AMSER Case of the Month June 2025

53-year-old female with past medical history of hypothyroidism presenting with word finding difficulties & worsening short term memory

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Patient Presentation

53 y.o. female with past medical history of hypothyroidism presenting with progressive difficulty with word finding & worsening short term memory such over the last year.

- Her mother was diagnosed with Alzheimer’s dementia in her 50’s and subsequent genetic testing showed a likely pathogenic variant of Presenelin-1 gene (PSEN1), a causative factor for early-onset Alzheimer's [1]

Patient Presentation

Neuropsychiatric evaluation showed no neurocognitive disorder, but mild weakness in executive function.

Pertinent Labs

- TSH: 3.02
- Hereditary Amyotrophic Lateral Sclerosis, Frontotemporal Dementia, and Alzheimer Disease with C9orf72 Panel: One copy of PSEN1 gene was found to have a c.252G>C mutation, likely pathogenic variant.

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Adult. Mild cognitive impairment not meeting criteria for dementia. Initial imaging.

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
Cognitive impairment, mild, dementia criteria not met, initial imaging	3198685	MRI head without IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate
		Amyloid PET/CT brain	1-10 mSv ☢☢☢		Usually appropriate
		CT head without IV contrast	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually appropriate
		FDG-PET/CT brain	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually appropriate
		MRI head without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		Tau PET/CT brain	1-10 mSv ☢☢☢		May be appropriate (Disagreement)
		MR spectroscopy head without IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
		MRI functional (fMRI) head without IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
		CT head with IV contrast	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually not appropriate
		CT head without and with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually not appropriate
		SPECT or SPECT/CT brain perfusion	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually not appropriate
		SPECT or SPECT/CT brain striatal	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually not appropriate

Imaging modality ordered by the physician.

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Findings (unlabeled)

MRI T2 Axial

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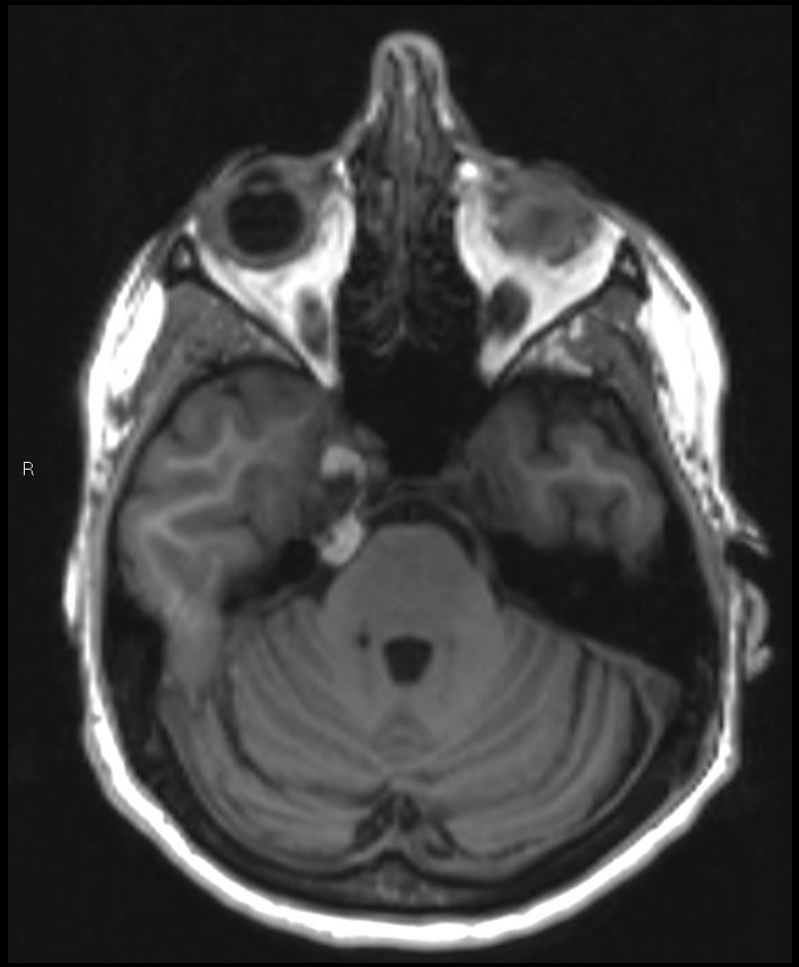
Findings (unlabeled)



