

AMSER Case of the Month

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91-year-old with headache and left sided weakness

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Patient Presentation

- 91-year-old female presented with acute onset left sided weakness and facial droop. The patient was brought to the ED after a nurse noticed the facial droop and unsteadiness while ambulating. The patient also endorses a 6-month history of worsening right-sided headache. Past medical history significant for hypertension and heart failure.
- In the emergency department physical and neurological exam showed 5/5 strength in all extremities and facial symmetry.
 - Right sided cranial nerve VI palsy. The rest of the exam was normal.
- Labs were largely unremarkable.

What Imaging Should We Order?

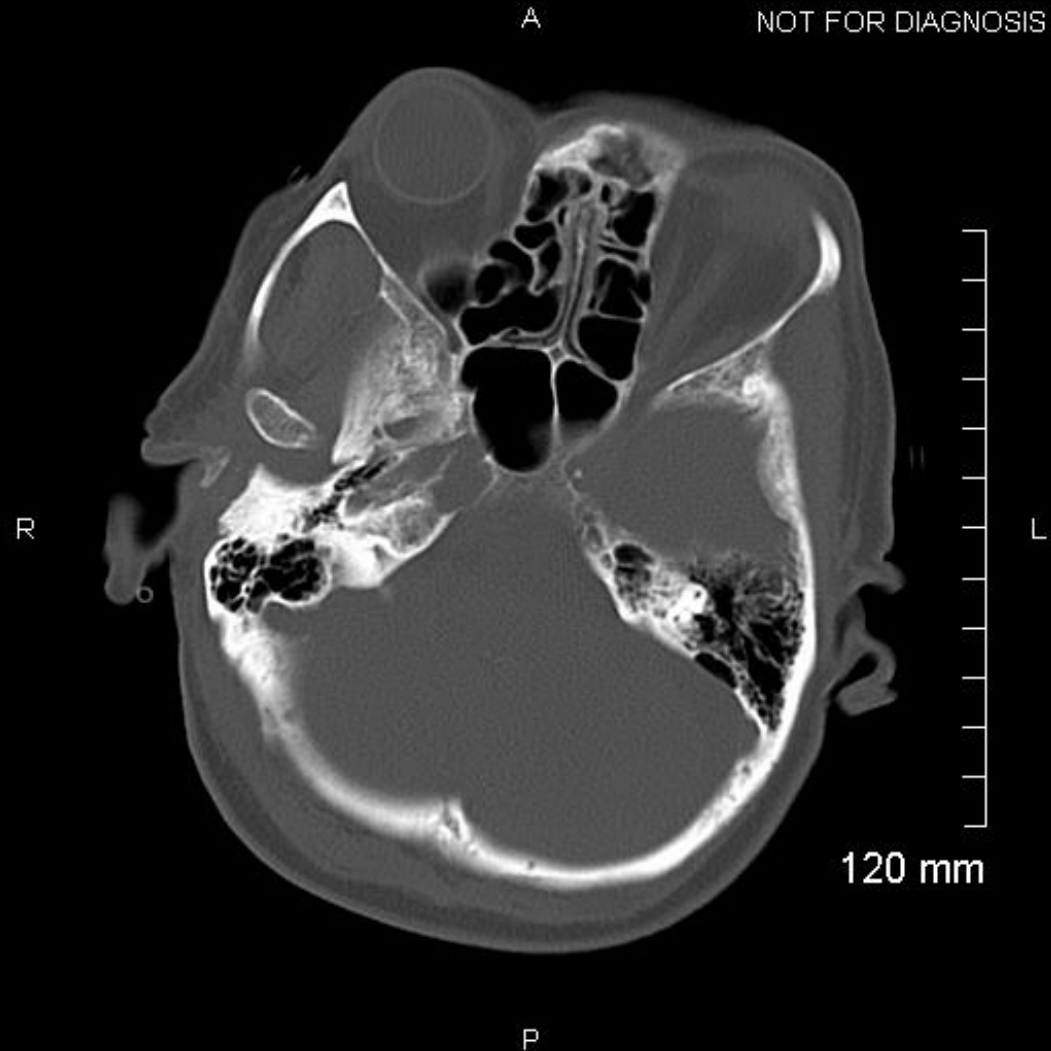
ACR Appropriateness Criteria

Scenario	Scenario Id	Procedure	Adult RRL	Peds RRL	Appropriateness Category	
