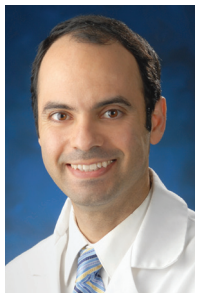


Symptoms: Hearing Loss and Dizziness

By Hamid R. Djalilian, MD

A 60-year-old man comes to the office with a sudden onset of hearing loss and dizziness.

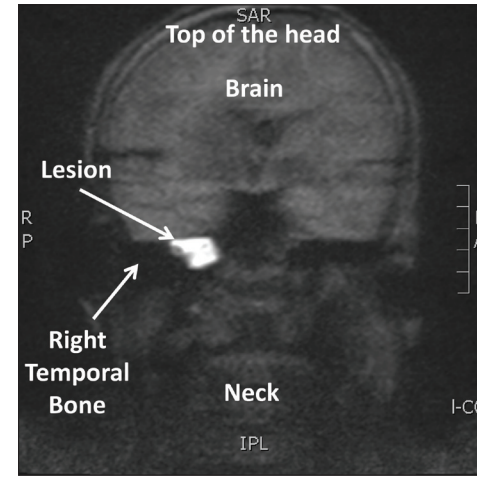
He had presented to the emergency department (ED) after waking up with severe vertigo and noticing a very loud ringing sound in his right ear. Before that, he had been in his usual state of health. The patient was evaluated in the ED and told that he most likely had labyrinthitis.

On further questioning, the patient states that he recently developed spasms on the right side of his face as well. He is a bus driver and has had difficulty working since this episode started three weeks ago.

An MRI was obtained. The results are shown on the right.

What is your diagnosis? See p. 10.

Dr. Djalilian is director of neurotology and skull base surgery and associate professor of otolaryngology and biomedical engineering at the University of California, Irvine.



In this coronal (top-to-bottom) non-echo planar (HASTE) diffusion-weighted MR image of the temporal bone and brain, the lesion appears hyperintense, or bright.

Diagnosis: Petrous Apex Cholesteatoma

By Hamid R. Djalilian, MD

Continued from p. 8

The patient's MRI shows a mass in the right petrous apex. The petrous apex is at the medial-most projection of the temporal bone, divided into an anterior and posterior cell track by the internal auditory canal.

The anatomy of the petrous apex is complex due to its intimate relationship with vital structures, including the internal carotid artery, internal auditory canal, cranial nerves V and VI, middle and posterior fossa dura, and the dural sinuses.

Petrous apex lesions are uncommon. When they do occur, the most common types are cholesterol granuloma, cholesteatoma, chondrosarcoma, Meckel's cave diverticulum, meningioma, schwannoma, chordoma, and aneurysm of the carotid artery, among others.

ROLES OF MRI, CT

The diagnosis of a petrous apex lesion primarily depends on imaging. The best modalities for imaging this area include MRI and CT scanning.

The value of CT imaging is in demonstration of bony destruction. If no bony destruction is seen for a lesion contained within the temporal bone, then, generally, no intervention is needed, and follow-up imaging is obtained for comparison.

The MRI can provide a better understanding of the soft tissue characteristics of the mass and whether contrast material is taken up by the lesion.

Cholesterol granulomas of the petrous apex are mucosal-lined cysts that can enlarge. They are distinguished by a hyperintense (bright) signal on both T1- and T2-weighted MRI. If the cyst is getting bigger, it must be drained.

Cholesteatoma of the petrous apex most commonly occurs as a secondary cholesteatoma from the middle ear or the mastoid invading the petrous apex. However, it also can be congenital, growing indolently for many years before becoming symptomatic.

These lesions are diagnosed based on MRI findings: They are hyperintense on T2 imaging and isointense—the same color as the brain—on T1 imaging. A complete resection is required in order to prevent recurrence.

COMPLICATED TREATMENT

The surgical approach to the petrous apex is complicated because of the various vital structures that exist in the surgical field on the way to the petrous apex. Preoperative evaluation is usually needed to see if the carotid artery could potentially be ligated in case of intraoperative injury.

If only drainage is necessary, an infracochlear approach can be performed, which allows for a corridor of 2 to 3 mm under the cochlea and between the carotid artery and the jugular vein.

Masses of the posterior petrous apex can be reached and drained via the subarcuate or retrolabyrinthine approach, among others. Sometimes, the only way to reach the petrous apex is using a middle cranial fossa approach.

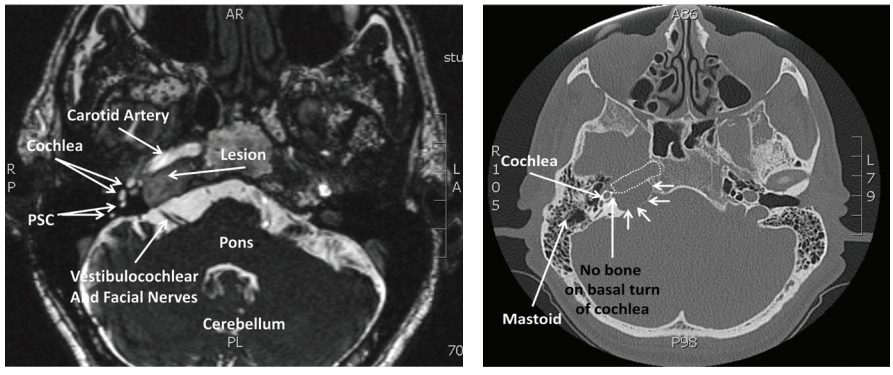
The translabyrinthine approach traverses the vestibular system to reach the posterior petrous apex and the internal auditory canal. The transotic and transcochlear approaches are used to traverse the cochlea and reach the anterior portion of the internal auditory canal.

Since all three approaches mean the sacrifice of hearing, they are used in patients with no usable hearing. The transcochlear approach requires rerouting of the facial nerve, which will cause some permanent facial nerve dysfunction.

Our patient had a congenital cholesteatoma of the petrous apex. A transotic approach was used for resection. The cochlea was removed in order to reach the cholesteatoma.

As the mass was primarily an anterior petrous apex lesion, the vestibular structures were kept intact. Since the cholesteatoma involved the medial wall of the carotid artery, the bone overlying the carotid artery was removed to mobilize the carotid and reach the depth of the cavity for a full resection.

The patient had normal facial nerve function postoperatively.



Left: In this axial CISS image of the brain and temporal bone, the lesion is seen in the petrous apex and is gray in color. PSC=posterior semicircular canal. Right: In this axial CT of temporal bones at the level of the cochlea, the lesion is outlined with short arrows, and the carotid artery is outlined by a dotted line.