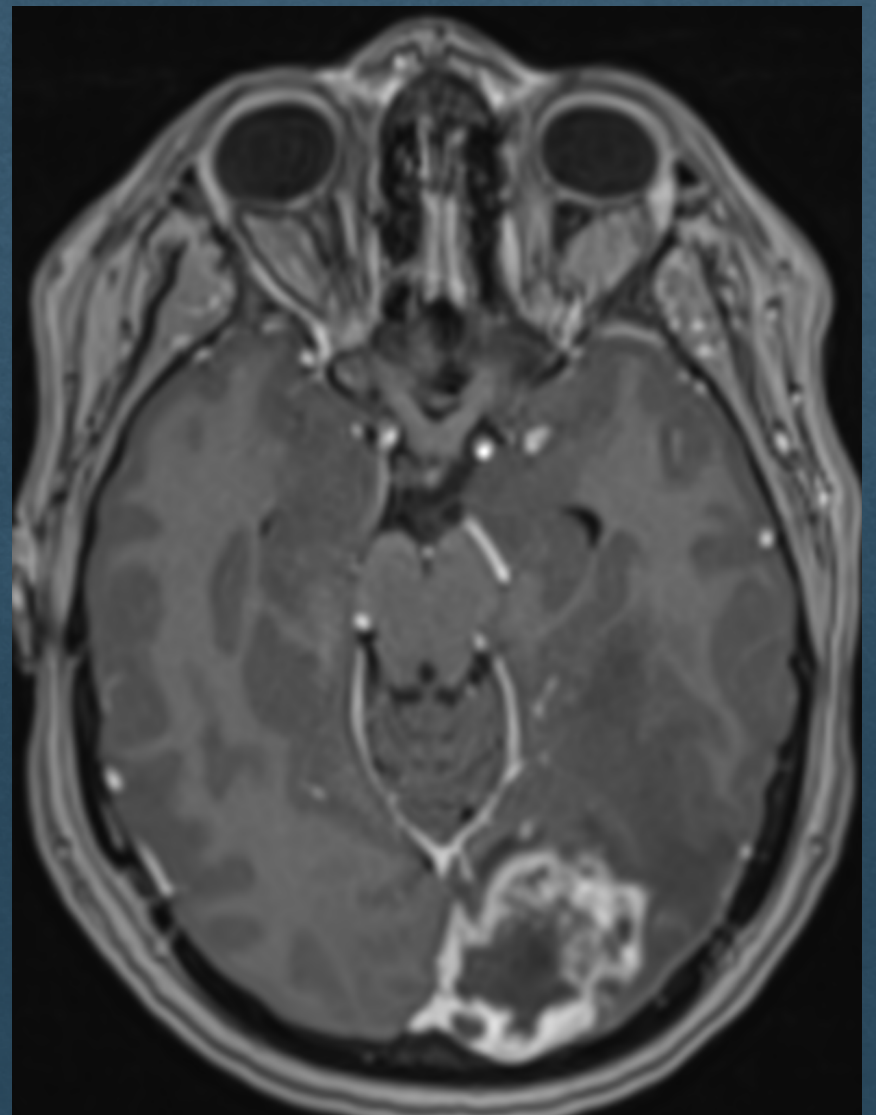
Clinical Presentation

- The patient underwent gamma knife radiosurgery for treatment of the AVM with an initial reduction in headache severity.
- Four months later she complained of worsening headache.
- She was started on dexamethasone.