MRI T1 Axial

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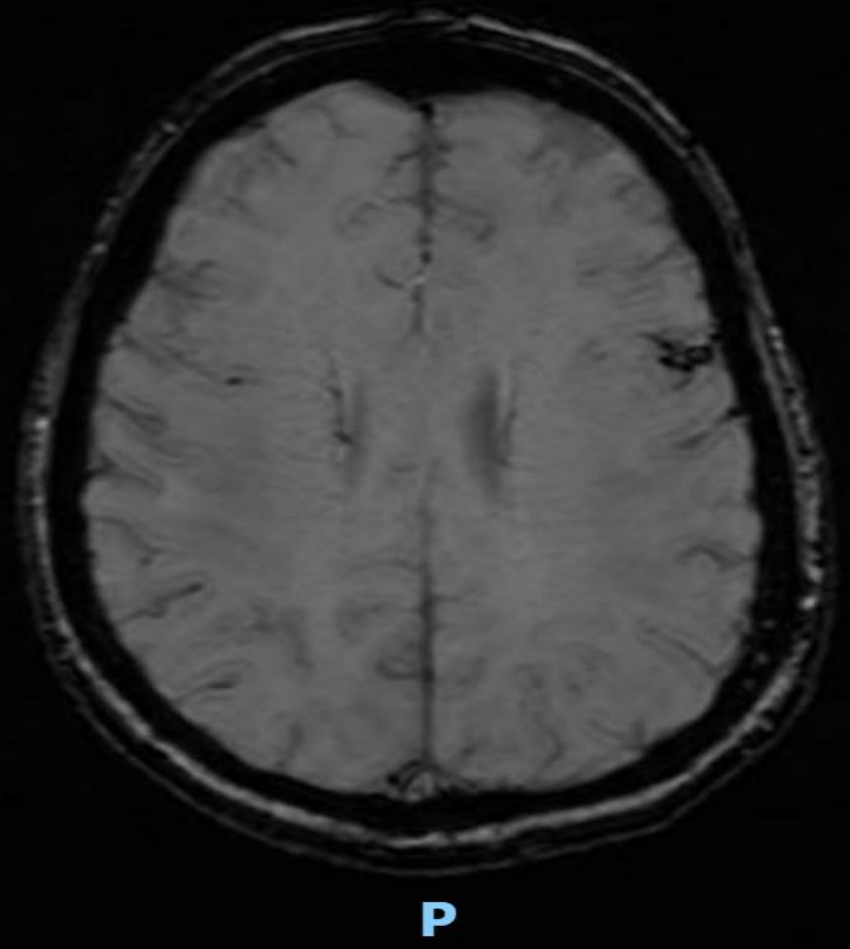
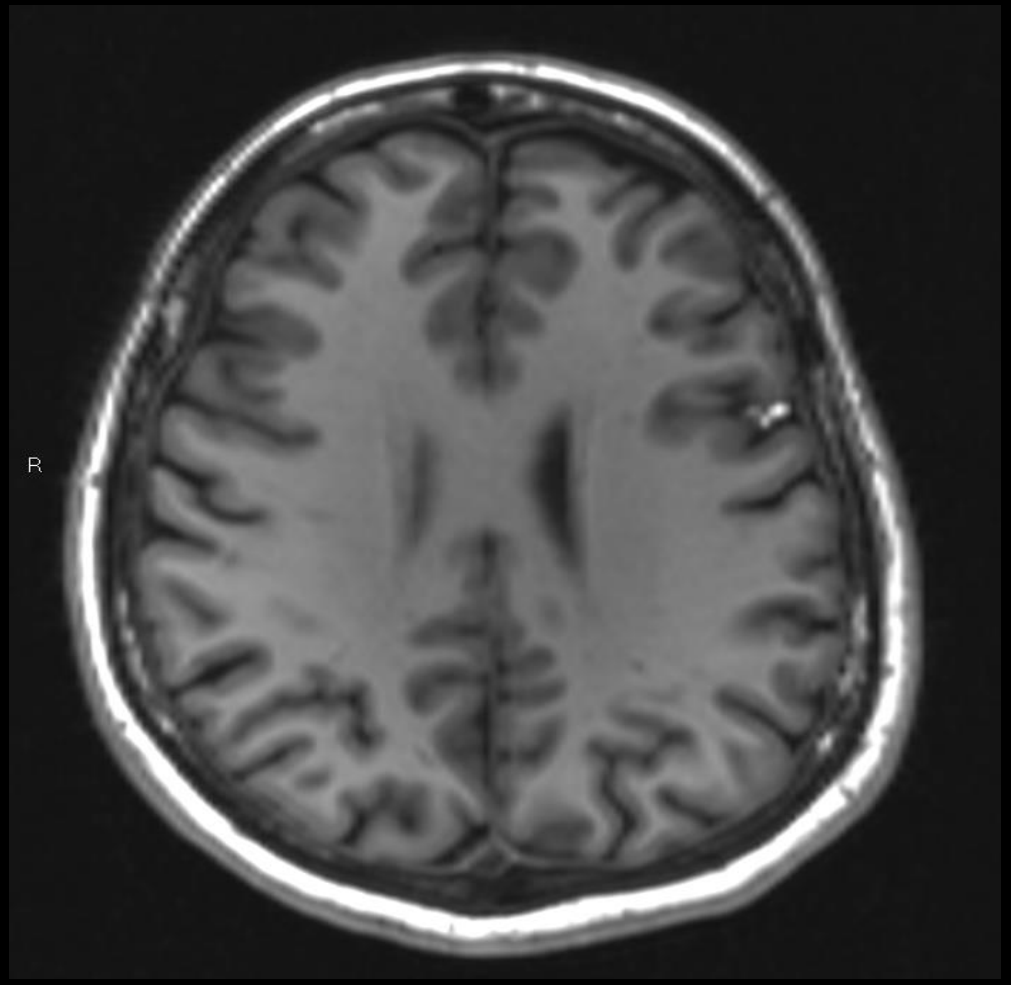
Findings (unlabeled)



