



CLINICAL CONSULTATION

Symptom: Conductive Hearing Loss

By Hamid R. Djalilian, MD

A 40-year-old woman presents with a history of hearing loss that has progressed in the last five years. While she always detected a slight difference in hearing between the left and right sides, the distinction has become more pronounced over the last several years, she said.

The patient had multiple infections when she was a child, but neither she nor anyone in her family has a history of ear surgery.

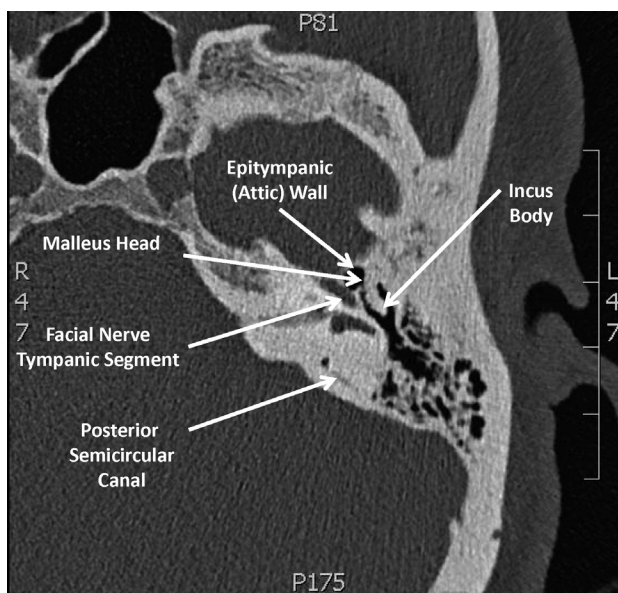
The microscopic examination of the ears yields normal findings. In the Weber exam, sound is localized to the left side. On Rinne testing, bone conduction seems louder than air conduction on the left, and results are normal on the right.

The audiogram shows a 50-dB to 60-dB conductive hearing loss on the left, with a drop in the bone-conduction threshold on that side down to 35 dB at 2,000 Hz.

An axial CT image at the level of the malleus head and incus body is shown on the right.

What is your diagnosis? See p. 14.

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This axial CT of the left temporal bone was taken at the level of the malleus head and incus body.

Diagnosis: Malleus Head Fixation

By Hamid R. Djalilian, MD

Continued from p. 12

A patient presentation of progressive conductive hearing loss with a normal tympanic membrane is most suggestive of otosclerosis.

Otosclerosis affects the otic capsule bone, resulting in a vascular active bone that appears spongy on histopathologic evaluation. Due to this appearance, the condition has been termed otospongiosis.

Patients with otosclerosis start developing symptoms when the abnormal bone growth involves the anterior-most aspect of the oval window. This area, called the fissula ante fenestram, is the most common location of otosclerotic plaque.

Another possible area of involvement is the posterior aspect of the oval window, termed the fossula post fenestram. Involvement of the stapes leads first to a reduction in mobility and, eventually, complete immobility of the stapes.

Otosclerosis is thought to have a genetic cause, though other theories have been offered as possible explanations for this condition, including measles virus infection and angiotensin-converting enzyme abnormalities.

On an audiogram, patients with otosclerosis commonly have conductive hearing loss with a drop in the bone-conduction threshold at 2,000 Hz, called a Carhart notch. This finding, in addition to an absent acoustic reflex, is generally thought to be diagnostic of otosclerosis.

Some patients will have a high-frequency sensorineural hearing loss due to involvement of the cochlea, termed cochlear otosclerosis. However, other conditions can cause the same type of audiologic profile.

Another disorder that can cause a conductive hearing loss in the presence of a normal tympanic membrane is superior canal dehiscence. The cause of the condition is unknown; however, one theory attributes its development to intracranial hypertension.

In superior canal dehiscence, the bone overlying the superior semicircular canal is incomplete, leading to the presence of a third window into the inner ear and a conductive hearing loss from the loss of sound energy through the third window.

Audiometry of patients with this disorder shows supranormal bone-conduction thresholds; these thresholds can be between 0 dB and -10 dB. A Carhart notch is not present. Some patients with this condition may present with a mixed hearing loss as well.

THREE DIFFERENT TYPES

Our patient had malleus head fixation, which was apparent on the preoperative CT imaging (see images 1 through 3). A bony bridge connected the head of the malleus to the attic wall, causing the fixation of the malleus head. The patient did not appear to have otosclerotic plaque anterior or posterior to the oval window, indicating a low likelihood of otosclerosis.

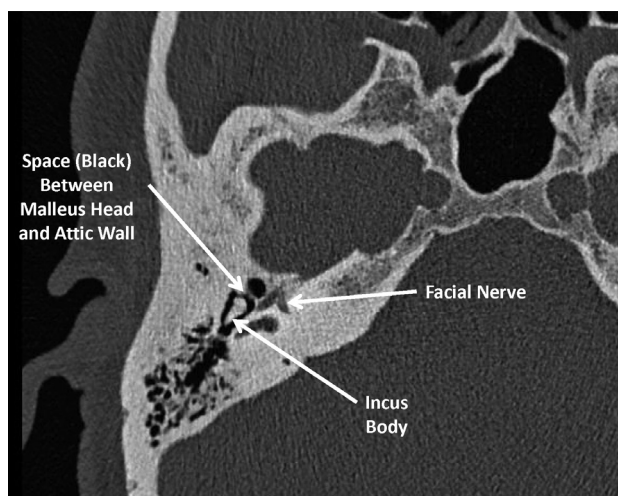


Image 1. The axial CT of the right temporal bone at the level of the malleus head and incus body showed a small space between the malleus head and the epitympanic (attic) wall.