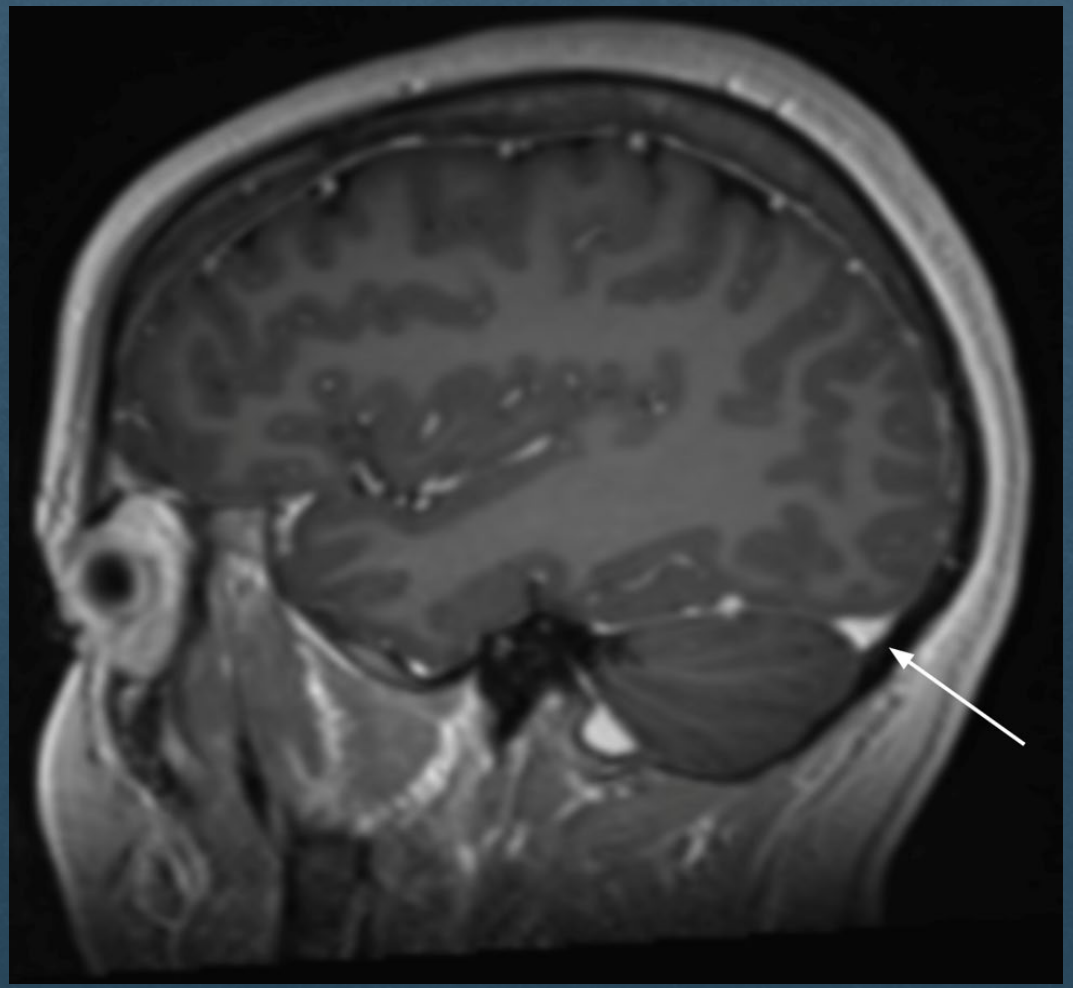


Clinical Presentation

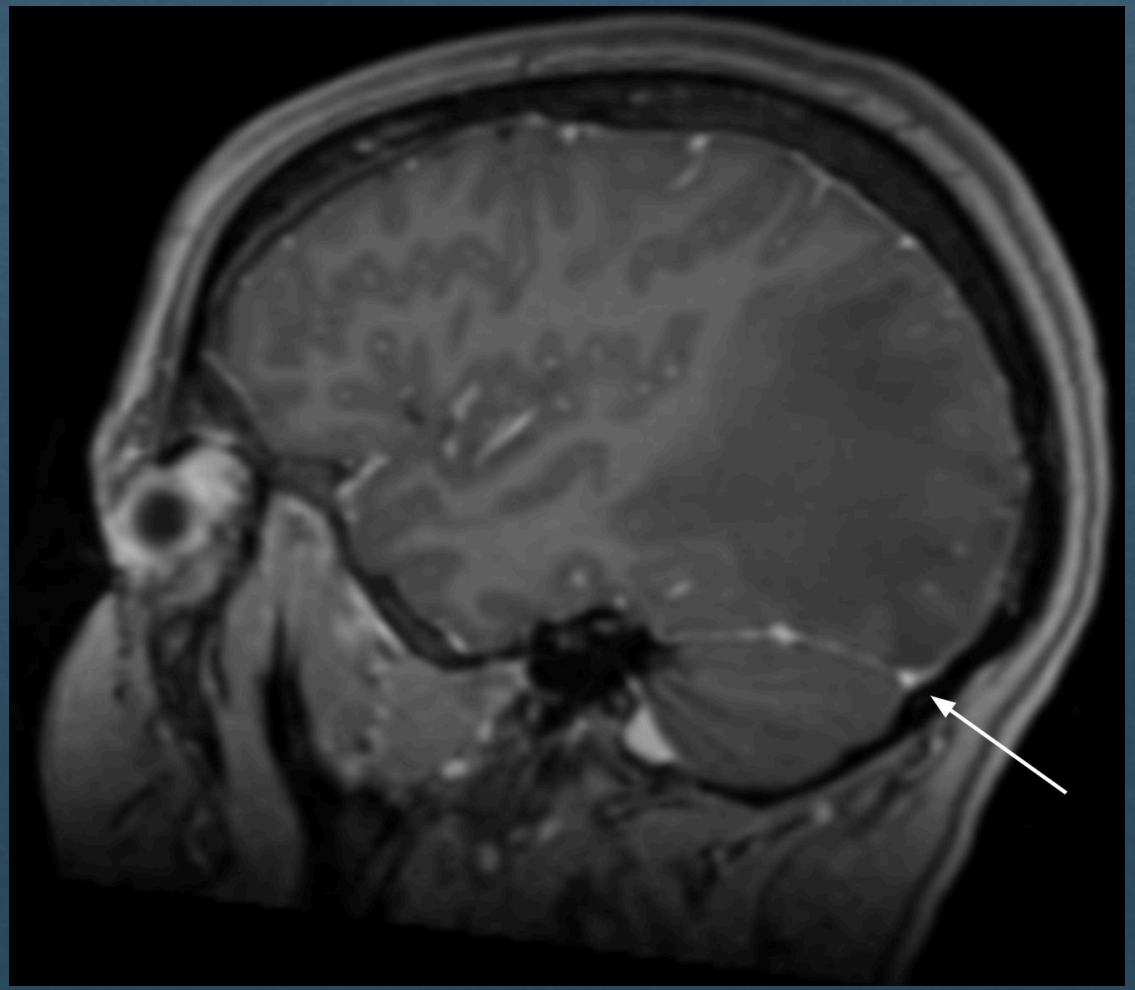
- She represented to the ED 2 months later, for headache, nausea & vomiting, and left ear pain and she was given another course of dexamethasone.
- She represented to the ED 2 weeks later and was admitted to the neurocritical care unit.
- Lumbar puncture showed an opening pressure of 50cm H20.