MRI SWI Axial



MRI T1 Axial

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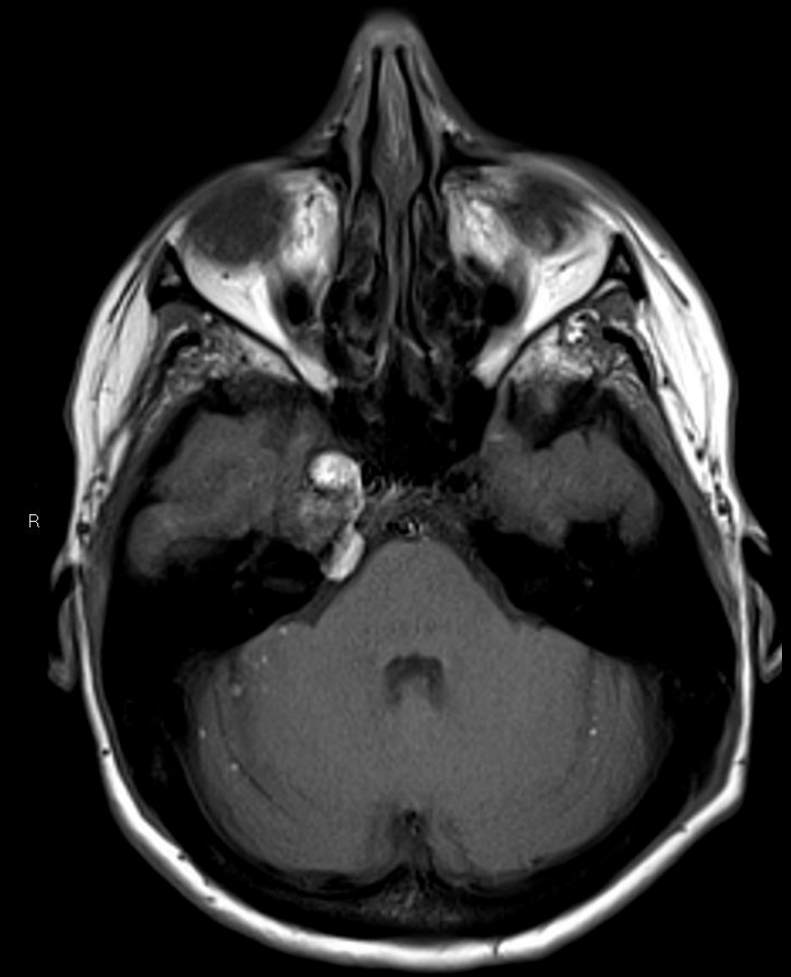
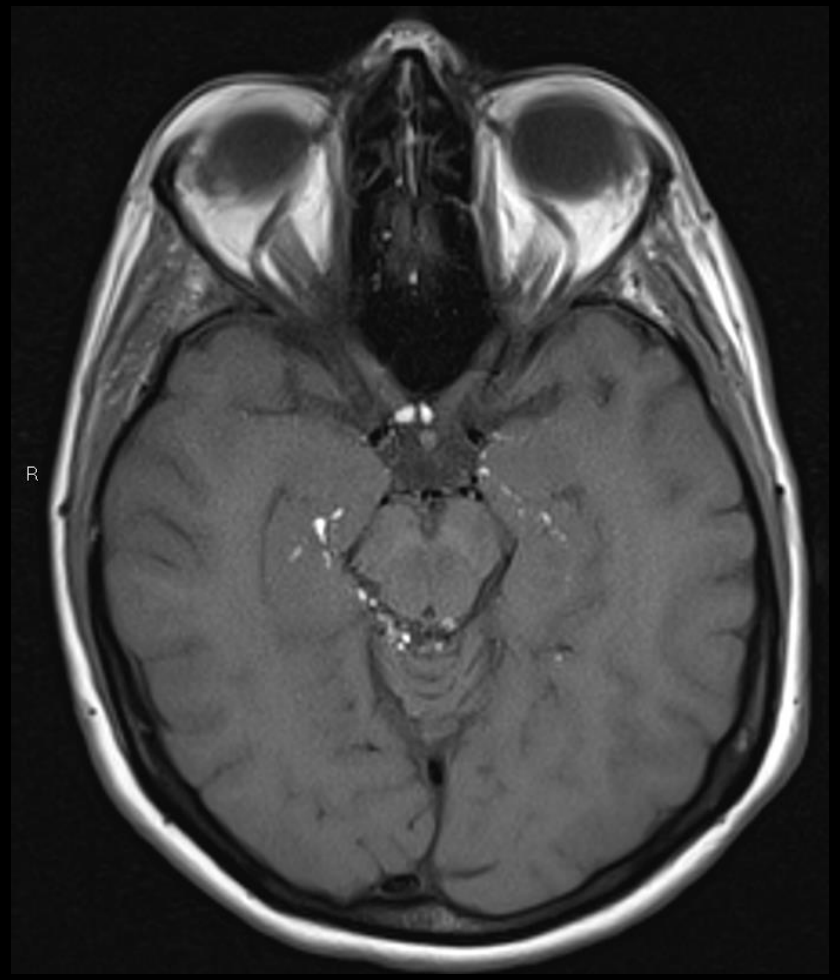
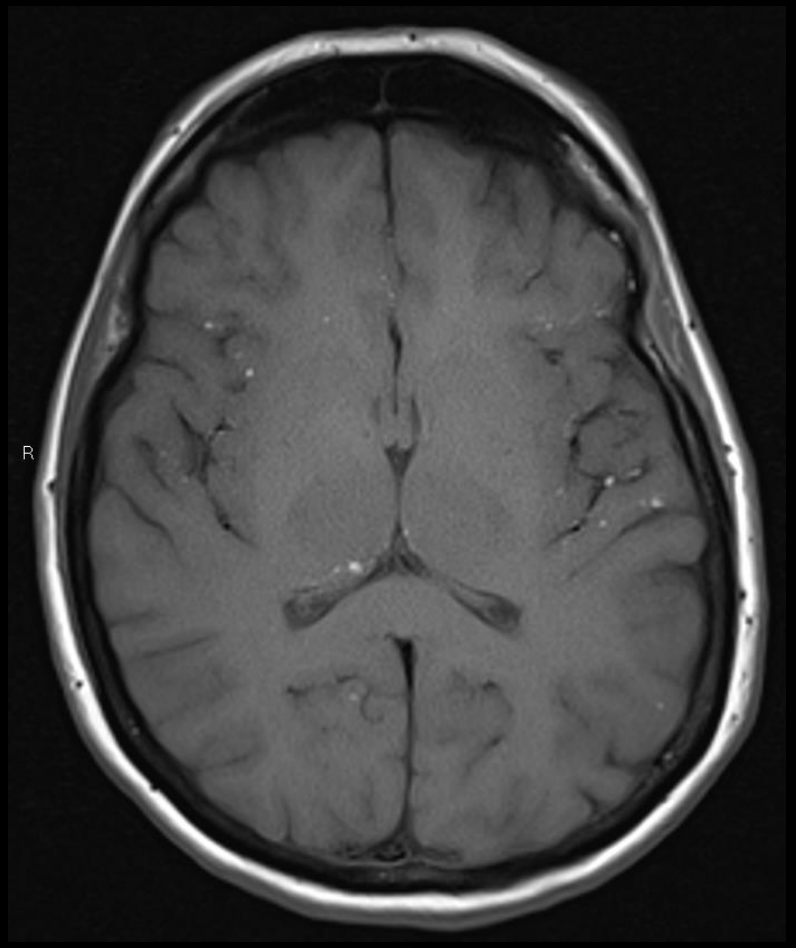
Findings (unlabeled)







