

Analysis of Otorhinolaryngological Manifestations in Patients Diagnosed with Traumatic Brain Injury

KHALID MAHMOOD KHAN¹, ZAHID KHAN², SOHAIL AHMAD³, SAJID KHAN⁴, ABDUL HAFEEZ BALOCH⁵, SABIKA HUSSAIN⁶

¹Assistant Professor of Neurosurgery, Gomal Medical College D.I Khan

²Assistant Professor Neurosurgery, Lady Reading Hospital Peshawar

³Senior Registrar Neurosurgery, POF Hospital, Wah Medical College

⁴Assistant Professor Neurosurgery, Prime Teaching Hospital Peshawar Medical College

⁵Assistant professor Anatomy, MIMC Mipur AJk

⁶Assistant Professor Forensic Medicine, Rawal Institute of Health Sciences

Corresponding author: Zahid Khan, Email: neurosurgeonzahid@yahoo.com, Cell: +92 335 9345434

ABSTRACT

Background: Even though otorhinolaryngological injuries are relatively common, they are occasionally neglected, missed, and overlooked.

Objective: The study aimed to analyze the Otorhinolaryngological manifestations in patients suffering from brain injury admitted in tertiary care unit.

Study design: This analytical study was conducted at the Neurosurgery Department of Lady Reading Hospital Peshawar and Neurosurgery Department of Prime Teaching Hospital Peshawar for the duration of the six months from August 2021 to January 2022.

Material and Methods: There were 448 patients that were admitted in the tertiary care unit with complaint of head injury. Only 365 patients fulfilled the inclusion criteria. The ethical and review board committee of our hospital approved the study. The written consent was taken from the patients.

Results: There were 75 (25%) patients who were linked with ENT manifestation. The patients having ENT manifestations included more male than female. The average age of the patients was 37.3 ± 15.3 years. The 52% came with minor injury in the head. It was seen that recovery rate was quite good in case of patients having ENT manifestations.

Conclusion: In case of head injuries ENT injuries are seen commonly. Injuries in the soft tissues of nose, ear and face are some of the commonly observed findings some other findings like CSF rhinorrhea was also observed. There was no prominent link of ENT injury with the overall impact of hospital stay of the patients and the head injury.

Keywords: CSF rhinorrhea and Otorhinolaryngological manifestations.

INTRODUCTION

The Greek word "troma," meaning is "to wound". The term trauma also originates from this word. A vast array of injuries to the scalp, skull, brain and blood vessels in the head are altogether referred to as "head injuries." Brain damage may or may not be a part of this. With the increasing urbanization and industrialization in the developing countries and lack of safety precautions and traffic rules adherence the frequency of head injuries has also increased¹⁻². The varying degrees of physical and functional damage are associated with the ENT manifestation. Even though otorhinolaryngological injuries are relatively common, they are occasionally neglected, missed, and overlooked. It is one of the major health care problem around the globe. The numbers of morbidity and mortality cases are associated with the different types of head injuries. The most frequent causes of head injuries are motor vehicle accidents (RTA), falls, physical assault etc.³⁻⁴ It causes severe disability and add to significant financial and psychological burden of society. Failure to provide proper and prompt treatment results in a spectrum of complications range from a minor contusion to a neurological deficiency and ultimately death. The most frequently observed head injuries are soft tissue damage and craniofacial bone fractures. It may be difficult to immediately detect occult brain injuries. The haemorrhage in the ear canal or behind the tympanic membrane is indicative of occult head injuries⁵⁻⁶.

As a result of the olfactory nerves severance at the cribriform plate of the ethmoid bone the anosmia is commonly observed that can be followed by CSF rhinorrhea. There is high possibility of developing meningitis in such patients. The urgent tracheostomies are required in few cases of neck and face injuries that leads to airway competence. The patients diagnosed with Dysphagia may have aspirations and poor nutrition. The patient is not only at the higher risk of developing traumatic brain injury but may also suffer from the soft tissue injuries of nose, ear and face⁷⁻⁹. It provide the surgeons with aesthetic and cosmetic challenges. Otorhinolaryngologists are frequently overlooked partners in the therapy of head injuries. The patients must attend the otorhinolaryngologists as early as possible to improve the

patient's clinical and aesthetic outcomes. The need of the hour is to raise the awareness for early recognition. The rapid treatment can improve the outcomes of the patients¹⁰. The study aimed to evaluate the epidemiological traits, clinical manifestations. It also study the management of these head injuries. The Otorhinolaryngological manifestations were analyzed in the patients presented with brain injury in tertiary care unit

MATERIAL AND METHODS

This analytical study was conducted at the Neurosurgery Department of Lady Reading Hospital Peshawar and Neurosurgery Department of Prime Teaching Hospital Peshawar for the duration of the six months from August 2021 to January 2022. There were 448 patients that were admitted in the tertiary care unit with complaint of head injury. The ethical and review board committee of our hospital approved the study. The written consent was taking from the patients.

