RADY 401 Case Presentation

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Radiology

Focused patient history and workup

- 69yo M with progressive bilateral hearing loss
- Using hearing aids since age 53
- Worked in a loud steel mill
- Rinne test demonstrates AC louder than BC on both sides, Weber doesn't lateralize

→ Diagnosis?

- Now his speech comprehension is at 90 dB is:
  - 16% on R side
  - 4% on L side

→ Next step?

[1]

Focused patient history and workup

- 69yo M with progressive bilateral hearing loss
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- Rinne test demonstrates AC louder than BC on both sides, Weber doesn't lateralize

→ Sensorineural hearing loss

- Now his speech comprehension is at 90 dB is:
  - 16% on R side
  - 4% on L side

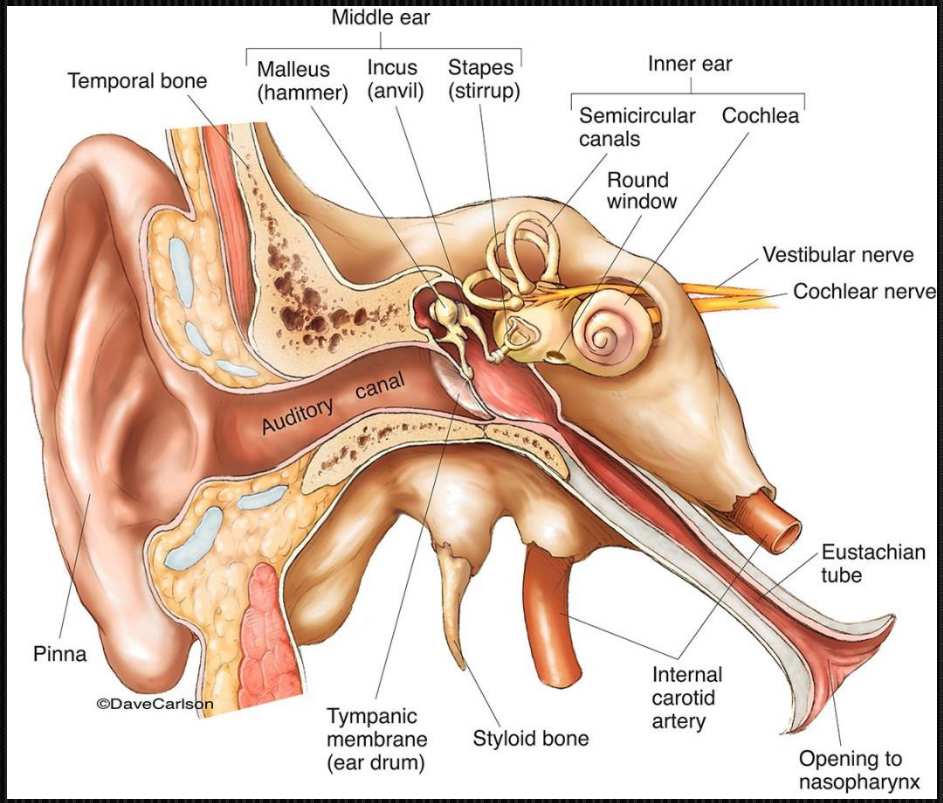
→ Preop workup cochlear implant

[1]

List of imaging studies

- Pre-Op: Temporal Bone CT w/o contrast (or MRI)
  - Assess cochlear/vestibular anatomy
  - Rule out other etiologies of SNHL
    - Enlarged vestibular aqueduct → Meniere's Disease
    - Mass on CN8 → Vestibular Schwannoma (Acoustic Neuroma)
    - Enhancing lesions → Multiple Sclerosis
    - Deformed cochlea → Malformation
- Intra-Op: XR to ensure correct device placement