MRI T1 Axial

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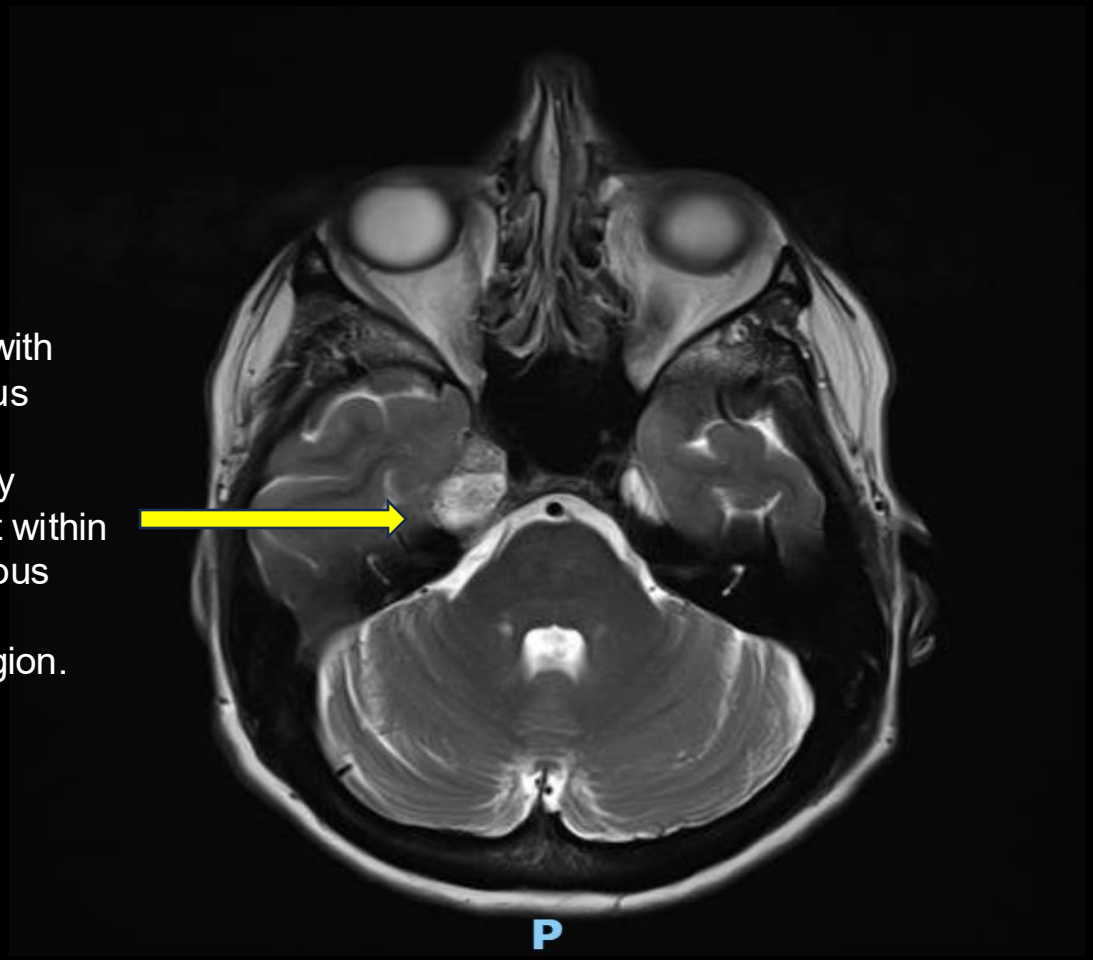
Findings: (labeled)