Among these 448 patients, there were 80 participants that reported spine injury without any complaint of head injury. And the remaining 368 patients were admitted because of isolated head injury. Among these 368 patients, 63 patients were not included in the study because their data was incomplete, also some of them never contacted for a follow-up. Only 365 patients were included in the study. The demographic data (age, sex,) and clinical data (symptoms and injuries) of every patient was recorded. Radiological and laboratory investigations were carried out as necessary following resuscitation. Further treatment such as blood transfusions, tracheostomy, craniotomies, laparotomy, fracture reductions, fixations, and immobilization were effected where necessary. The random sampling technique was used¹¹.

The management of these patients was multidisciplinary involving the attending trauma surgeons, otolaryngologists, neurosurgeons, and cardiothoracic surgeons. A proforma was designed and all the data entered as required. All patients were followed up in our outpatient facility following discharge from hospital, especially those with various neurological deficits who are undergoing physiotherapy. According to the exclusion criteria the patients with medical emergencies and other surgical emergencies

were excluded from the study. Patients with head injuries but brought in dead were also excluded from this study. Grading of head injury was done with the Glasgow coma scale and head injury outcome was graded using the Glasgow outcome score. The SPSS software V22.0 was used for the statistical evaluation of the data. The t-test was performed for the comparison of the data. The Fischer exact test was also performed to analyze the categorical data.

RESULTS

Only 365 patients were included in the study. There were 75 (25%) patients who were linked with ENT manifestation. Multiple ENT manifestations of the participants who were admitted with an injury in their head during the study period, are shown in Table no.1.

Table 1: ENT manifestations among participants admitted with head injury

ENT manifestations	Frequency	% of the patients
CSF Rhinorrhea	9	14%
Vertigo	7	10%
Facial palsy	4	7%
Frontal bone fracture	7	11%
Temporal bone fracture	11	15%
Tinnitus	7	11%
Hearing loss	6	9%
Hemotympanum	4	8%
TM perforation	6	9%
Neck and face lacerations	21	30%
Ear lacerations	16	21%

One of the commonest findings that were made among these patients was face and nose laceration, which led to fractures in the bones of face. Grading of head injury was done with the Glasgow coma scale and head injury outcome was graded using the Glasgow outcome score.

Table 2: Head injury grading

Grading of head injury	Frequency	%
Mild	39	52%
Moderate	22	30%
severe	13	16%

The patients having ENT manifestations included more male than female. The average age of the patients was 37.3 ± 15.3 years. The 52% came with mild injury in the head. And 30% cases were of moderate head injury however, there were 16 patients with complicated head injury. The grading of the recovery group was also carried out shown in table 2. The Good recovery group had most number of participants, whereas poor recover was almost 10%.

Table 3: Type of injury

Type of injury	Frequency	%
Assault	24	31%
Road accident	27	36%
Fall injury	15	21%
Others	5	6%

The type of injuries was also analyzed by the data and it is shown in table 3.

Table 4: Comparison of overall outcome in between the two groups

Head injury group	Good recovery	Poor recovery	P
With ENT manifestation	75	10	0.219
Without ENT manifestation	193	40	

The comparison was also carried out between ENT manifestations and the head injury participants. It was seen that recovery rate was quite good in case of patients having ENT manifestations as compared to the other group.

DISCUSSION

This study was carried out to find the Otorhinolaryngological manifestations in case of patients admitted for brain injury in tertiary care unit. There were 448 patients that were admitted in the tertiary care unit with complaint of head and spine injury. There were 25% patients that had ENT manifestations. In case of head injury, the ENT manifestations ranged from tissue lacerations to CSF leaks and fractures in the craniofacial bones. The findings that were most commonly observed were nose and face lacerations. Then it was followed by other findings like CSF rhinorrhea and ear lacerations. As per previous studies it was found that the lacerations of ear were commonly found in the patients, one other study reported ear injury as the most commonly found ENT manifestation¹²⁻¹³. As there is no protected position in the head therefore, any head injury due to accident result in minor to complicated lacerations in the ear area.