Temporal bone anatomy

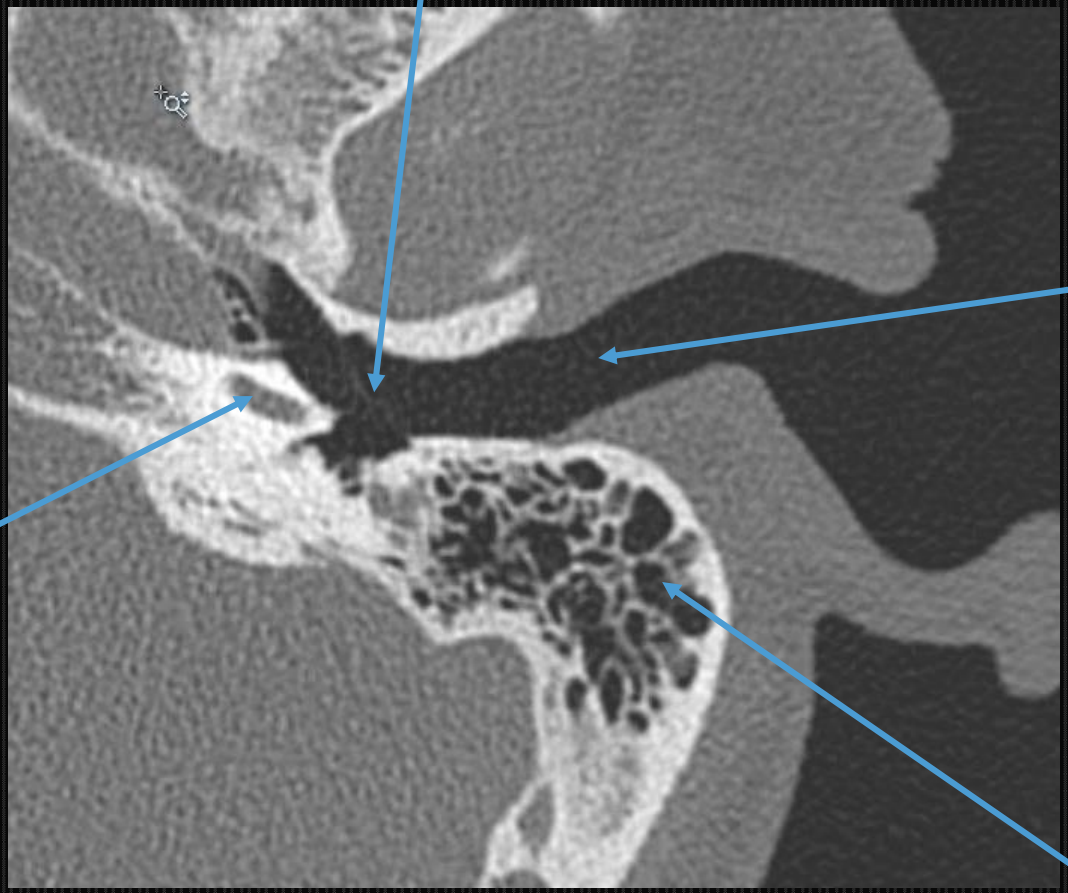


[2]

[3]