Imaging Discussion

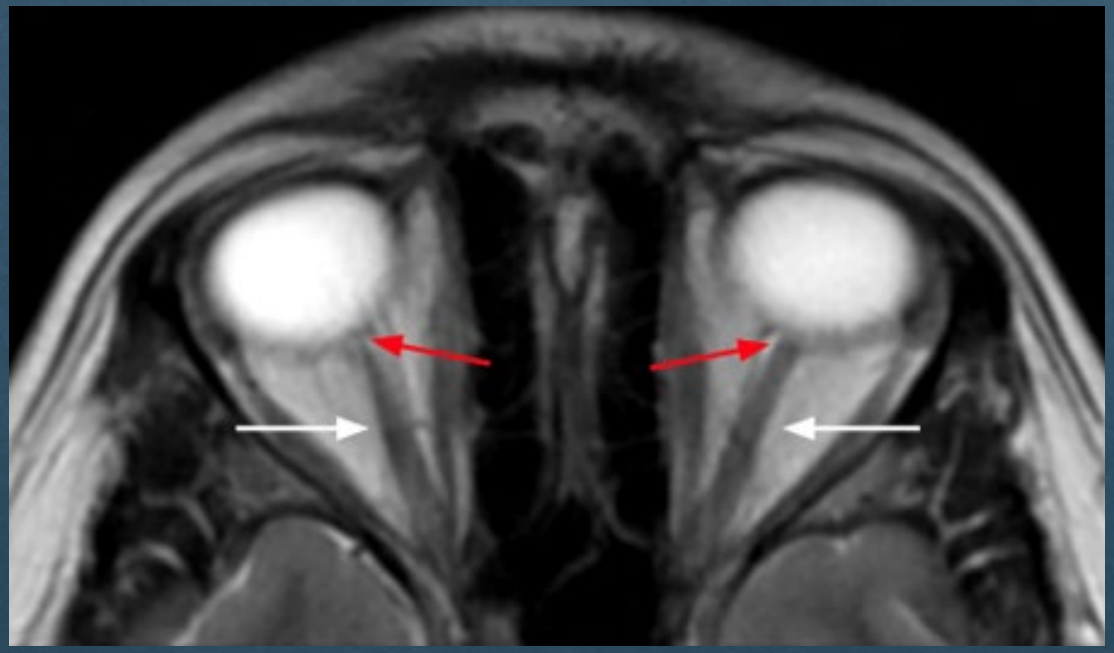


Pretreatment MRI

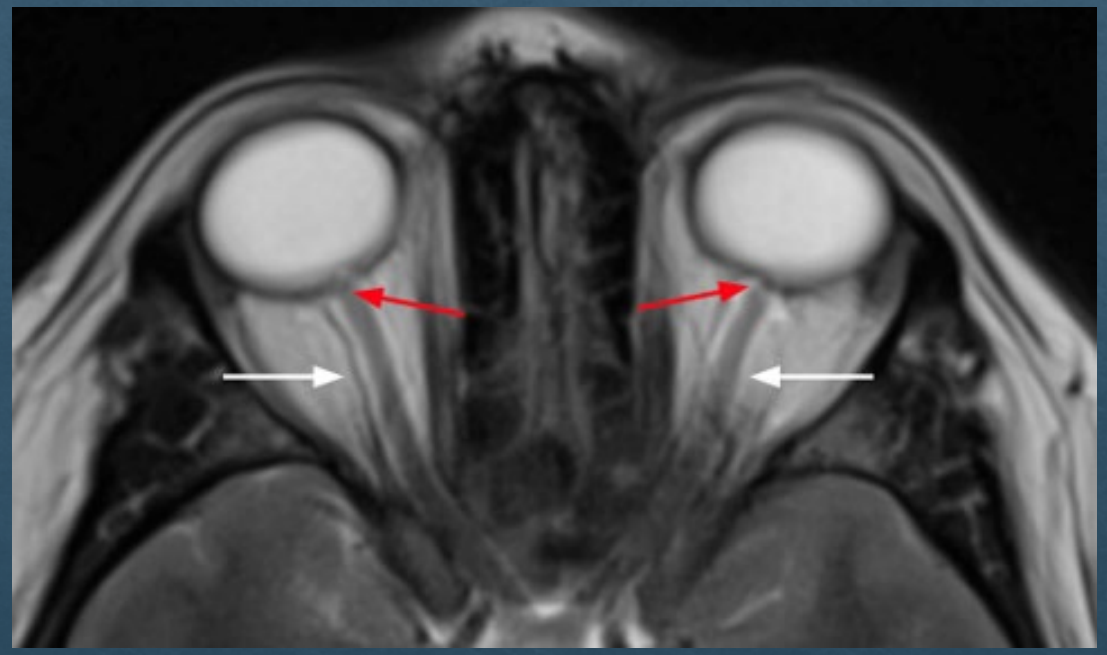


MRI obtained in the ED 7 months post-radiation

