

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 56 year old man comes to establish a primary care practitioner. Although his chief complaints are of cough and wheezing, he also reports unilateral increasing hearing loss. He has also had bouts of ear pain that last 5-20 seconds, which are quite sharp. What is the most appropriate imaging examination?

- (a) plain films of the skull
- (b) ultrasound of the carotid arteries
- (c) MR of the brain with special attention to the internal auditory canals
- (d) unenhanced CT of the head

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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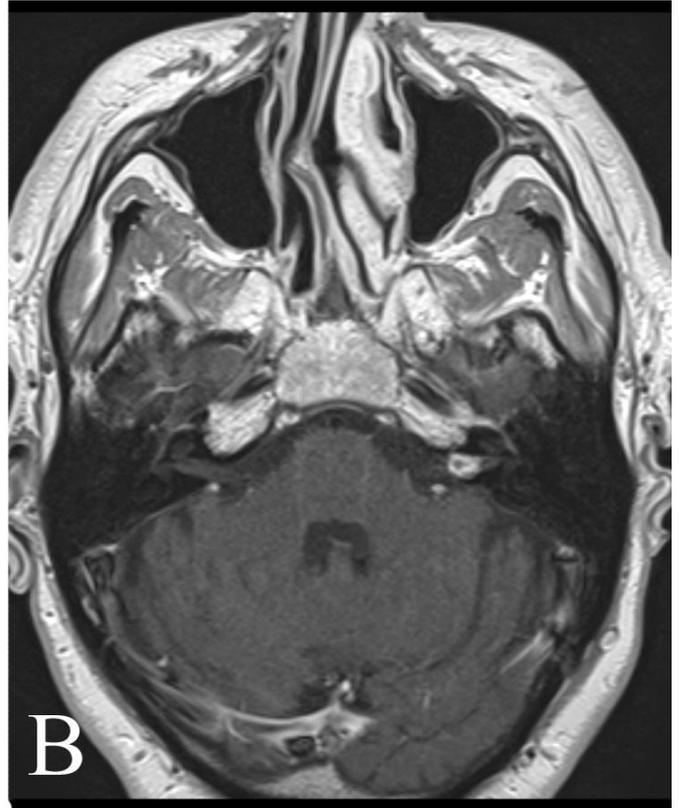
- (a) plain films of the skull
- (b) ultrasound of the carotid arteries
- (c) MR of the brain performed without and with contrast material, with special attention to the internal auditory canals
- (d) unenhanced CT of the head

Answer: (c), MR of the brain performed without and with contrast material, with special attention to the internal auditory canals. The patient's symptoms suggest possible neural lesion of the left ear, and MR is ideal for evaluation of this lesion. MR can also diagnose fluid in the mastoid air cells and middle ear in cases of infection.

Plain films of the skull are of limited value in most situations, including this one, and (a) is incorrect. Ultrasound of the carotid arteries is usually performed to evaluate for potential carotid artery stenosis, which is not a usual cause of hearing loss or ear pain, and (b) is incorrect. Unenhanced CT of the head may provide information about aeration of the mastoid air cells and the middle ear, but is not capable of depicting the VII/VIII nerve complex, and (d) is incorrect.