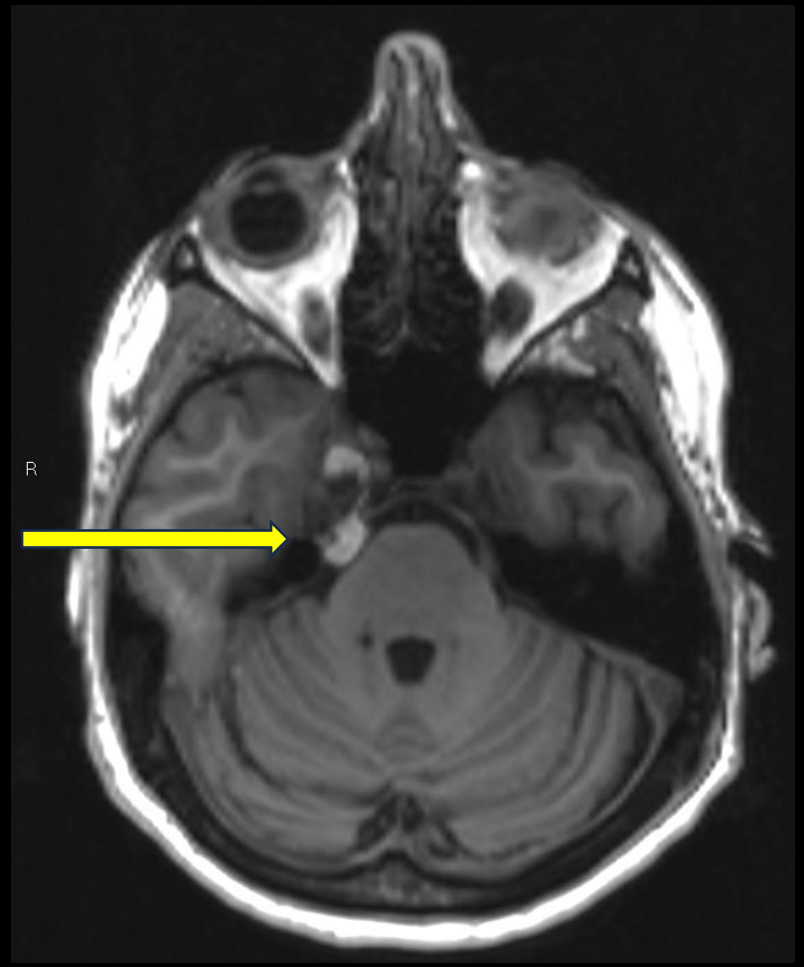
Ovoid mass with heterogeneous signal predominantly containing fat within the right petrous apex/right parasellar region.