Imaging Discussion



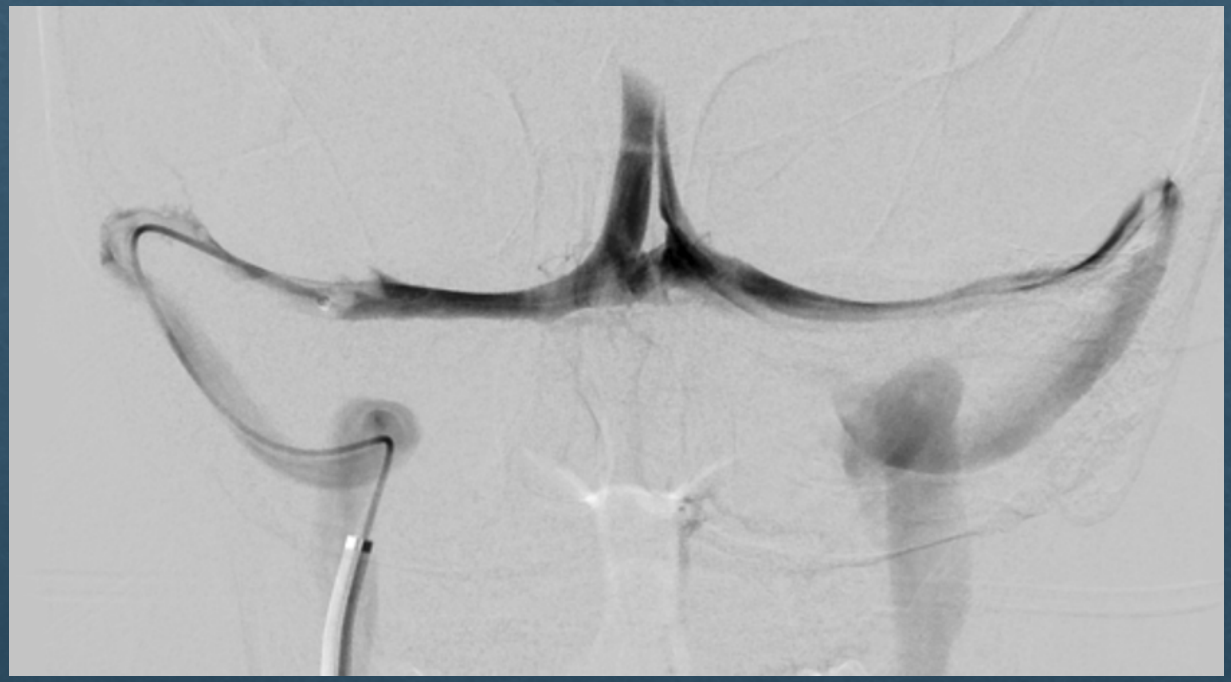
Pretreatment MRI



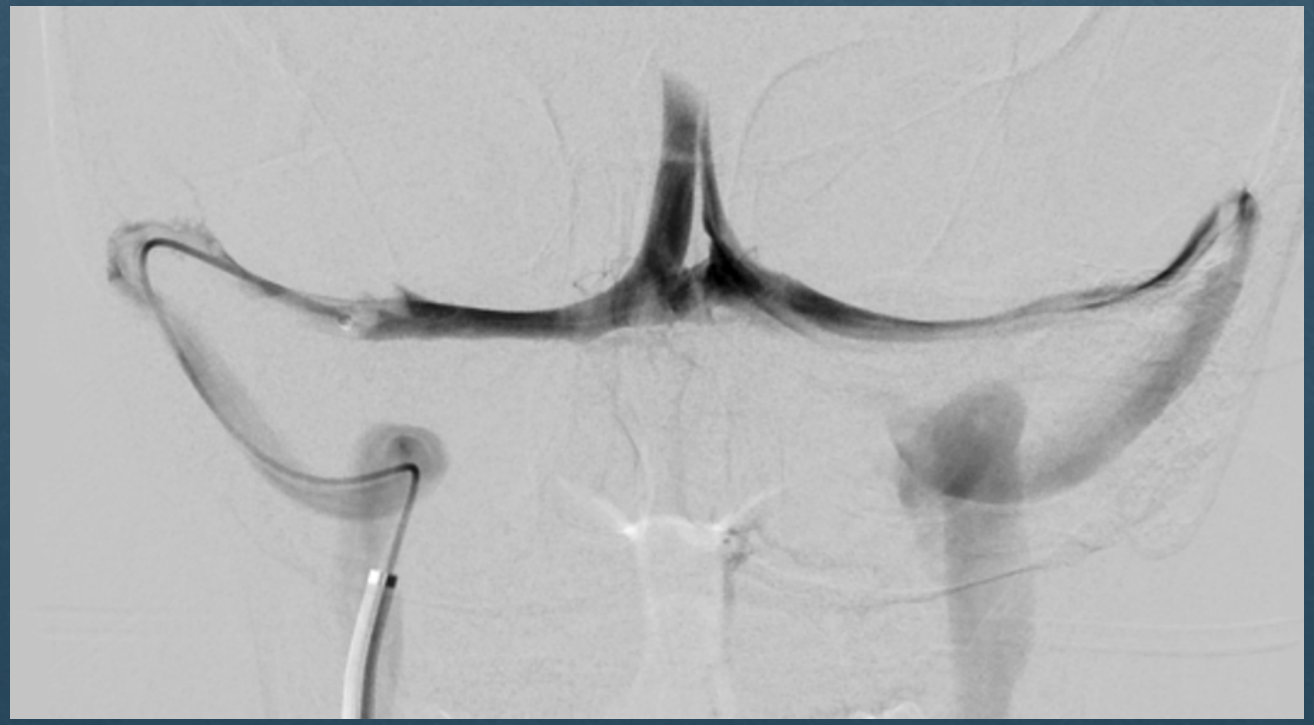
MRI obtained in the ED 7 months post-radiation