IMAGING STUDY AND QUESTIONS

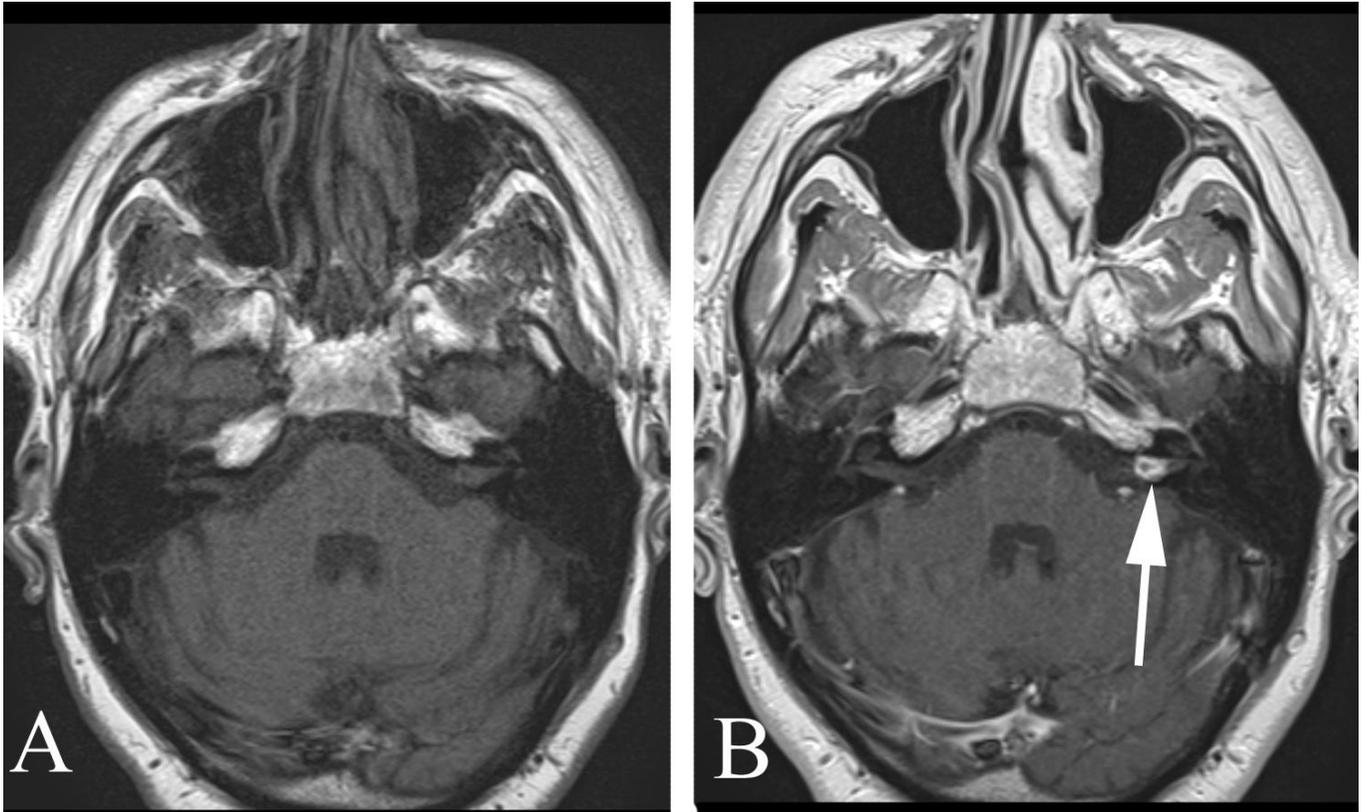
An imaging study was performed.



Imaging questions:

- 1) What type of study is this?
- 2) Are there any abnormalities?
- 3) What is the likely diagnosis?
- 4) What is the next appropriate step in management?

IMAGING STUDY QUESTIONS AND ANSWERS



Imaging questions:

- 1) What type of study is this? A brain MR. A) represents an axial unenhanced T1-weighted image at the level of the internal auditory canals. B) represents as axial contrast-enhanced T1-weighted image at the level of the internal auditory canals.
- 2) Are there any abnormalities? There is a small but intensely enhancing lesion of the left internal auditory canal, which is not easily seen on the pre-contrast study but which is quite conspicuous on the post-contrast study (white arrow).
- 3) What is the likely diagnosis? Vestibular schwannoma (formerly called acoustic neuroma).
- 4) What is the next appropriate step in management? Referral to an appropriate surgeon (typically an otorhinolaryngologist or “ENT” surgeon).

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The internal medicine physician referred the patient to an otorhinolaryngologist, who concurred that the patient has an acoustic neuroma and planned appropriate surgery.

SUMMARY

Presenting symptom: Imaging for complaints arising from the cranial nerves depend to a large extent on which cranial nerve is involved and what the symptoms are. As a generalization, isolated involvement of a single cranial may be caused by intrinsic dysfunction of the nerve or by a mass compressing the nerve. Symptoms arising from multiple cranial nerves or cranial nerve symptoms accompanied by other symptoms (headache, pain, non-cranial nerve neurologic abnormalities) are generally more worrisome.

Imaging work-up: Hearing loss is usually further evaluated in the office by a combination of a Weber and Rinne test to differentiate sensory from conductive hearing loss, possibly supplemented by a Dix Hallpike maneuver to evaluate for vertigo. As the patient also had ear pain, an MR was obtained.

Establishing the diagnosis: A presumptive diagnosis vestibular schwannoma can be made on the basis of sensorineural hearing loss and the classic findings on MR examination. Evaluation of resected tissue confirms the diagnosis.

Treatment: Acoustic neuromas may be observed if they are incidentally discovered and minimally symptomatic, as these are benign lesions. Tumors causing hearing loss or facial weakness are generally treated with either classic surgery, or with “stereotactic radiosurgery” which involves irradiating the tumor with gamma rays using a special device.

Take-home message: MR is generally the imaging method of choice in those cases where imaging of cranial nerve symptoms is necessary. Note that not all cranial nerve symptoms need imaging, however. Please see the references for further details.

FURTHER READING

Furman JM, Barton J. Evaluation of vertigo. UpToDate, accessed 10/10/09.

Renfrew, DL. Cranial nerves, sinuses, and neck masses. Chapter 5 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.

Weber PC. Evaluation of hearing loss in adults. UpToDate, accessed 10/10/09.