Focal neuro deficit, new, fixed or worsening, >6 hours, stroke suspected	3106370	MRA head and neck without IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	●
		MRA head and neck without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	●
		MRI head without IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	●
		CT head without IV contrast	1-10 mSv ●●●	0.3-3 mSv [ped]..	Usually appropriate	●
		MRI head without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	●
		CTA head and neck with IV contrast	1-10 mSv ●●●	3-10 mSv [ped]..	Usually appropriate	●
		Arteriography cervicocerebral	1-10 mSv ●●●	3-10 mSv [ped]..	May be appropriate	●
		MRI head perfusion with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate	●
		CT head perfusion with IV contrast	1-10 mSv ●●●	Not Assigned	May be appropriate	●
		US duplex Doppler carotid	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	●		

These imaging modalities were ordered by the ER physician



CT Findings (unlabeled)

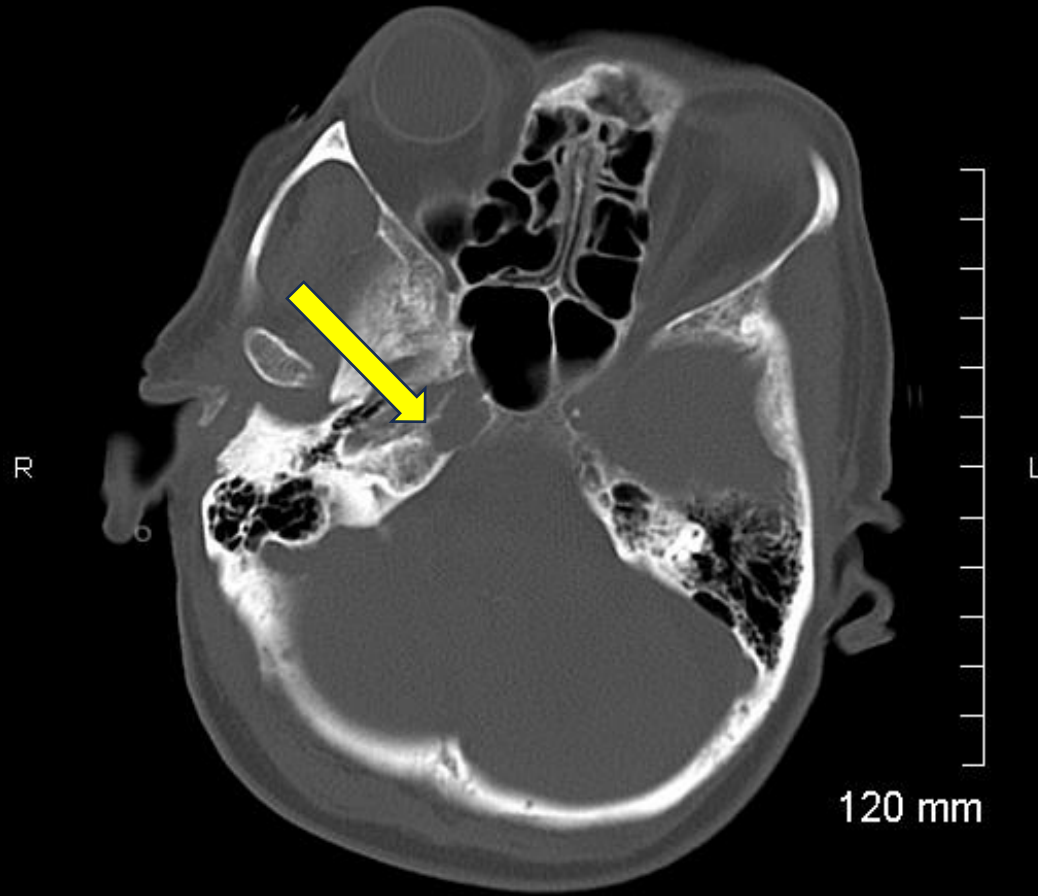


Findings: (labeled)