Management

- Dural sinus pressure measurements showed an elevated superior sagittal sinus pressure of 28 mmHg and bilateral sigmoid sinus pressures of 10 mmHg, yielding an 18-mmHg gradient bilaterally.
- The patient underwent right transverse-sigmoid sinus stenting.
- Venous pressures normalized to 12 mmHg with no residual gradient.



Management



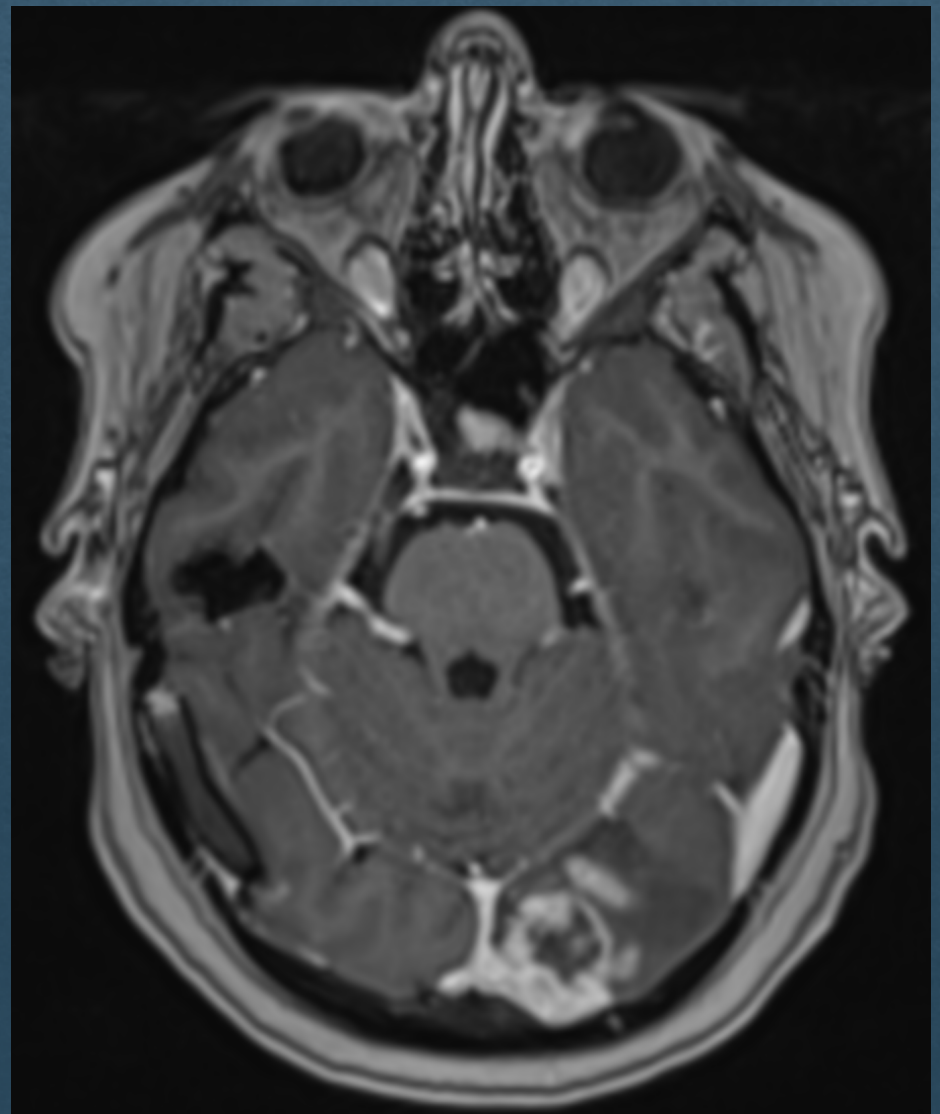
Pre-stent venography



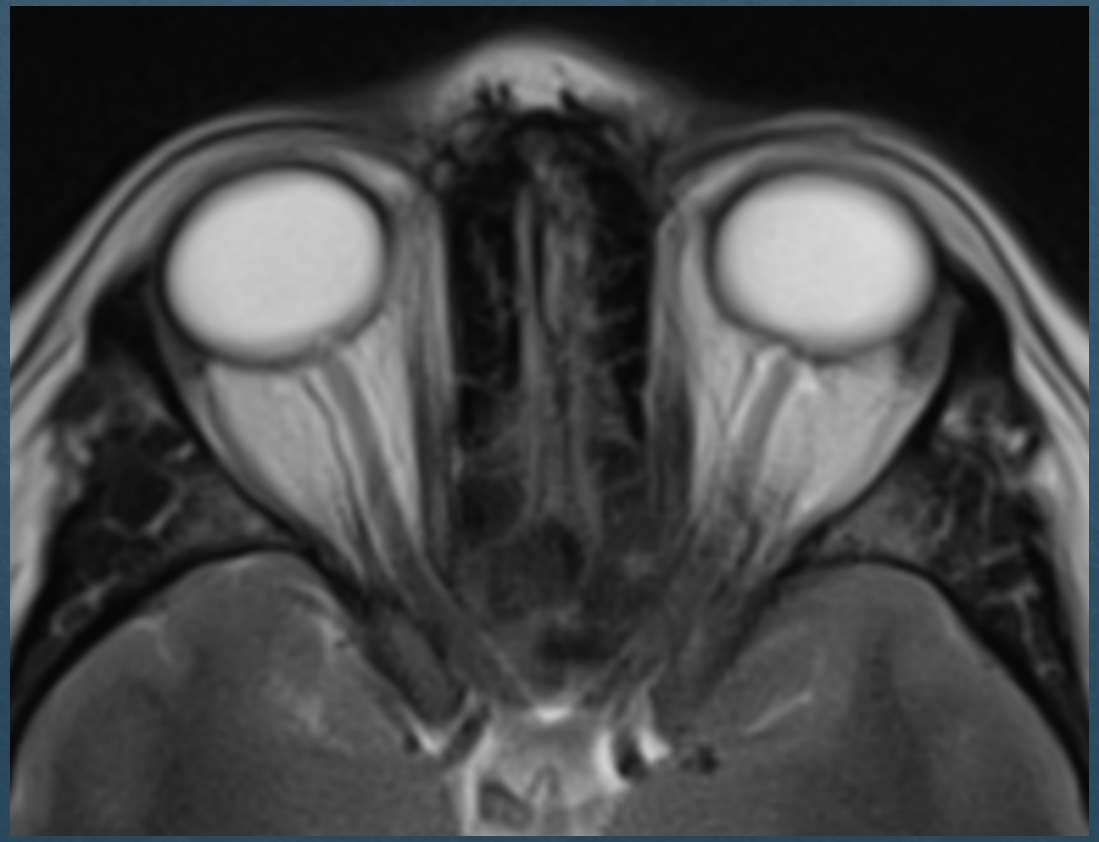
Venography post-stenting

