Symptoms: Sudden Hearing Loss in Both Ears

By Hamid R. Djalilian, MD

A 26-year-old patient comes in for the evaluation of bilateral hearing loss, which started after he fell in a skateboarding accident. He initially lost consciousness and was taken to the hospital, where head scans were performed. When he woke up, he had ringing in his ears, which felt like they were blocked. This wasn't the first time he had hit his head skateboarding, but it was the most severe.

His friends told him that he had bleeding from his ears and they thought he would die, he said. He did not have any injury other than hearing loss and is otherwise healthy. There is no family history of hearing loss.

His otoscopy reveals a slight step-off in the posterior superior aspect of the bony ear canal, and his audiogram shows bilateral conductive hearing loss (*Figure 1*).

What is your diagnosis? See next page.

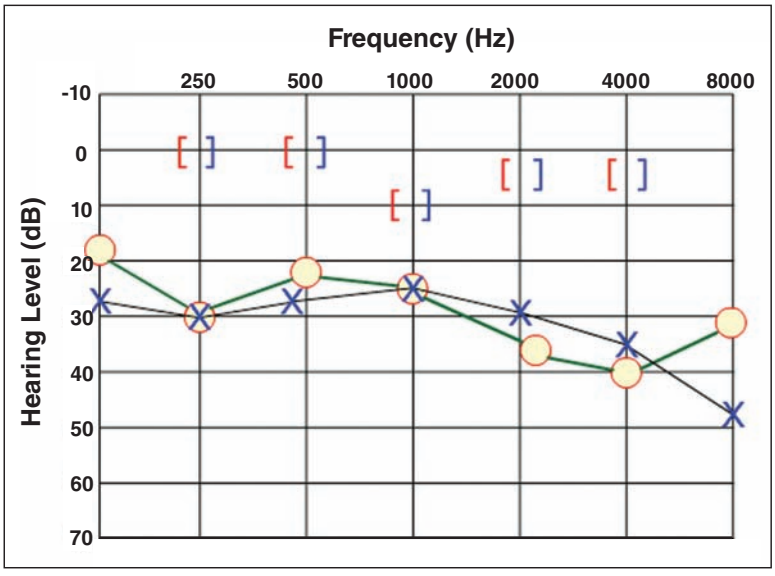

Figure 1. *Audiogram of the patient.*

Diagnosis: Bilateral Temporal Bone Fracture

By Hamid R. Djalilian, MD

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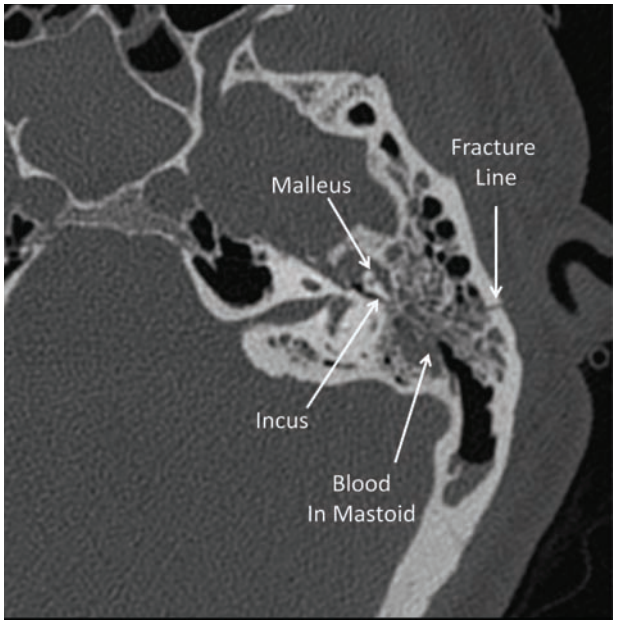
Sudden onset of conductive hearing loss after trauma can be due to any of several problems. The simplest cause is blood in the ear canal from a laceration. Lacerations can occur around the ear or scalp, and blood can run into the ear canals and coagulate, leading to conductive hearing loss. Blood in the ears after trauma is best managed with antibiotic ear drops. Another explanation for blood in the external auditory canal is a temporal bone fracture, which can cause an ear canal laceration.

A temporal bone fracture also can disrupt the dura that is adherent to the superior surface of the temporal bone and cause a leakage of cerebrospinal fluid (CSF) into the ear canal or middle ear. Usually CSF leakage that occurs after temporal bone fracture will spontaneously stop after a few days, but sometimes intervention is required. Intervention would include packing of the ear canal to stop the flow of the leak, placement of a lumbar drain to reduce CSF pressure, or surgery to close the dural opening.