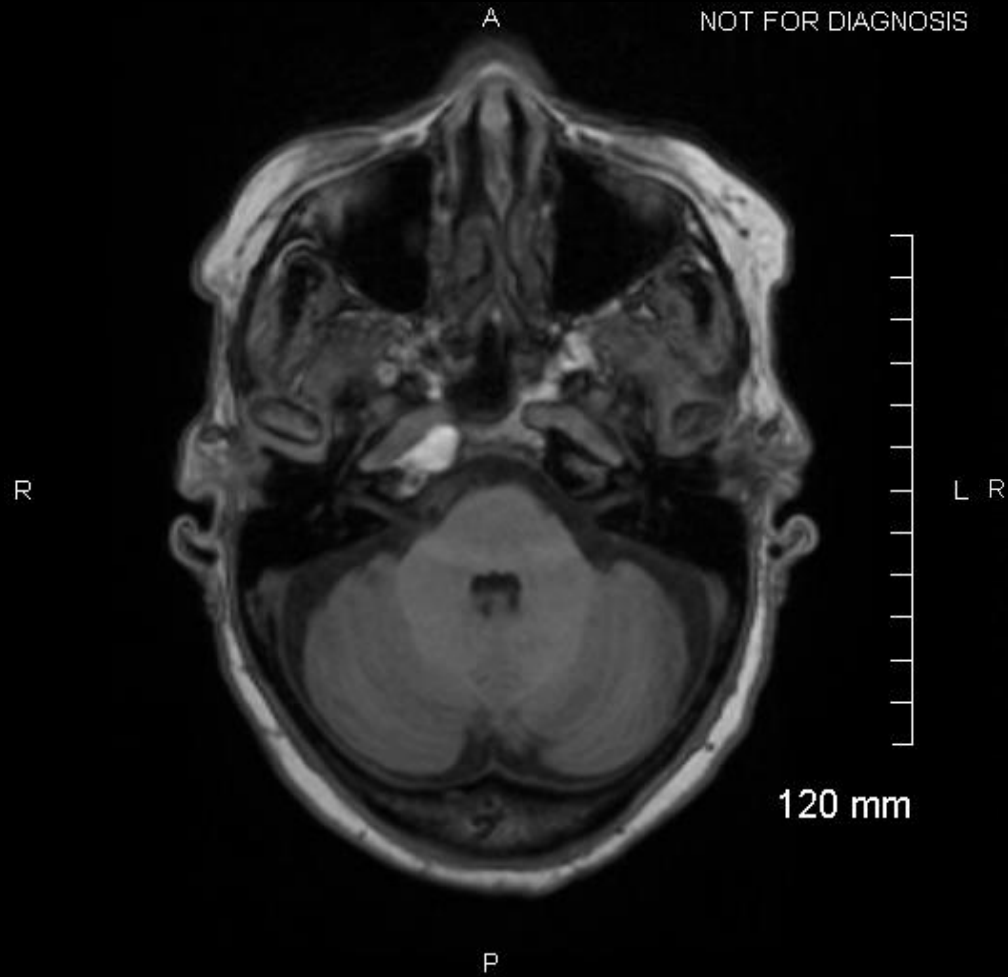
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NOT FOR DIAGNOSIS

