Abstract

**Objectives:** To share results and recommendations for the management of a unique case of penetrating traumatic cochlear injury.

**Study Design:** Case report.

**Methods:** A single patient underwent early repair of a penetrating cochlear injury and tympanoplasty after a projectile from a nail gun led to a traumatic cochleostomy with a narrow miss of both the facial nerve and intracranial carotid artery.

**Results:** Postoperatively the patient's audiogram identified a down-sloping hearing loss worse in the high frequencies, a PTA of 47.5dB for air conduction and 35dB for bone conduction with a Word Recognition Score of 76%.

**Conclusions:** Hearing loss from an acute penetrating cochlear injury can be mitigated with early repair, by minimizing inner ear trauma, and with the judicious use of steroids to treat post-traumatic labyrinthitis.

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**Introduction**

Traumatic, penetrating cochlear injury typically causes devastating hearing outcomes. Pneumocochlea and pneumolabyrinth are radiographic signs of otic capsule violation. A recent literature review reported 51 cases of pneumolabyrinth where the primary etiology was blunt trauma, followed by penetrating trauma, iatrogenic injury, and barotrauma. While 11 of 23 (48%) cases with pneumolabyrinth limited to the vestibular apparatus showed improvement in hearing (at least 10dB gain in an average of 0.5, 1, and 2 kHz), none of 6 cases (0%) with pneumocochlea showed hearing recovery. One case of isolated pneumocochlea from blunt trauma associated with a round window perilymph fistula (PLF) is reported. This patient had a hearing loss with a pure tone average (PTA) of 27dB. The PLF was repaired three days following the injury and the patient had return of normal hearing with a PTA of 8dB.

We present a case of penetrating cochlear injury with early repair and preservation of serviceable hearing.

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**Conclusions**

In cases of penetrating middle and inner ear injury we recommend early middle ear exploration and repair. Minimizing inner ear trauma is essential when a cochlear fistula is suspected. Gentle debris removal and minimal use of suction avoids further damage to intracochlear membranes and inadvertent perilymph evacuation. Finally, post-operative steroids may minimize post-traumatic labyrinthitis that could injure the inner ear.