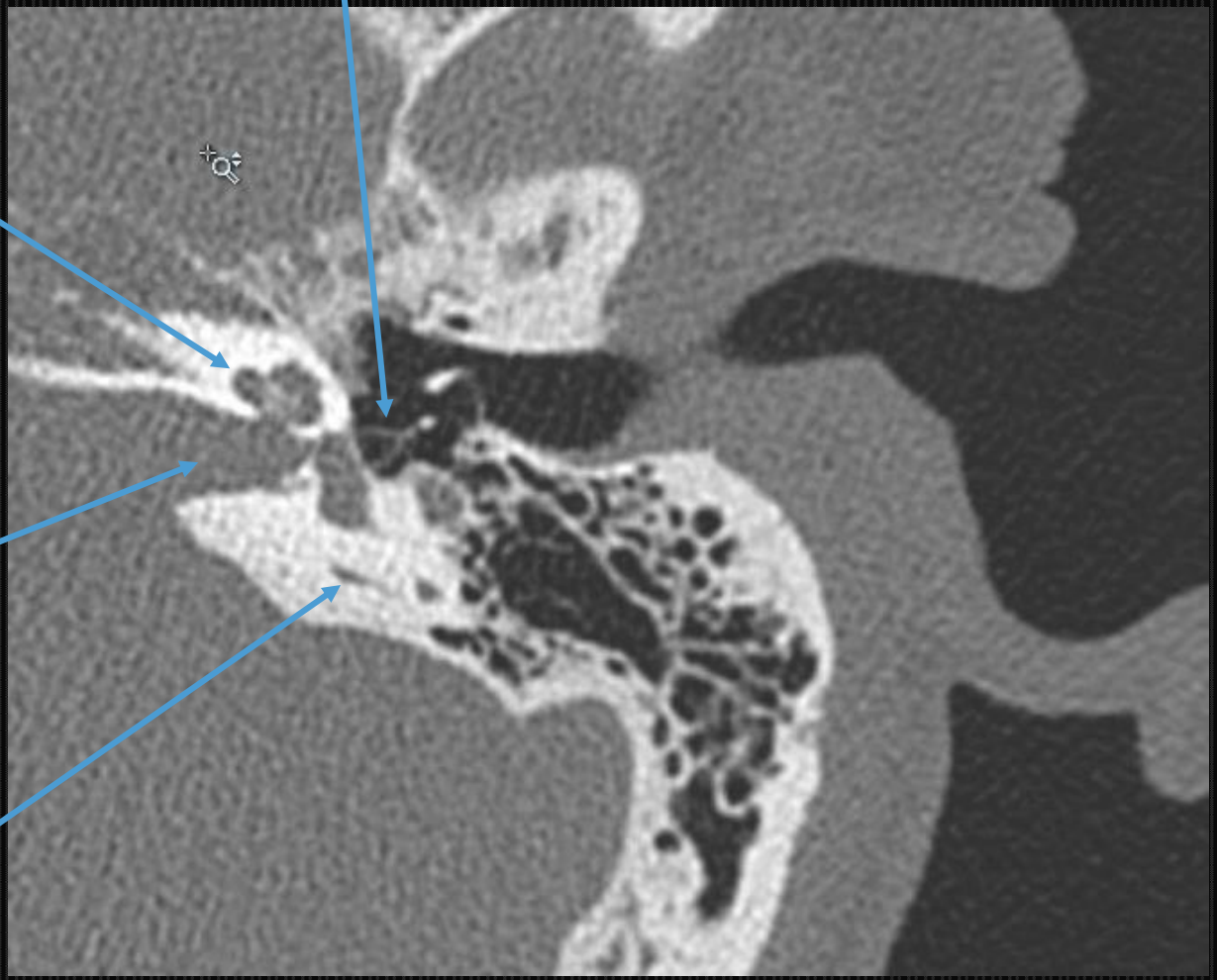
L axial (transverse) view

Pre-op CT



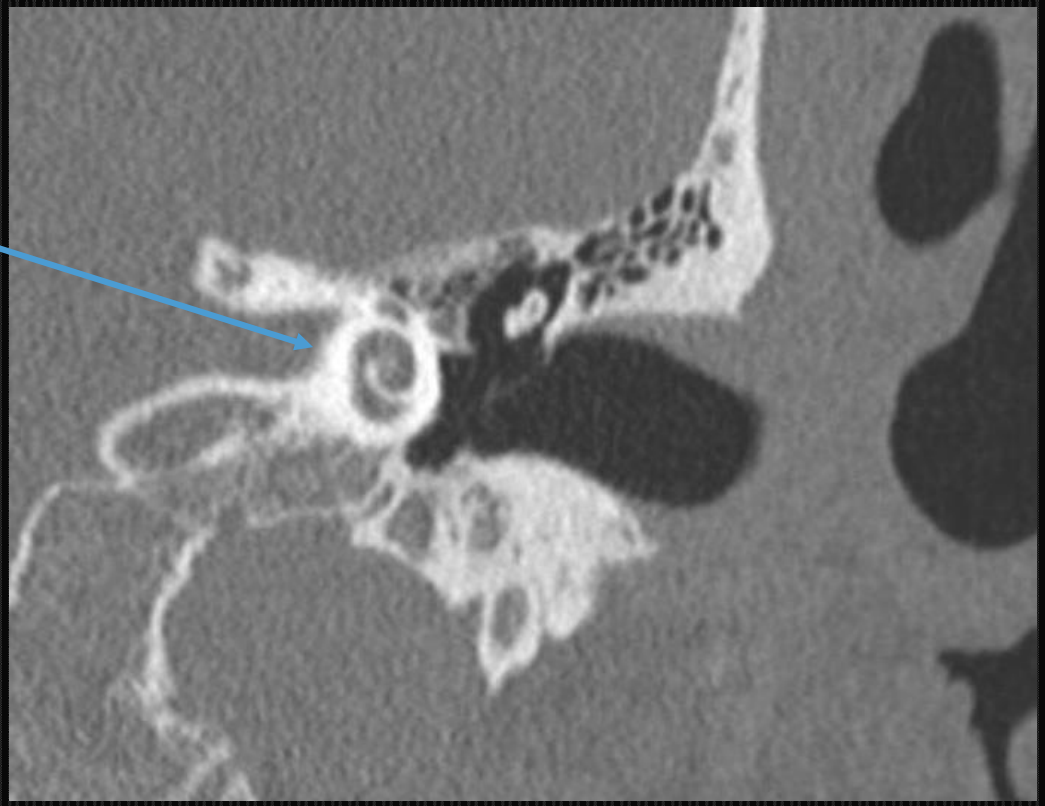
L axial (transverse) view

Pre-op CT



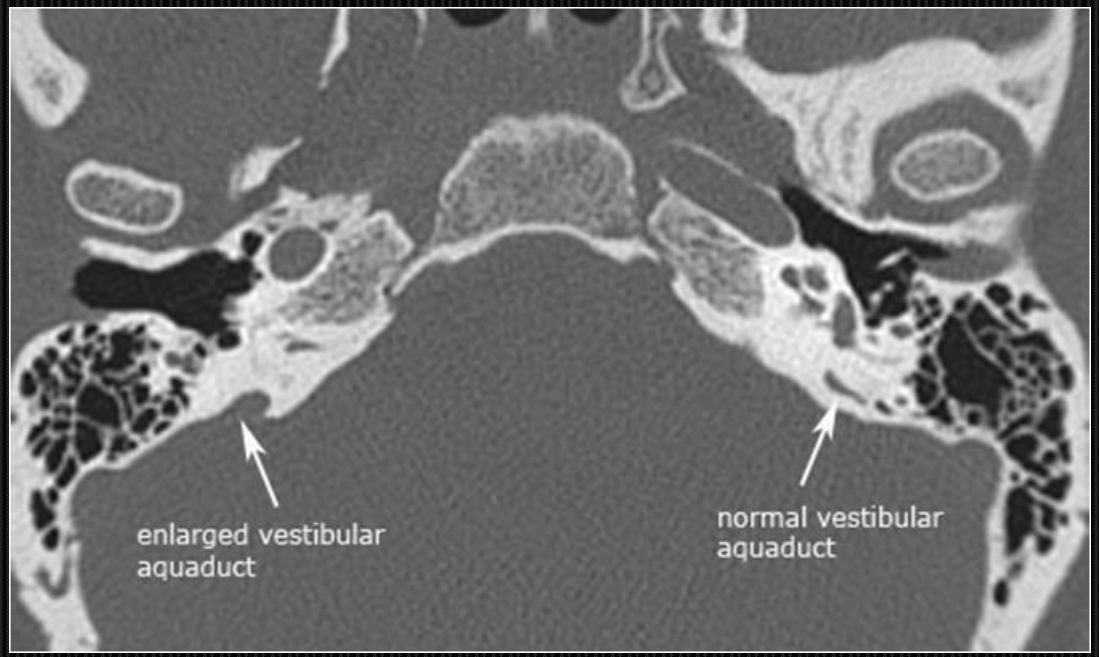
L coronal view

Pre-op CT



Imaging discussion 1: Pre-op evaluation

- External auditory canal patent, TM & ossicles normal (conductive loss unlikely)
- Normal vestibular aqueduct (not enlarged)
- Cochlea (normal size and morphology)
- No narrowing of internal auditory canal (likely normal CN8)