MRI T2 Axial

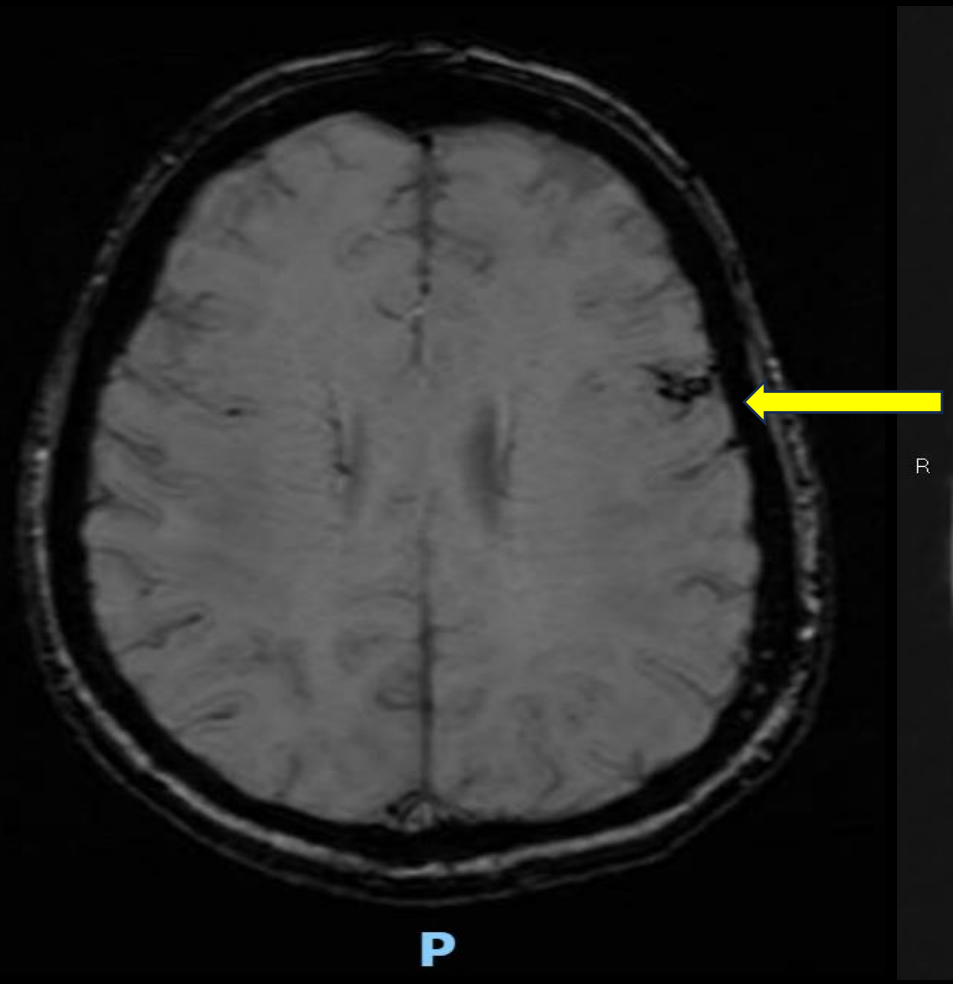
Findings (unlabeled)

Ovoid mass with heterogeneous signal predominantly containing fat, which is T1 hyperintense within the right petrous apex/right parasellar region.

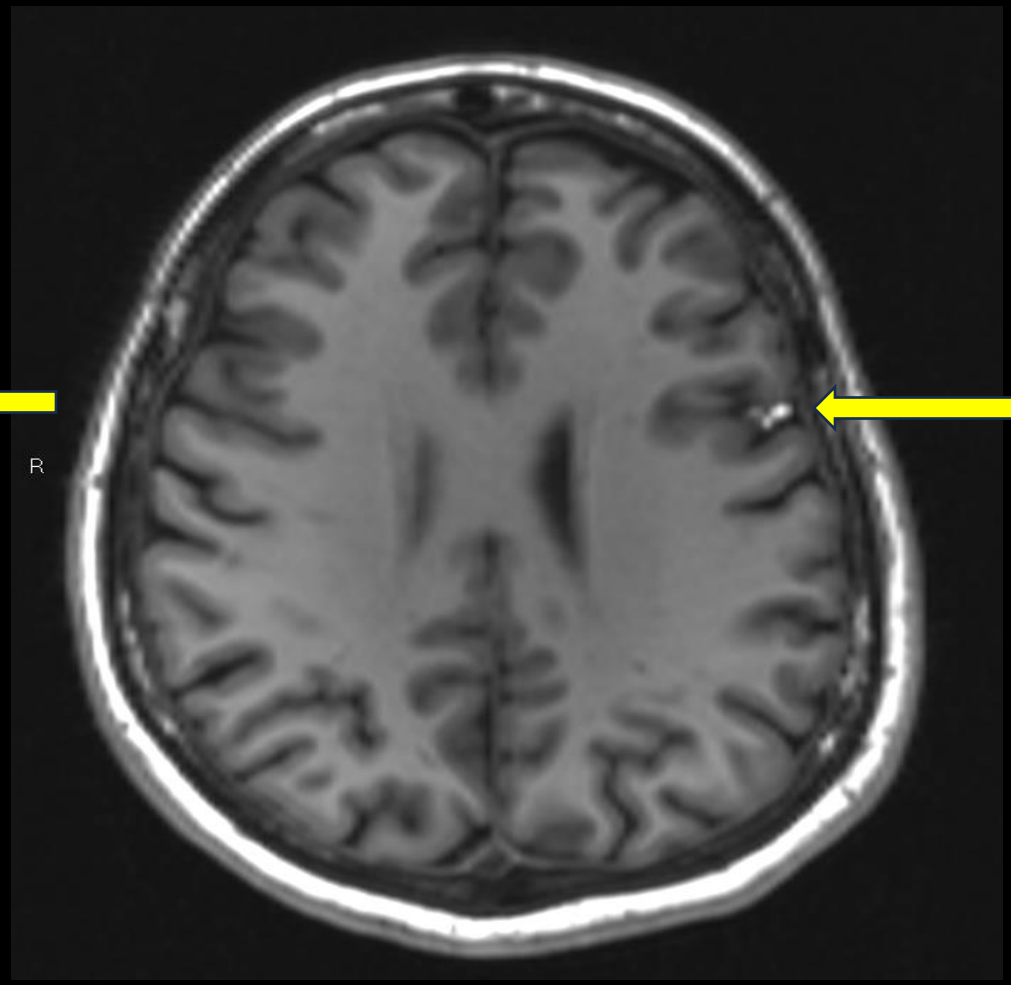


MRI T1 Axial

Findings (unlabeled)



MRI SWI Axial



MRI T1 Axial

Fat droplet seen as hyperintense foci on T1W sequence with susceptibility on SWI sequence in left frontal convexity sulci above the sylvian fissure.