Another cause of conductive hearing loss after a temporal bone fracture is disarticulation of the ossicular chain. The joint between the malleus and incus can separate or stretch, leading to fibrosis and hypomobility, and the incudostapedial joint also can separate. Ossicular fractures are uncommon.



Axial CT image of the patient at the level of the head of the malleus and the body of the incus. The fracture line extends from the lateral (left) aspect of the mastoid, traversing the mastoid air cells. The mastoid air cells have filled with blood as a result of the fracture. Though subtle, there is a separation of the incudostapedial joint.

Temporal bone fractures traditionally have been classified as longitudinal or transverse. Longitudinal fractures occur along the length of the temporal bone, starting laterally and extending medially, and are usually the result of trauma to the side of the head. These fractures commonly cause lacerations and bleeding in the ear canal. If longitudinal fractures start more posteriorly in the mastoid and miss the ear canal, the blood will be seen behind the tympanic membrane as a hemotympanum. When this type of fracture affects hearing, it usually causes a conductive loss.

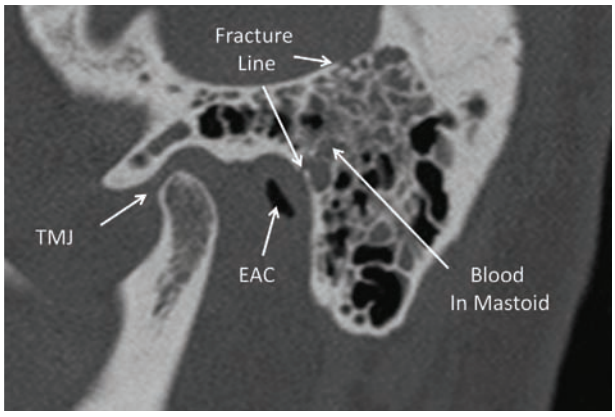
> Usually, a conductive hearing loss in patients who had a temporal bone fracture is observed for six weeks

Transverse fractures mainly occur after trauma in the anterior-posterior direction, such as a fall on the back of the head. This fracture type, which generally runs in a perpendicular direction to that of a longitudinal fracture, more commonly causes sensorineural hearing loss due to disruption of the cochlea or vestibule. Transverse fractures are also more likely to cause facial nerve paralysis from a fracture of the bony canal through which the facial nerve travels (fallopian canal).

Many fractures of the temporal bone are a combination of transverse and longitudinal fractures. A new classification scheme was created due to this compound nature, with these fractures more recently described as otic capsule sparing or otic capsule disrupting.

In the setting of trauma and bleeding in the ear canal or hemotympanum, a temporal bone fracture should be suspected. Temporal bone imaging using a CT scan is only necessary in cases of CSF leakage, sensorineural hearing loss, or facial paralysis.

Usually, a conductive hearing loss in patients who had a temporal bone fracture is observed for six weeks. An audiogram generally is obtained at that point, giving adequate time for the hemotympanum and subsequent serous otitis media to resolve. If at the six-week mark a serous otitis is still present, a myringotomy and aspiration or tube placement is considered. Another audiogram typically is done after the procedure to assess the degree of hearing loss. If there is persistent conductive hearing loss, an ossicular chain problem is suspected. Tympanograms on these patients may show a type As or Ad depending on the nature of the pathology. Many temporal bone fractures involve the eustachian tube and can cause long-term eustachian tube dysfunction. These patients need observation



Sagittal CT image of the patient showing a fracture line (step-off in the bone) extending from the posterior-superior aspect of the external auditory canal (EAC) to the superior aspect of the mastoid, with resultant blood in the mastoid. The temporomandibular joint (TMJ) is located anterior (left) of the EAC.

for the development of chronic serous otitis media and cholesteatoma. Canal stenosis also is possible as a result of scar formation in the ear canal from inflammatory changes.

In the setting of long-term conductive hearing loss, the options of surgery versus a hearing aid are discussed with the patient. In cases of incudomalleal joint abnormalities, the incus is either replaced with a prosthesis or reshaped and placed between the malleus and the stapes. Just loosening the scar tissue in the joint by instrumentation does not lead to a good long-term result since the scar tissue will re-form after three to six months and lead to a recurrence of the conductive hearing loss. Incudostapedial joint problems can usually be corrected by placing bone cement on the joint. This allows the incus and stapes to move in a more uniform fashion.

If conductive hearing loss is mild (20 dB or less), then surgical treatment is discouraged since ossicular chain reconstruction may not offer significant improvement and may even worsen the condition. If the patient has a mixed hearing loss after trauma, a hearing aid may be a better solution, as correction of the conductive hearing loss would only address part of the problem.

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

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