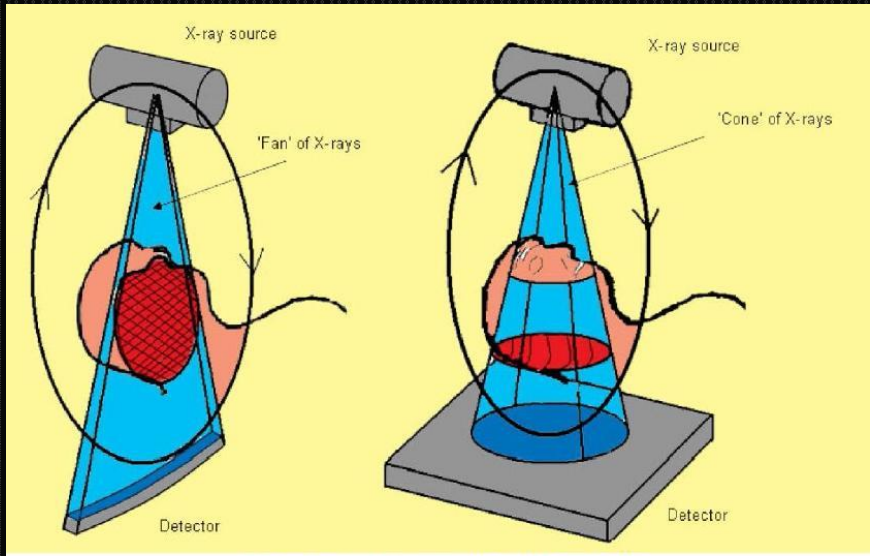


[4]

[5]

Imaging discussion 1: Pre-op evaluation

- MRI w contrast has been the scan of choice to rule out cerebellopontine angle syndrome, vestibular schwannomas, and MS [6]
- Recently, cone-beam CT (CBCT) has provided better resolution than traditional helical CT and is being used more regularly [7]
  - CBCT is 94.4 uSv, compared to 1066.1 uSv for helical multi-slice CT. CBCT is also faster and cheaper than helical CT. [8]



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Imaging discussion 1: Pre-op evaluation

- 144 temporal bones w abnormalities analyzed with both CT and MRI [9]

		Truth + (Abnormal Cochlea)	Truth - (Normal Cochlea)
Test +	(CT says abnormal)	133	0
Test -	(CT says normal)	11	0
		144	0
	Sensitivity	0.923611111	

		Truth + (Abnormal Cochlea)	Truth - (Normal Cochlea)
Test +	(MR says abnormal)	136	0
Test -	(MR says normal)	8	0
		144	0
	Sensitivity	0.944444444	

MR missed all cases of cochlear sclerosis
CT missed all cases of absent CN8

→ Was CBCT appropriate in this case?