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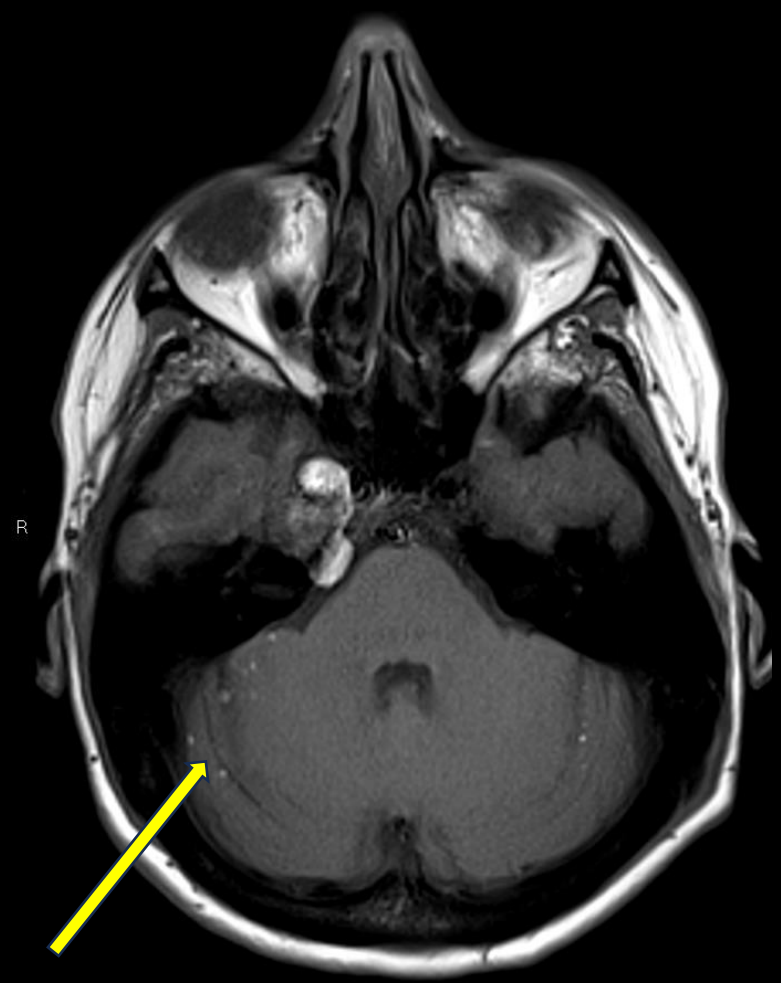
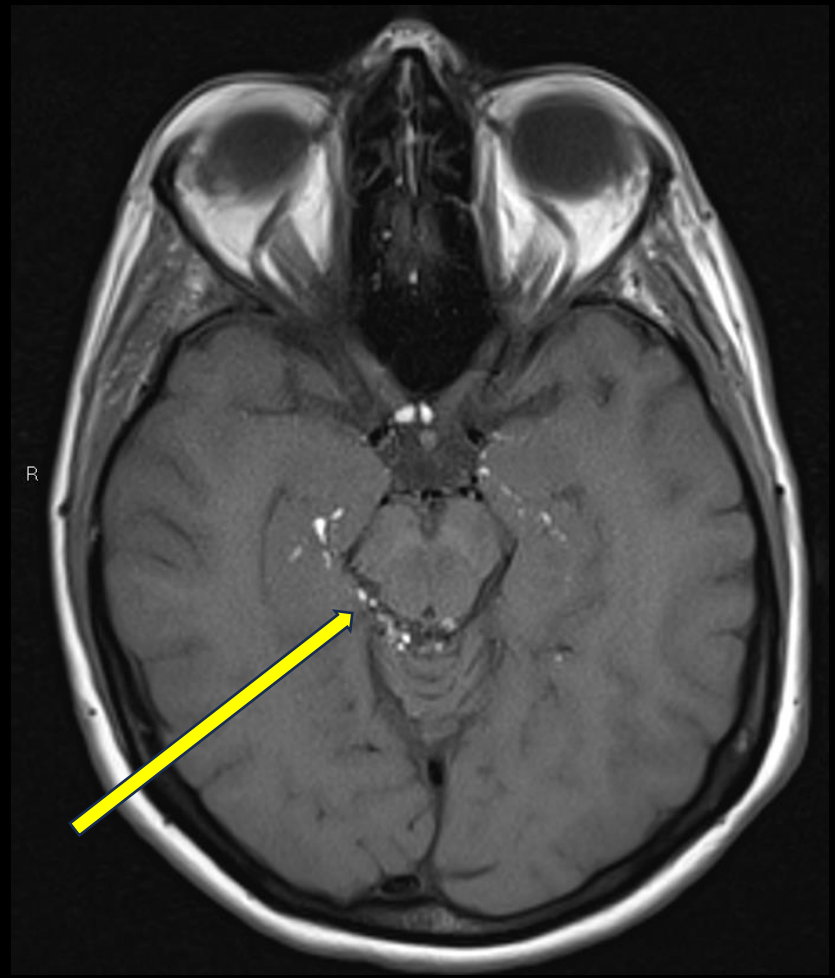
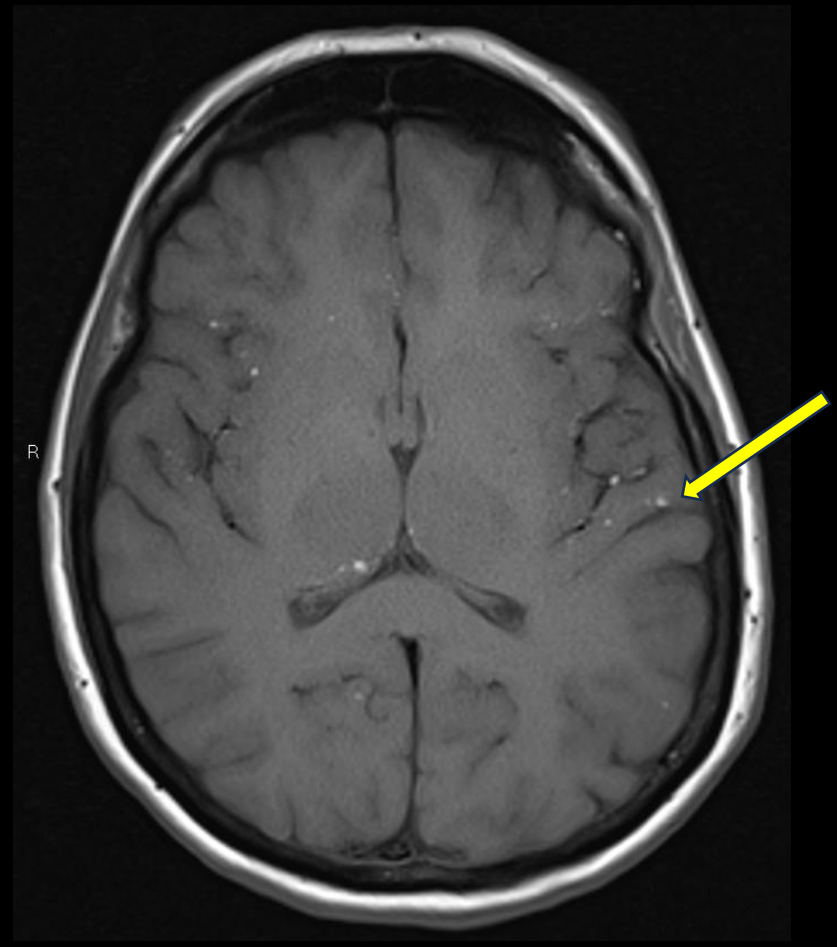
Findings (unlabeled)



