Case report

Ipsilateral facial nerve injury with contralateral labyrinthine concussion and subdural hematoma in a case of longitudinal temporal bone fracture

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Abstract

Head trauma can lead to hearing loss. Both sensorineural and conductive hearing loss has been reported in cases of head injury. We report a case of labyrinthine concussion and subdural hematoma in the opposite ear of a patient who had head trauma after involved in motor vehicle accident. A complete hearing assessment for head trauma patients should be advised as it can avoid misdiagnosis and negligence in management.

Keywords: Trauma; hearing loss; contralateral

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Introduction

Hearing loss is not uncommon after head trauma. The incidence of hearing impairment does not rely on the sternness of head injury. Both conductive and sensorineural hearing loss has been demonstrated in cases of head injury with or without skull base fracture. Tranverse type for temporal bone fracture is commonly associated with ipsilateral sensorineural hearing loss. On the contrary,the contralateral profound hearing loss is postulated by the mechanism of labyrinthine concussion but with very limited information in the medical literatures.1 We are reporting a patient with contralateral profound hearing loss and subdural hemorrhage secondary to unilateral petrous part of temporal bone fracture with facial nerve palsy following a high impact head injury.

Case report

A 44-year-old Malay male was allegedly involved in a motor vehicle accident, motorbike versus car with an unknown mechanism of injury. He sustained a brief episode of loss of consciousness at the scene. An examination revealed right ear canal filled with blood clot. However, there were no cerebro-spinal fluid leakage and absence of facial nerve palsy. A computed tomography (CT) scan of brain showed left temporo-parietal acute subdural haemorrhage with an underlying contusion with right longitudinal temporal bone fracture (Fig. 1a & 1b). However the middle ear cavity and structures are intact bilaterally. He underwent left decompressive craniectomy and evacuation of subdural hematoma.

When his condition was stable, a full ear, nose and throat (ENT) examination was carried out. The right ear showed hemotympanum with intact tympanic

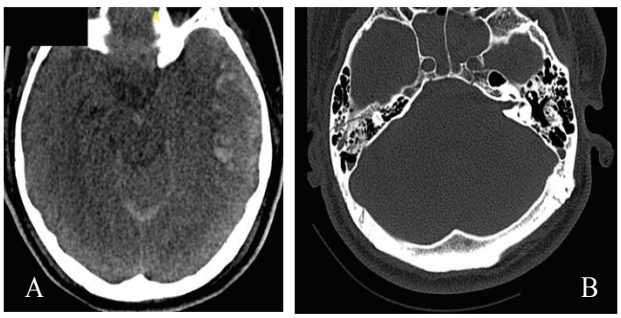

Fig. 1: CT scan showing left subdural hematoma (a) and right longitudinal temporal bone fracture (b)

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membrane. There was right hemifacial paralysis with grade IV House-Brackman classification of facial nerve palsy. Pure tone audiometry (PTA) showed that the patient was having left profound sensorineural hearing loss and right mild to severe conductive hearing loss (Fig. 2).

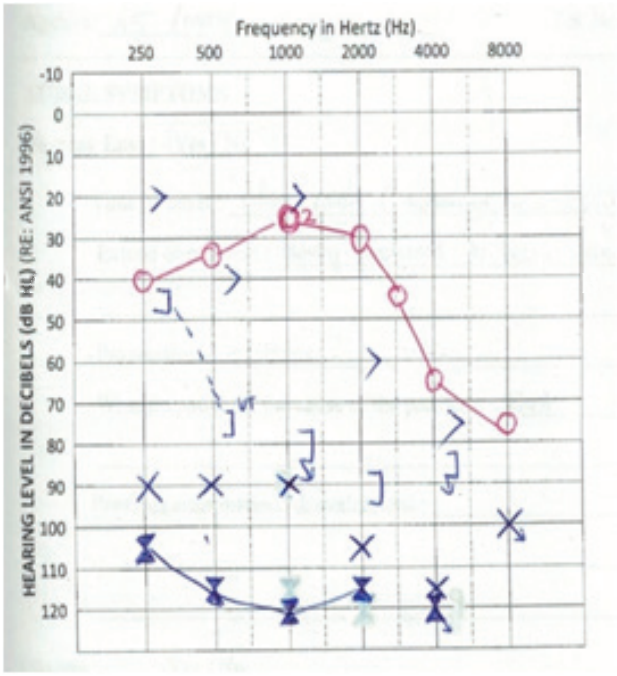

Fig. 2: PTA showing left profound sensorineural hearing loss

Discussion

Hearing loss is not uncommon following a head trauma. It is more frequently found at the pathological side where the temporal bone fracture occurred. However, it has been reported that head trauma causing both conductive and sensorineural hearing loss on the opposite side of the trauma.[1]

Conventionally, classification of hearing loss type are depends on the type of temporal bone fracture. Conductive hearing loss commonly occurs in the longitudinal type of fracture secondary to injury of the external ear canal, tympanic membrane and ossicular chain. Meanwhile, sensorineural hearing loss tends to develop into a tranverse type of fracture due to the involvement of the labyrinth, particularly the otic capsule. Both of these fractures refer to the fracture and hearing loss of the ipsilateral ear.

A contralateral profound sensorineural hearing loss secondary to injury of the inner ear structures is rare in head injury patient. The underlying postulated mechanism of this type of hearing loss is labyrinthine concussion.[1] The mechanism to cause the labyrinthine concussion in the opposite ears of patients is still under speculation. The high pressure waves that caused by high impact trauma to the head is one of the causal mechanism which are directly transmitted to the cochlea via bone conduction.[2] Another type of pressure waves can be generated through elevated intracranial pressure, which can be transmitted to the inner ear by way of internal auditory canal, the cochlear aquaduct and the endolymphatic sac.[3] These pressure waves can cause disruption of the membranous labyrinth with inflammatory healing by fibrotic connective tissue, scarring and new bone formation.

The contralateral subdural hematoma is due to countercoup injury, usually associated with head trauma from falls and motor vehicle accidents that severe enough to cause a skull fracture, cerebral contusion or laceration. It is due to the shearing forces (angular or rotational type) initiated by brain's rapid acceleration and deceleration motions within the skull and resulted disruption or avulsion of veins that bridging from the cortex to the venous dural sinuses.

According to Choi et al, they found that the hearing improved patients after head injury had obtained hearing gain mostly in low frequencies rather than high frequencies.[4] Their speculated mechanism was the vibrating wave affecting the basal turn of cochlea most severely, thus causing irreversible damage to the organ of Corti in the basal turn.

Labyrinthine concussion can be confirmed mainly by audiometric tests.[2] The PTA can reveal the type and severity of hearing loss. BSER may locate the level of involvement in the auditory pathway. The imaging method, such as CT scan can specifically assess the involvement of the temporal bone structure and other underlying anatomical structures.

Conclusion

One should be alert that both sensorineural and conductive hearing loss can happen on the opposite ear after head injury, particularly in temporal bone trauma. Therefore, careful hearing assessment for head trauma patients should be advised as it can avoid misdiagnosis and negligence in management.

References

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