

Temporal Bone Fracture and its Effect on Hearing**Choubey Mishra Surbhi¹, Moupachi Surendra Singh², Siddiqui Yasmeen³, Tiwari Ankit Kumar⁴**¹PG 3rd year, Department of Otorhinolaryngology, Shyam Shah Medical College and Sanjay Gandhi Memorial Hospital, Rewa.²Professor and HOD, Department of Otorhinolaryngology, Shyam Shah Medical College and Sanjay Gandhi Memorial Hospital, Rewa.³Assistant professor, Department of Otorhinolaryngology, Shyam Shah Medical College and Sanjay Gandhi Memorial Hospital, Rewa.⁴Senior resident, Department of Otorhinolaryngology, Shyam Shah Medical College and Sanjay Gandhi Memorial Hospital, Rewa.

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Abstract

Temporal bone fracture is commonly associated with head injury. As temporal bone enclose the organ of hearing, its fracture can be associated with hearing loss which can deteriorate quality of life. In this study Aim is to access the most common type of temporal bone fracture, its etiology, gender distribution, presentation and to access degree and type of hearing loss in patients with temporal bone fracture. One-year prospective study of head injury patient admitted in the Sanjay Gandhi Hospital, SSMC Rewa was conducted. Examination and HRCT Temporal Bone done. 100 cases of patients with temporal bone fracture were underwent examination and hearing assessment. Type, degree hearing loss, age, gender, cause of injury, clinical presentation, facial nerve palsy, otorrhoea, vestibular symptoms, tinnitus were analysed. In results RTA is most common cause of head injury. majority were male, between 30 -40 yrs of age. Longitudinal fracture is most common and presents commonly with blood in EAC and Moderate degree conductive hearing loss is most common.

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Introduction

Temporal bone fracture is extremely common in any head injury. Around 30 to 70% of the skull fracture involve temporal bone in patients of head trauma. Temporal bone is a complex bone has four divisions the mastoid process, the petrous apex, the tympanic section, the squamous section.[1]The temporal bone houses the organ of hearing and balance. It also contains temporal portion of carotid artery and facial nerve and forms the floor of middle cranial fossa.

Fracture of temporal bone can lead to regional and intracranial complications as well as functional deficit it such as conductive hearing loss, sensorineural hearing loss, balance dysfunction, facial nerve palsy, CSF otorrhoea, perilymphatic fistula, vascular injury.

Traditionally petrous temporal bone fractures are classified into longitudinal, transverse and mixed fractures depending on their relationship with the petrous pyramid.[2]

Transverse fracture:

Fracture Line extend from jugular foramen and extend across the petrous pyramid to the area of foramen lacerum and foramen spinosum.

Longitudinal fracture:

Fracture lines begins at the squamous portion of the temporal bone and extend towards apex .

A strike delivered laterally was more likely to cause a longitudinal fracture than an anteroposterior blow, while an anterior-posterior blow was more likely to cause a transverse fracture.

The purpose of this article is to assess the type of temporal bone fracture and its gender distribution, etiology of fracture, its presentation, type of hearing loss and degree of hearing loss.

Aims and Objectives

- To access the most common type of temporal bone fracture, its etiology,
- To access type of hearing loss in patients with temporal bone fracture.

- To assess the Degree of hearing loss

Material and Methods

A prospective analytical study carried out in the admitted patients of ENT and Surgery department in period of 1.5 year. 100 cases of head injury with temporal bone fracture were studied. All the patients were between 15 -70 yrs of age with no history of hearing loss. In each patient complete neuro-otological examination done and GCS score assigned. In all patients NCCT brain and HRCT temporal bone done to detect the temporal bone fracture. Detailed history of all the patients, mode of injury, presenting complain and examination of ear , status of tympanic membrane ,hearing assessment by rinne, weber and pure tone audiometry done to

assess the degree and type of hearing loss following ASHA Classification where

Slight- 16dB to 25dB

Mild- 26 to 40 dB

Moderate- 41to 55dB

Moderately Severe- 56 To 70 dB

Severe- 71 TO 90 dB

Profound- more than 90dB

The Chi-square test was done for comparing. P value less than 0.05 is considered statistically significant.

Results

100 patients of temporal bone fractures were diagnosed by using HRCT temporal bone. In our study the majority of the cases were between 30-40 years of age constituting about 44 % cases.

Table 1 : Age Distribution

Age	Cases
15-20 yrs	11
21-30yrs	22
31-40 yrs	44
41-50 yrs	13
51 -60yrs	7
61-70yrs	3

The most common age group is 31-44 yrs followed by 21-30yrs.