The patients having ENT manifestations included more male than female. The average age of the patients was 37.3 ± 15.3 years. Similar average age of patients was also observed in case of previous studies. Leaks of cerebrospinal fluid are also seen as commonly found in patients with head injuries. This happens mostly after a severe brain injury, the complications include CSF rhinorrhea and CSF otorrhea¹⁴⁻¹⁵. CSF leaks are one of the most severe ENT manifestations that have lethal consequences. As they can increase the chance of meningitis and other infective problems. And the rate of deaths increases if such complications are reported in patients. Patients are given antibiotics like conservative prophylactic intravenous antibiotics (CPIA) to control the CSF leaks and conditions like meningitis if they appear¹⁶.

There are some cases of CSF leaks where the condition does not resolve on its own and even after CPIA there is no positive outcome, then it lead to surgeries in which radiological procedures are used that are followed by surgical procedure. Here the doctors aim to repair the cranial and dura base. In this study there were 14% cases that reported CSF rhinorrhea in their ENT manifestations. Among all these patients there was only one case that led to surgical operation in which the anterior cranial fossa repairing was carried out. Our studies are just in accordance with the previous studies. In this study there were 9% cases with perforations in the tympanic membrane and these studies are in accordance with the previous studies where 8.3% of the admitted patients had tympanic membrane perforations as their ENT manifestations¹⁷⁻¹⁸. All these patients were treated by their doctors in a conservative manner and healing was observed in all of them. In the OPD, PTA was carried out to look for the hearing loss and most of them reported conductive loss of hearing. The patients having large perforations or with perforations that are persistent and are healing should be suggested to undergo surgery. Similarly, patients with severe conditions like persistent form of vertigo, sensorineural loss of hearing should also be undergoing surgery. In our studies it was found that there were no patients that had tympanic membrane perforations with no healing, therefore there was no patient that needed surgery related to these TM perforations¹⁹⁻²⁰.

In this study there were 7% and 9% patients that suffered from facial palsy and hearing loss followed by tinnitus and persistent vertigo. All of these patients showed recovery and no surgery was needed for them either. The patients having hearing loss issues were followed up in OPD and it was seen that they had conductive hearing loss which has quick resolution. In the previous studies similar data was found where the hearing loss issue was solved without any surgery²¹. Facial palsy was also observed in 7% of the patients, and similar ratio ranging from 6%-11% was observed in previous studies as well. However, in a study carried out to find ENT manifestations in head injury patients it was observed that there was one patient that needed facial nerve decompression as compared to other patients. In our study there was no statistically significant variation found in the results of good recovery patients with or without ENT manifestations. However, there was majority of the patients that were included in good

recovery group, as they needed no surgery and healed with the passage of time²².

CONCLUSION

In case of head injuries ENT injuries are seen commonly. Injuries in the soft tissues of nose, ear and face are some of the commonly observed findings some other findings like CSF rhinorrheas was also observed. There was no prominent association of ENT injury with the overall impact of hospital stay of the patients and the head injury.