Fat droplets along the cerebellar folia seen as hyperintense foci on T1-W imaging.



Fat droplets along the perimesencephalic cistern seen as hyperintense foci on T1-W imaging.



Fat droplets along the sylvian fissure seen as hyperintense foci on T1-W imaging.

MRI T1 Axial

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Final Dx:

Ruptured Dermoid Cyst

Case Discussion

Dermoid cysts are ectodermal lined inclusion cysts that contain hair, sebaceous glands, sweat glands, & squamous epithelium. They arise due to ectodermal cells failing to partition from the neural tube during embryonic development [4]

These cysts grow by desquamation of the epithelium and glandular secretion [2]. Continued growth can lead to rupture, as seen in this case, which can cause chemical meningitis which can be complicated by vasospasm, infarction, & possibly death [2]

Case Discussion

Because these cysts contain liquid cholesterol from glandular secretions, they are all hyperintense on T1-weighted images. However, they have heterogenous signal intensity on T2-weighted imaging, as seen in this case [2]

These cysts tend to occur in the parasellar or midline sellar regions of the brain. Because of this, ruptured dermoid cysts tend to show fatlike droplets in the subarachnoid cisterns, sulci, and ventricles such as the imaging findings seen in this case [2]

Other pathologies with similar imaging findings: Teratoma, Epidermoid Cyst, & Craniopharyngioma [3]

Case Discussion

The patient was seen by neurosurgery and the decision was made to be conservative in approach and follow the ruptured cyst with serial imaging.

References:

1. Bagaria J, Bagyinszky E, An SSA. Genetics, Functions, and Clinical Impact of Presenilin-1 (PSEN1) Gene. *Int J Mol Sci*. 2022;23(18):10970. doi:10.3390/ijms231810970
2. Osborne A, Preece M. Intracranial Cysts: Radiologic-Pathologic Correlation and Imaging Approach | Radiology. Accessed April 22, 2025. https://pubs.rsna.org/doi/10.1148/radiol.2393050823
3. Kucera JN, Roy P, Murtagh R. Ruptured intracranial dermoid cyst manifesting as new onset seizure: a case report. *J Radiol Case Rep*. 2011;5(4):10-18. doi:10.3941/jrcr.v5i4.592
4. Smirniotopoulos JG, Chiechi MV. Teratomas, dermoids, and epidermoids of the head and neck. *RadioGraphics*. 1995;15(6):1437-1455. doi:10.1148/radiographics.15.6.8577967

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