Table 2 : Etiology of Fracture

Mode	Case
Assault	20
RTA	60
Fall From Height	10
Blunt Trauma Face	10

Most common cause is RTA followed by assault.

Table 3 : Present at Fracture

Otological Finding	Cases
Tm Normal Intact	19
Haemotympanum	34
Perforation	16
Blood Filled Eac	37

Most common presentation is blood filled EAC followed by Haemotympanum.

Table 4: Types of Fracture

Ct Finding	Chl	Normal	Mixed	High Frequency
Longitudal Fracture	50	1	4	1
Transverse Fracture	19	2	9	0
Mixed Fracture	6	1	5	0

Most common types of fracture is longitudinal fracture followed by transverse fracture

Table 5: Gender Distribution

Sex	Case
Female	29
male	71

male patients (71%) were more common than female patients (29%).

Discussion

According to literature temporal bone fractures are common in younger age group similar to literature in our study the most common age group is 30-40 years old. Our study shows similar finding to Basavaraju et al. in gender distribution that is 66.23% male and most common age group is 30-40 yrs that is 50%. [3] In our study males were more common than females. M Abhishek et al. 54 % were male and 46% were female. And most common age group 30-40yrs. [4] the most common mode of injury is RTA and 60% in cases followed by Assault (20 %) M Abhishek et al. found 54% of cases were due to RTAs. [4]

Most common Otological finding in patients is blood in EAC (37) followed by haemotympanum (34) B K Prasad et al. Important otological features included Battle sign (24.6%), ear canal laceration (53%), tympanic membrane perforation (7%), haemotympanum (40%), ear discharge (66.7%), hearing loss (63%), [5] In CASES fracture of petrous part of temporal bone, Longitudinal fracture of petrous (57) is most common followed by transverse (30) M Abhishek et al. found out of 50 cases, 32 (64%) were longitudinal fractures, 12 (24%) were transverse, and 6 (12%) were mixed type of fractures [4]. Ishman and Friedland in their study on 155 fractures reported 99 (64%) were longitudinal, 36 (23%) were transverse, and 20 (13%) were mixed. [6] Most common is conductive hearing loss (7) followed by mixed hearing loss (18%). 6% cases had normal hearing threshold M Abhishek et al. In 50 patients, 34 (68%) had CHL and 16 (32%) had mixed hearing loss SNHL. This shows that CHL is more in temporal bone fractures. [4]

41.4% is moderate degree of hearing loss, moderate degree hearing loss is most common in cases M Abhishek et al. the severity of hearing loss was minimal in 6%, mild in 40%, moderate in 30%, and moderately severe in 24% [4]

Conclusion

The most common cause of heady injury with temporal bone fracture is RTA. Males were most common than female. Most commonly patients presented with blood in EAC. HRCT temporal bone done to detect the type of fracture in which longitudinal fracture was more common than temporal bone fracture. Patients who sustain fracture also underwent audio logical examination in which conductive type of hearing loss and moderate degree of hearing loss was the most common finding.

References

1. Gunlock M G, Gentry L R. Anatomy of the temporal bone. *Neuroimaging Clin N Am.* 1998;8(1):195–209. [PubMed] [Google Scholar]
2. HR L. Deformations of the skull in head injury studied by the stresscoat technique, quantitative determinations. *Surgery, gynecology & obstetrics* 1946 Aug 1;83:219-33.
3. Basavaraju U, Jayaramaiah SK, Turamari RU, Prakash V, Mankani S. Temporal bone fractures and its classification: retrospective study of incidence, causes, clinical features, complications and outcome. *Int J Anat Radiol Surg* 2017; 6:RO57-61.
4. Abhishek M, Kaleeswaran R, Srinivasan K. Assessment of hearing loss in temporal bone fractures. *Indian Journal of Otology.* 2021 Jul 1;27(3):158.
5. Chen JX, Lindeborg M, Herman SD, Ishai R, Knoll RM, Remenschneider A, Jung DH, Kozin ED. Systematic review of hearing loss after traumatic brain injury without associated temporal bone fracture. *American Journal of otolaryngology.* 2018 May 1;39(3):338-44
6. Ishman SL, Friedland DR. Temporal bone fractures: Traditional classification and clinical relevance. *Laryngoscope* 2004; 114:1734-41.
7. D K Nosan et al., *Otolaryngol Head Neck urg,* Current perspective on temporal bone trauma. 1997 Jul.