REFERENCES

- Rai S, Yogi N, Karmacharya B, Maharjan M, Koirala K. Otorhinolaryngological manifestations in Traumatic brain injury in a tertiary care center of western Nepal. *Journal of Brain and Spine Foundation Nepal*. 2021;2(2):18-22.
- Jarandikar AA, Shrivastava SS, Chawan PD, Bansode SS, Gill J. Prospective study of Ear, Nose and Throat manifestations in head injury cases at a tertiary care hospital. *IP Journal of Otorhinolaryngology and Allied Science*. 2020 Aug 15;3(2):42-5.
- Desai E, Patel RB, Pandya K, Mitra S. A Clinical Study of ENT Manifestations in Cases of Head Injury Patients Coming to Tertiary Care Centre of South Gujarat. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Nov 27:1-6.
- Junaid M, Nabi A, Khan MA, Umair M. Prevalence of cerebrospinal fluid leak in traumatic head injury at a Tertiary Care Center. *Journal of Islamabad Medical & Dental College*. 2019 Sep 29;8(3):123-6.
- Junaid M, Nabi A, Khan MA, Umair M. Prevalence of cerebrospinal fluid leak in traumatic head injury at a Tertiary Care Center. *Journal of Islamabad Medical & Dental College*. 2019 Sep 29;8(3):123-6.
- HariPriya GR, Mary P, Dominic M, Goyal R, Sahadevan A. Incidence and treatment outcomes of post traumatic BPPV in traumatic brain injury patients. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2018 Sep;70(3):337-41.
- Symvoulakis EK, Klinis S, Alegakis A, Kyrmizakis DE, Drivas EI, Rachiotis G, Philalithis A, Velegakis GA. Epidemiologic profile of otorhinolaryngological, head and neck disorders in a tertiary hospital unit in Greece: a challenge for general practitioners?. *BMC Ear, Nose and Throat Disorders*. 2006 Dec;6(1):1-7.
- Singla P, Gupta M, Matreja PS, Gill R. Otorhinolaryngological complaints in pregnancy: a prospective study in a tertiary care centre. *Int J Otorhinolaryngol Head Neck Surg*. 2015 Oct;1(2):75-80.
- Ajiya A, Ayyuba R, Hamisu A, Daneji SM. Otorhinolaryngological health of women attending antenatal care clinic in a tertiary hospital: The Aminu Kano Teaching Hospital experience. *Nigerian Journal of Basic and Clinical Sciences*. 2016 Jul 1;13(2):119.
- Knoll RM, Herman SD, Lubner RJ, Babu AN, Wong K, Sethi RK, Chen JX, Rauch SD, Remenschneider AK, Jung DH, Kozin ED. Patient-reported auditory handicap measures following mild traumatic brain injury. *The Laryngoscope*. 2020 Mar;130(3):761-7.
- Raykar R. Clinical profile, management and outcome of patients with head injury associated CSF rhinorrhea at a tertiary care centre. *Medica*. 2020 Jul;9(2):41.
- Kumar P, Kumar A, Thakur RP. Assessment of Ear, Nose and Throat Manifestations in Head Injury Cases: A Prospective Study.
- Fann JR, Burington B, Leonetti A, Jaffe K, Katon WJ, Thompson RS. Psychiatric illness following traumatic brain injury in an adult healthMaintenance organization population. *Archives of general psychiatry*. 2004 Jan 1;61(1):53-61.
- Sreekanth G, Reddy LS, Bhushan IP. An Overview of Emergencies in Otorhinolaryngology at a Tertiary Care Centre, Telangana. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Jun 17:1-8.
- Panda S, Mohamed A, Sikka K, Kanodia A, Sakthivel P, Thakar A, Bhatnagar S, Mohan A, Meena VP, Tiwari P, Sahoo B. Otolaryngologic manifestation and long-term outcome in mild COVID-19: experience from a tertiary care centre in India. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Mar;73(1):72-7.
- Emerson LP, Mathew J, Balraj A, Job A, Singh PR. Peripheral auditory assessment in minor head injury: a prospective study in tertiary hospital. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2011 Jan;63(1):45-9.
- Koul D, Begh RA, Kalsotra P. Olfactory and Gustatory alterations in COVID-19 patients: a tertiary care COVID-19 centre inpatient experience. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Jan 28:1-5.
- Smart LR, Mangat HS, Issarow B, McClelland P, Mayaya G, Kanumba E, Gerber LM, Wu X, Peck RN, Ngayomela I, Fakhar M. Severe traumatic brain injury at a tertiary referral Center in Tanzania: epidemiology and adherence to brain Trauma Foundation guidelines. *World neurosurgery*. 2017 Sep 1;105:238-48.
- Gilyoma JM, Chalya PL. Etiological profile and treatment outcome of epistaxis at a tertiary care hospital in Northwestern Tanzania: a prospective review of 104 cases. *BMC ear, Nose and throat Disorders*. 2011 Dec;11(1):1-6.
- Makda A, Kumar S, Kumar A, Kumar V, Rizwan A. The frequency of neurological symptoms in COVID-19 patients at a tertiary care hospital in Pakistan. *Cureus*. 2020 Sep 10;12(9).
- O'Reilly RC, Greywoode J, Morlet T, Miller F, Henley J, Church C, Campbell J, Beaman J, Cox AM, Zwicky E, Bean C. Comprehensive vestibular and balance testing in the dizzy pediatric population. *Otolaryngology--Head and Neck Surgery*. 2011 Feb;144(2):142-8.
- Staab JP, Ruckenstein MJ. Expanding the differential diagnosis of chronic dizziness. *Archives of Otolaryngology--Head & Neck Surgery*. 2007 Feb 1;133(2):170-6.