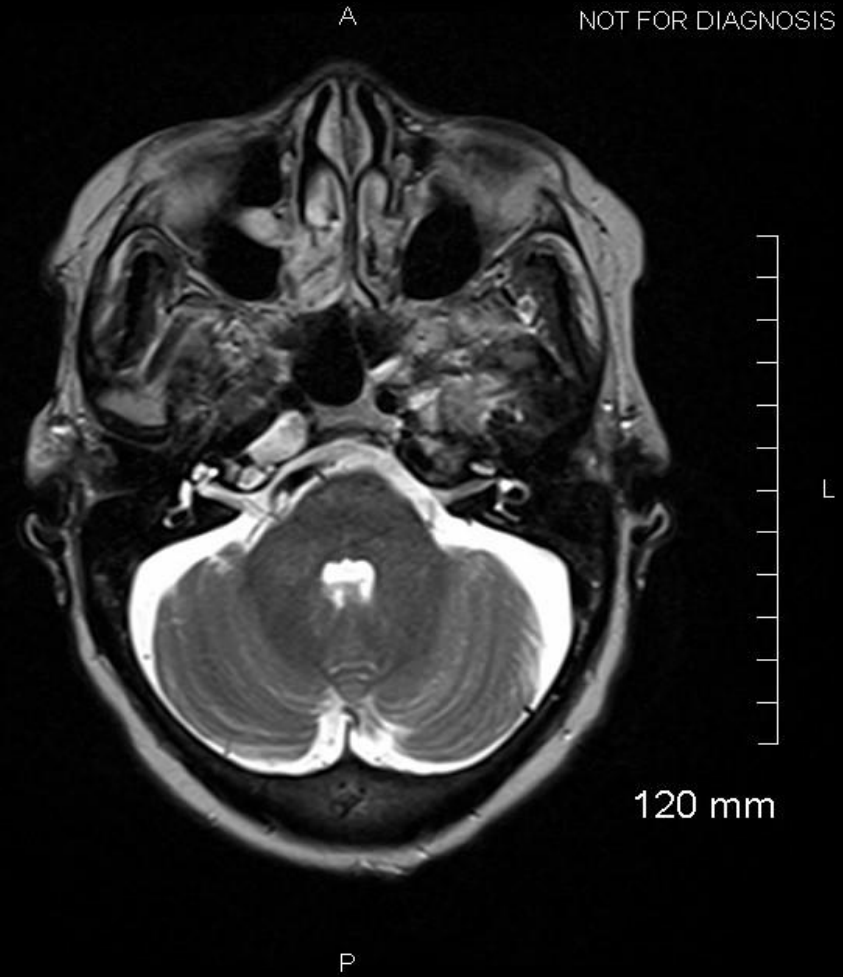
Expansile lucent lesion at the right petrous apex with thinning of the overlying bone



MRI Findings (unlabeled)