Imaging discussion 1: Pre-op evaluation

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MR missed all cases of cochlear sclerosis
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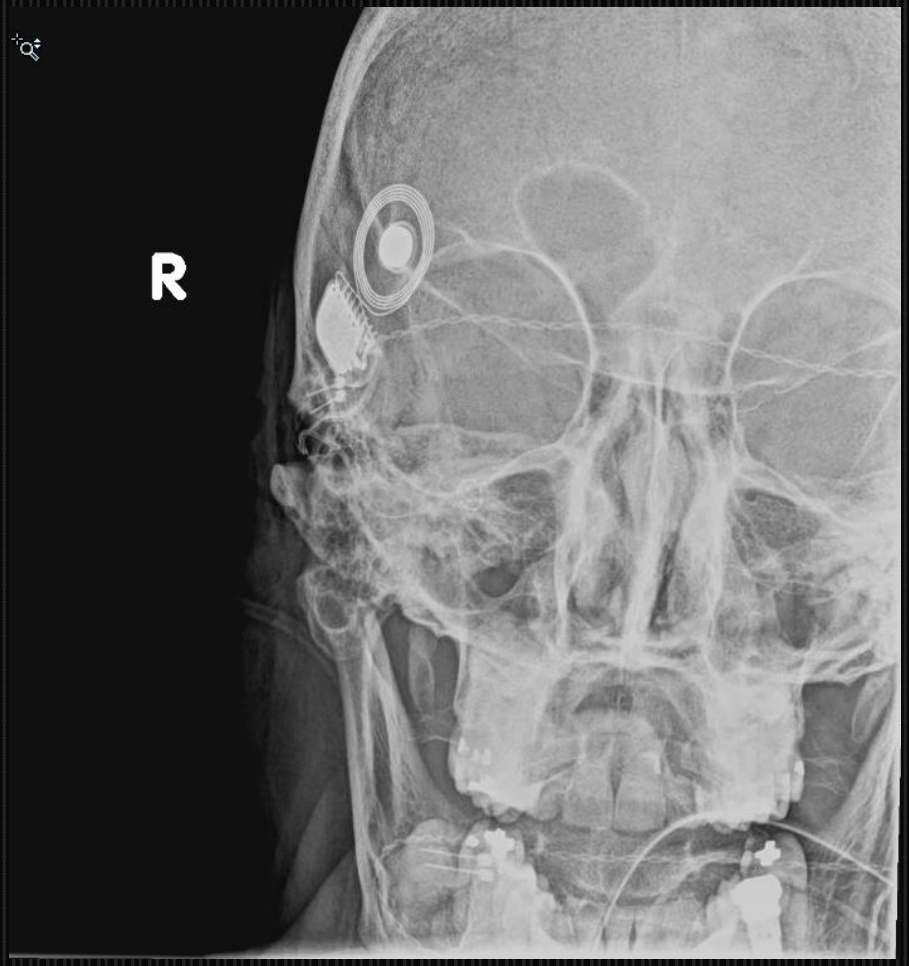
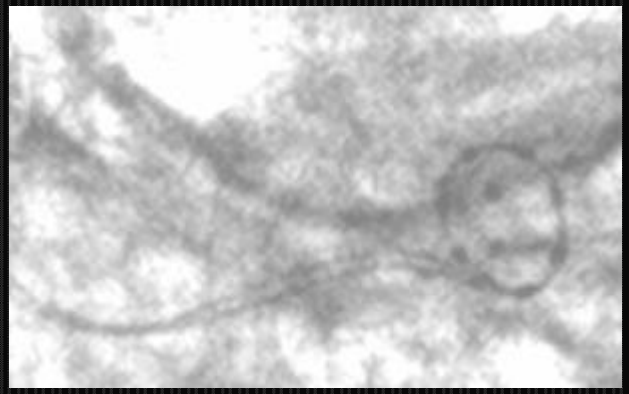
YES! It was appropriate to perform cone-beam CT

Intra-op XR on Epic (6/20/2017)





Imaging discussion 2

- Do we need post-op Xrays?
- In a study of 824 cases, 4 were misplaced (<1%) [10]
- In a study of 277 cases, 4 had tip rollover (<1.5%) [11]

normal

tip rolled over

[12]

Patient treatment & outcome

- L Cochlear Implant with "atraumatic placement" via cochleostomy in the round window (MEDEL Flex 28^{TM})
- Outcome: 4% word score to 56% word score!

WrapUp

- Sudden SNHL → Corticosteroids and get MRI immediately
- Gradual SNHL → Audiology
- Cone-beam CT (or MRI) to evaluate cochlear implant candidacy
- Intraoperative XR to evaluate cochlear implant positioning

References

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[11] Cosetti, Maura K., et al. "An evidence-based algorithm for intraoperative monitoring during cochlear implantation." Otology & Neurotology 33.2 (2012): 169-176.
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