



Radiodiagnosis

POST TRAUMATIC DISLOCATION OF INCUS INTO THE EXTERNAL ACOUSTIC CANAL: A RARE CASE REPORT.

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ABSTRACT

We report a rare case of dislocation of incus into the external acoustic canal following a fall from stairs with head injury. CT scan revealed disrupting the Ossicular chain with disarticulation of malleolo-incudal joint and dislocation of incus. A bony fragment, giving appearance as shape of incus, noted in the postero-inferior region of right external ear canal. Micro-Otосcopy, 10 days after injury, revealed an intact tympanic membrane covering the fractured - dislocated incus. The fractured segment was displaced and attached to the postero-inferior aspect of the external auditory canal. Further the bone extraction surgery was performed and the diagnosis confirmed.

KEYWORDS : Incus, middle ear, HRCT, dislocation, ossicle.**INTRODUCTION:**

Incus fracture and its dislocation is a rarely diagnosed and reported condition associated with head trauma and skull base fracture. The malleus is well stabilized by tympanic membrane, ligamentous attachment and malleo-incudal articulation. The stapes is supported by annular ligament in the oval window, incudo-stapedial articulation and the stapedial Tendon. The Incus, however, is suspended only by the articulation described above and fewer very thin ligament. Therefore the incus is most vulnerable for dislocation.

Incus dislocation can be caused by head trauma, direct injury to the tympanic membrane or barotrauma. Axial high resolution CT scans can demonstrate the exact nature and placement of the Ossicular fractures and dislocations. Recently, CT virtual endoscopy (VE) of the middle ear was used to assess middle ear pathologies and Ossicular injuries preoperatively by obtaining three-dimensional (3D) reconstructions of the tympanic cavity using the standard temporal bone CT scan as a template. This method adds information not obtained by the standard temporal bone HRCT scan. In this report, we describe a unique clinical case of incus fracture and dislocation using 3D and HRCT with discussion on the application of this technique in middle ear pathologies.

AIM:

Ossicular injury is a frequent complication of head trauma and temporal bone fractures. However, an isolated fracture of the incus with lateral dislocation is extremely rare. We report a case of incus fracture and dislocation after head trauma diagnosed on 3D HRCT temporal bone with confirmation of the diagnosis on Otосcopy.

CASE REPORT:

A 33 year old male patient came to our department having with a history of fall from stairs 20 days back, facial nerve palsy, right side ear ache and mild hearing loss. HRCT scan of temporal bone was performed on SIEMENS 128 slice CT system "Somatom Definition AS+".

CT scan examination revealed that there is longitudinal fracture along the right petrous temporal bone crossing through the middle ear cavity, disrupting the Ossicular chain with disarticulation of malleolo-incudal joint and dislocation of incus and a transverse fracture line noted extending from the horizontal fracture, crossing tympanic part of facial canal, lateral semicircular canal and vestibule, reaching up to posterior margin of petrous temporal bone with a small laceration of tympanic membrane at its inferior quadrant. A bony segment, giving appearance as shape of incus, noted in the postero-inferior region of right external ear canal.

Micro-Otосcopy examination of the right ear revealed an intact tympanic membrane covering a fractured and laterally dislocated incus. In 3 weeks time, the ear drum perforation got healed covering

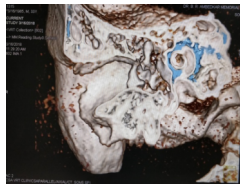
the rent. The fractured segment was displaced and attached to the postero-inferior aspect of the external auditory canal which again was covered by pseudo membrane. Further the bone extraction surgery was performed. The fractured bony segment has extracted and the diagnosis of incus displacement was confirmed.

DISCUSSION:

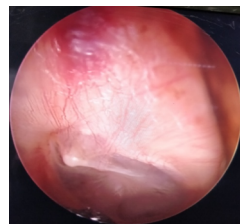
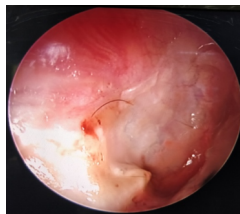
The various known Ossicular chain injuries are incudo-malleal or incudo-stapedial joint separation, dislocation of incus, dislocation of the incudo-malleal complex, dislocation of stapedio-vestibular complex, and fracture of the ossicle. However, Incus dislocation is the most common injury and occurring more often than the fracture. Incudo-stapedial joint separation is the commonest injury of all the other Ossicular chain injury. [1, 2]. Malleus and stapes are relatively more stable than the incus and very rarely affected. Saito *et al.*, [3] further proposed that in certain types of injuries the vulnerable incus may rotate posteriorly along the long process and is pushed into the external auditory canal. The malleus is stabilized by the TM and the tensor tympani tendon, and the stapes is firmly secured by the annular ligament and stapedial tendon. Therefore, the position of the relatively heavy (25 mg), weakly anchored (no muscle attachment) incus makes it relatively more vulnerable to traumatic dislocation. (4). The mechanism of Ossicular trauma in our case could be explained. (5) That is, for a brief instant, the dislocated incus rotated 180° laterally on the axis of the chorda tympani nerve and then passed through a widely opened fracture line in the postero-inferior EAC, leading to the TM rupture. The Ossicular chain injury is best confirmed using high-resolution CT, (6) and many reconstruction methods for incus dislocation have been proposed, of which incus reposition, interposition, or partial prosthesis are reported to reduce the air-bone gap considerably. (7) Ossicular chain fractures and discontinuity after head trauma are uncommon middle ear pathologies, presented by conductive hearing loss, and can be easily missed. In recent years, high resolution CT scan became the modality of choice in the evaluation of middle ear structures. Most of middle ear and Ossicular chain pathologies can be assessed through 2D CT scan. In the last decade, with the advancement of computer technology and the availability of high performance processors, 3D reconstruction and VE of the middle ear cavity became achievable. Martin *et al.* have previously demonstrated the advantage of VE over 2D spiral CT in the diagnosis of dislocation of the ear ossicle, and added value of this imaging modality in the preoperative planning of middle ear surgery [5]. In the present case, an uncommon incus fracture with lateral dislocation is visualized by high resolution CT of the right ear. The position of the incus was abnormal. 3D VRT reconstruction of the right ear verified the 2D scan finding and added important information. The incus was positioned in the EAC, formed by the temporal bone fracture. This data is important for surgical preoperative planning. Several surgical approaches have been described in the literature for the reduction and fixation of isolated incus fracture [8]. These approaches include raising a tympano-meatal flap exposing the malleus and incus [8].



Axial HRCT cuts showing a bony fragment in external auditory canal covered by a pseudomembrane.



3D VRT image showing a rotated-displaced Incus in external auditory canal.



Otoscopy images confirming the bony fragment.



Postoperative real image of Incus retrieved from the external auditory canal.

TEACHING POINT: In a case of head injury,

- Intact ear drum can deceive the previous perforation and ossicular dislocation.
- Dislocated Ossicle can be a cause of persistent pain and deafness.

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