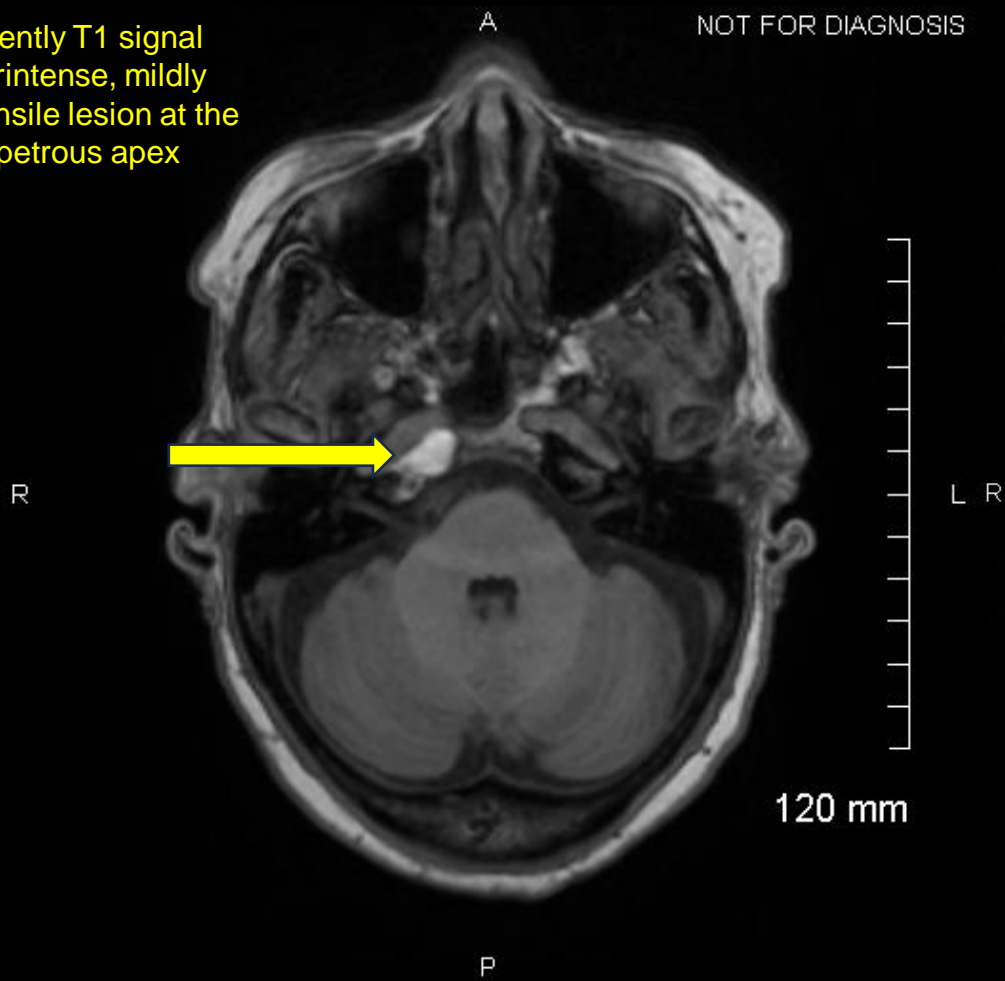
Axial T1



Axial T2

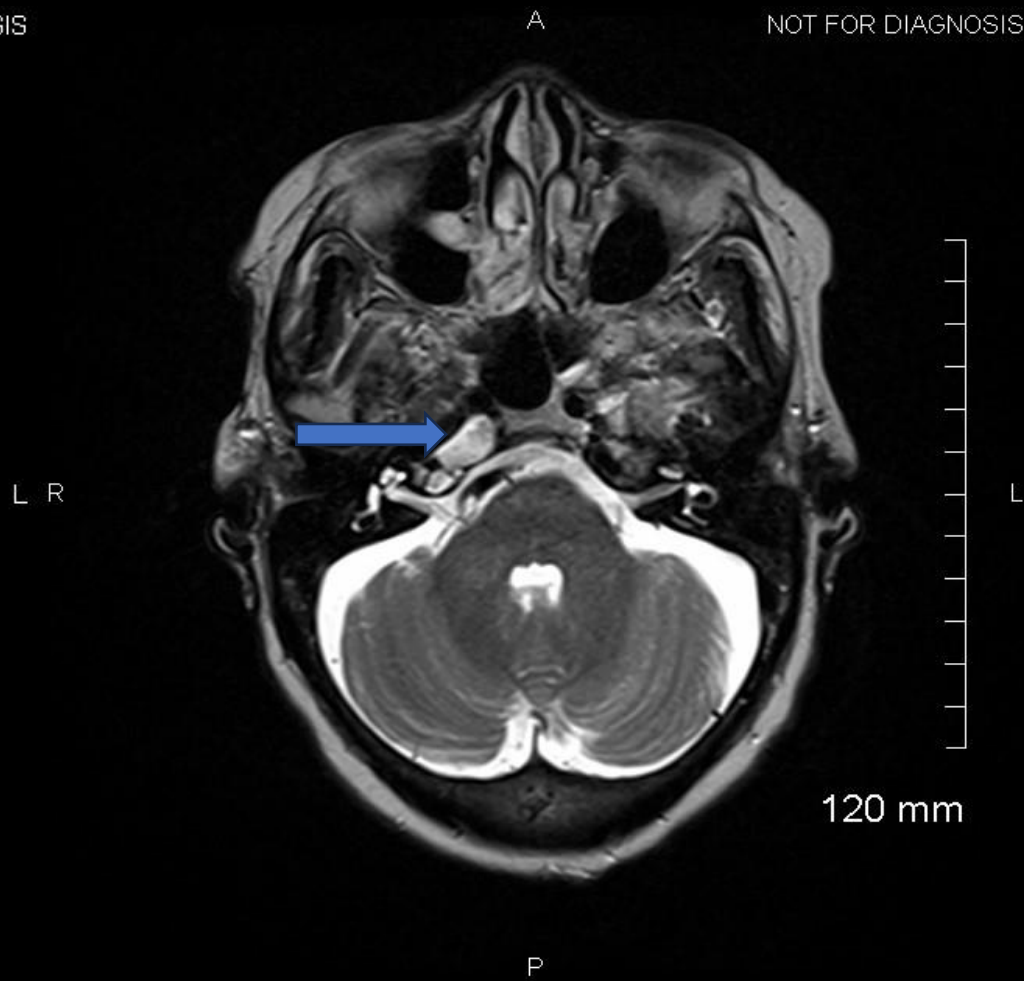
Findings: (labeled)