Outcome

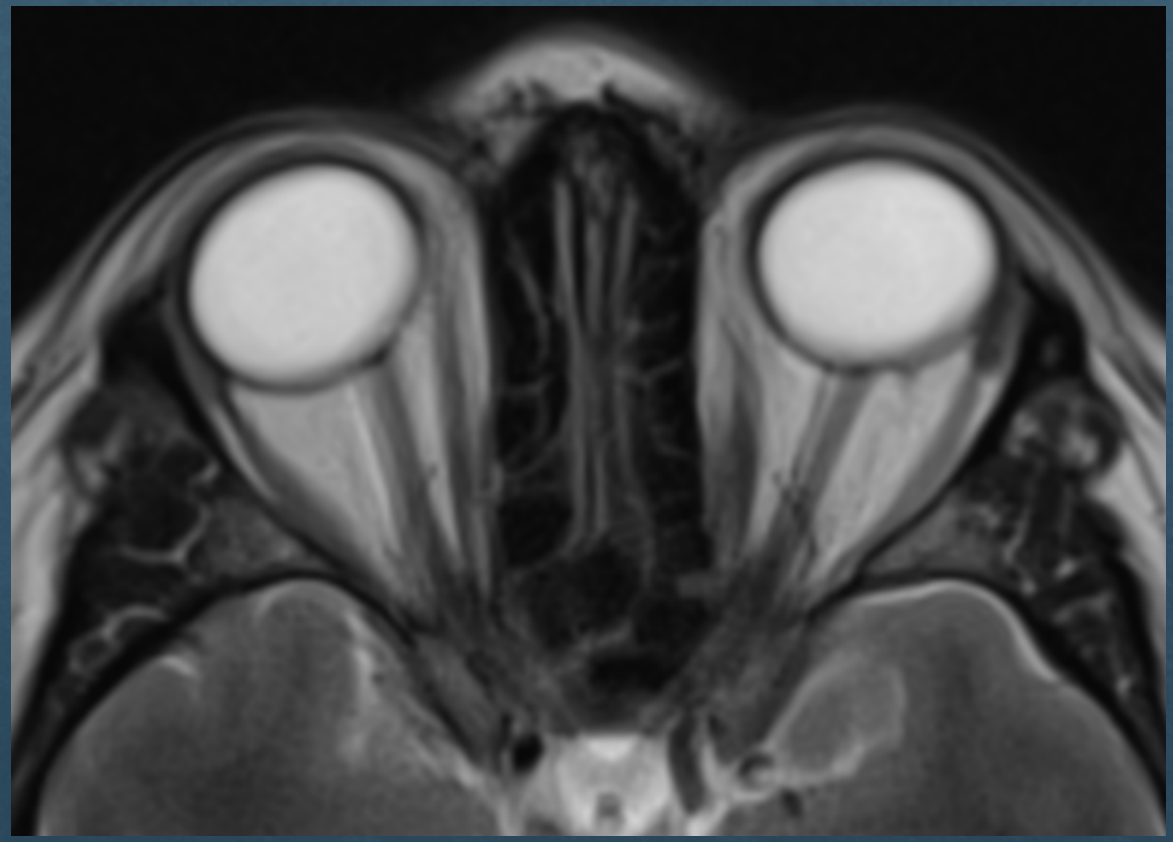
- After stenting the patient reported immediate improvement in headache & left ear pain.
- Imaging findings related to elevated ICP resolved on follow up MRI.
- Radiation necrosis, edema and mass effect gradually resolved.
- Follow up angiography showed no residual AVM at 18 months with a patent transverse sinus stent.



Outcome



MRI 1 week prior to stenting



MRI 6 months post-stenting

Take Home Points

- Vasogenic edema from radiation necrosis can directly compress a dural sinus, increasing venous pressure and causing CSF hypertension.
- Furthermore, CSF hypertension can cause external compression of the transverse sinuses, exacerbating venous hypertension in a vicious cycle. Venous sinus stenting can interrupt this cycle and restore normal pressures.
- Elevated ICP may be difficult to diagnose on noninvasive imaging; careful evaluation of the dural venous sinuses can provide important diagnostic clues.