The cause of malleus fixation is not well understood. Three different histological types have been described.

In the first type, normal bone is present between the malleus head and the anterior-superior epitympanic wall. The second type of fixation involves the potential expansion of the bone marrow spaces and is associated with an inflammatory process that leads to poor aeration of the attic (epitympanic space). The third type is caused by tympanosclerosis involving the area between the malleus head and attic wall (*Otol Neurotol* 2009;30[2]:165-169).

Unlike otosclerosis, which is seen more frequently in women, malleus head fixation occurs equally across both sexes.

One method of diagnosing malleus head fixation is the use of pneumatic otoscopy under microscopic visualization. This approach allows malleus handle examination and pneumatic otoscopy to be performed simultaneously, which will indicate whether the malleus moves with positive and negative pressure. Patients with otosclerosis will have movement of the malleus handle, while patients with malleus head fixation will not.

Another method of distinguishing otosclerosis and malleus head fixation on examination is to palpate the malleus gently under microscopic view. This maneuver requires some patient cooperation, which is not always possible.

Tympanometry of patients with malleus fixation generally shows a type A_s tympanogram with reduced compliance. Some patients, on the other hand, will have increased compliance on tympanometry. This increased compliance is thought to be due to progressive atrophy of the tympanic membrane from movement against a fixed malleus handle, and it could also be explained by patients performing auto-Valsalva to

iPad Double Feature!

TWO BONUS VIDEOS: REVIEW THE IMAGING

Read this month's Clinical Consultation case, and then watch the accompanying videos from Hamid R. Djalilian, MD, to see the patient's radiographic studies for yourself.

The first video depicts the axial CT images of the left temporal bone.

The second video shows the sagittal CT images of the left temporal bone.

These exclusive features are only available in the May iPad issue.



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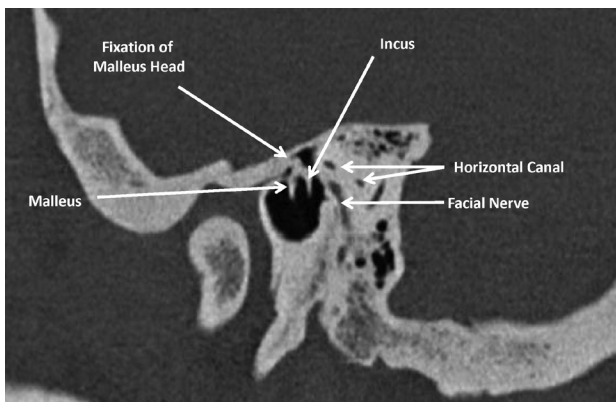


Image 2. The sagittal CT image of the left temporal bone at the level of the malleus and incus demonstrated fixation of the malleus head to the epitympanic (attic) wall.

“pop” their ears because of the conductive hearing loss or Eustachian tube dysfunction.

SURGERY VERSUS HEARING AID


Treatment of malleus head fixation depends on the patient's preference and level of risk tolerance versus aversion. Generally speaking, younger patients tend to choose surgical therapy, while older patients choose a hearing aid.

Patients with a significant sensorineural component to their hearing loss can sometimes be better served by a hearing aid if the sensorineural hearing loss is to such a degree that a

hearing aid would be needed even after closure of the air-bone gap. Some patients with a mixed loss, however, will request surgery to delay the use of hearing aids as long as possible.

The surgical procedure involves removal of the malleus head and incus with incus interposition.

Our patient elected surgery. A transcanal approach was performed, and the bone separating the malleus from the attic wall was drilled and lasered. A thin silicone sheet was placed between the two structures. The silicone sheeting prevents readhesion of the bone, which commonly occurs if the bone is left alone.

At four months post-surgery, the patient had an average air-bone gap of 8 dB in the operated on ear. 

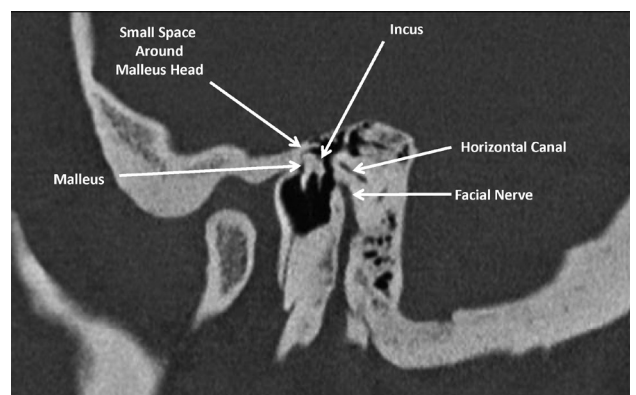


Image 3. The sagittal CT image of the right temporal bone at the level of the malleus and incus indicated a small space between the malleus head and the epitympanic (attic) wall.