Inherently T1 signal hyperintense, mildly expansile lesion at the right petrous apex



Axial T1

Well demarcated, mildly expansile, T2 hyperintense lesion at the right petrous apex



Axial T2

Final Dx:

Petrous Apex Cholesterol Granuloma

Case Discussion

- Etiology
 - More common in middle aged patients
 - Usually in patients with a history of middle ear infections
- Pathology and formation theories
 - One theory states there is a chronic foreign body reaction to cholesterol in the aerated portion of the temporal bone. This is attributed to eustachian tube dysfunction and repeated episodes of bleeding into blocked air cells
 - A second theory postulates that hyperplastic mucosa erodes bone and exposes marrow that bleeds.
 - In both scenarios, cholesterol is released and it is inefficiently absorbed by giant cells, causing a chronic inflammatory response, which creates a granuloma.

Case Discussion

- Clinical features
 - Variable presentation depending on the location of the granuloma, most are asymptomatic.
 - Petrous apex can present with: headache, hearing loss, tinnitus or cranial nerve VI dysfunction
 - Middle ear can present with: ear pain, hearing loss, dizziness, tinnitus, cranial nerve VII dysfunction or blue tympanic membrane
 - Mastoid bone can present with headache

Case Discussion

- Imaging Findings

- CT

- Expansile lesion with thinned overlying bone. Peripheral enhancement post-contrast
 - At the petrous apex, they are often associated with bone erosion

- MRI

- T1: Hyperintense expansile signal. Low signal rim due to hemosiderin ring
 - T2: Central signal with thinned adjacent bone
 - Difficult to differentiate between cholesterol granuloma and hydrated mucocele, but hydrated mucoceles are much rarer.
 - Can also have similar appearance to thrombosed ICA aneurysm. ICA aneurysm will usually have a central flow void.

Case Discussion

- Treatment
 - Asymptomatic lesions can be periodically monitored with imaging
 - There is no effective medical management for cholesterol granulomas
 - Definitive management requires surgical intervention
 - Different surgical approaches are available including an endoscopic endonasal approach or an infracochlear approach
 - Complete removal of the granuloma and cyst wall must be accomplished to reduce the risk of recurrence
 - Petrous apex granulomas are unique in that these lesions can be drained and stented as an alternative to surgical removal

References:

- “ACR Appropriateness Criteria®.” ® | *American College of Radiology*, www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria. Accessed 26 Aug. 2023.
- Gaillard, Frank. “Cholesterol Granuloma: Radiology Reference Article.” *Radiopaedia Blog RSS*, Radiopaedia.org, 26 Apr. 2023, radiopaedia.org/articles/cholesterol-granuloma?lang=us.
- Hoa, M, et al. “Petrous Apex Cholesterol Granuloma: Pictorial Review of Radiological Considerations in Diagnosis and Surgical Histopathology.” *The Journal of Laryngology and Otology*, U.S. National Library of Medicine, Apr. 2013, www.ncbi.nlm.nih.gov/pmc/articles/PMC3763740/.
- Kuruma, Tessei, et al. “Large Cholesterol Granuloma of the Middle Ear Eroding into the Middle Cranial Fossa.” *Case Reports in Otolaryngology*, U.S. National Library of Medicine, 2017, www.ncbi.nlm.nih.gov/pmc/articles/PMC5498906/.