

PATTERN, CLINICAL PROFILE, MANAGEMENT, AND OUTCOMES OF EAR, NOSE, AND THROAT TRAUMA: A PROSPECTIVE OBSERVATIONAL STUDY FROM CENTRAL INDIA

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ABSTRACT

Background: ENT trauma represents a significant cause of emergency hospital admissions and is associated with substantial functional impairment, cosmetic deformity, and socioeconomic burden. Understanding regional epidemiological patterns is essential for planning preventive strategies and optimising management protocols.

Objective: To evaluate the epidemiological profile, clinical presentation, management strategies, and outcomes of ENT trauma patients presenting to a tertiary care centre in Central India.

Methods: This prospective observational study was conducted in the Department of Otorhinolaryngology and Head & Neck Surgery at Netaji Subhash Chandra Bose Medical College, Jabalpur, Madhya Pradesh, India, from April 2023 to March 2025. A total of 100 consecutive patients with ENT trauma were included. Demographic profile, mechanism of injury, anatomical injury patterns, associated injuries, radiological findings, treatment modalities, complications, and outcomes were analysed. Statistical analysis was performed using SPSS version 25.0. A p-value <0.05 was considered statistically significant.

Results: Road traffic accidents were the leading cause of injury (59%), followed by assault (29%) and accidental falls (12%). Young adults aged 16–30 years constituted the most affected age group (46%). Male predominance was observed with a male-to-female ratio of 4.9:1. Combined skeletal and soft tissue injuries were present in 78% of patients. Nasal fractures were the most common skeletal injury (68%), whereas facial lacerations represented the most common soft tissue injury (65%). Surgical intervention was required in 84% of cases. Satisfactory functional and cosmetic outcomes were achieved in 92% of patients at 3-month follow-up. Delayed presentation beyond 24 hours was significantly associated with increased complication rates ($p = 0.028$).

Conclusion: ENT trauma predominantly affects young males and is mainly associated with road traffic accidents. Nasal fractures and facial soft tissue injuries are the most frequent injury patterns. Early diagnosis, multidisciplinary management, and timely surgical intervention are essential for favourable outcomes. Strengthening road safety measures and public awareness programs may substantially reduce the burden of preventable ENT trauma.

KEYWORDS: ENT trauma; facial trauma; nasal fracture; mandibular fracture; road traffic accident; maxillofacial injury

INTRODUCTION

Trauma involving the ear, nose, throat, and maxillofacial region constitutes a major public health concern worldwide and contributes significantly to morbidity, mortality, and healthcare expenditure [1,2]. Owing to the prominent anatomical position of the face and neck, ENT injuries are frequently encountered in emergency departments and are commonly associated with multisystem trauma requiring multidisciplinary management [3].

The spectrum of ENT trauma ranges from superficial soft tissue injuries to complex fractures involving the nasal bones, mandible, maxilla, orbit, and skull base [4]. In addition to immediate complications such as airway compromise and haemorrhage, these injuries may result in long-term functional deficits, cosmetic deformity, psychosocial distress, and reduced quality of life [5].

The epidemiological pattern of ENT trauma varies according to geographic location, socioeconomic conditions, cultural practices, and traffic regulations [6]. In developing countries such as India, road traffic accidents remain the predominant cause of facial trauma due to increasing vehicular density, inadequate traffic regulation enforcement, poor road infrastructure, and low compliance with protective safety measures [7,8].

Several Indian studies have evaluated maxillofacial trauma; however, prospective data focusing specifically on ENT trauma from Central India remain limited. The present study was therefore undertaken to evaluate the demographic profile, injury mechanisms, clinical presentation, management modalities, and outcomes of ENT trauma patients presenting to a tertiary care centre in Madhya Pradesh.

MATERIALS AND METHODS

Study Design and Setting

This prospective observational study was conducted in the Department of Otorhinolaryngology and Head & Neck Surgery at Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India, over 24 months from April 2023 to March 2025.

The study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Ethical Approval

Institutional Ethics Committee approval was obtained before commencement of the study (Approval No.: _____). Written informed consent was obtained from all participants or their legal guardians.

Sample Size Calculation

The sample size was calculated using the formula:

$$n = Z^2 \times p \times (1 - p) / d^2$$

Where:

- $Z = 1.96$ at 95% confidence interval
- $p = 0.094$
- $d = 0.06$

The minimum calculated sample size was 91. To compensate for possible attrition and incomplete follow-up, 100 patients were included.

Inclusion Criteria

- Patients presenting with ENT trauma requiring admission
- Age ≥ 1 year
- Patients willing to participate and provide informed consent
- Patients available for follow-up

Exclusion Criteria

- Isolated severe head injury managed primarily by neurosurgery
- Haemodynamically unstable patients unsuitable for detailed evaluation
- Patients unwilling to participate
- Patients lost to follow-up

Data Collection

A structured proforma was used for systematic data collection. The following variables were recorded:

- Demographic characteristics
- Mechanism of injury
- Clinical presentation
- ENT examination findings
- Cranial nerve assessment
- Radiological investigations
- Treatment modalities
- Complications
- Functional and cosmetic outcomes

Radiological investigations included plain radiographs, orthopantomogram (OPG), computed tomography (CT), and magnetic resonance imaging (MRI) wherever indicated.

Patients were followed up at 1 week, 1 month, and 3 months after treatment.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as frequency, percentage, mean, and standard deviation. Categorical variables were compared using Chi-square test or Fisher's exact test. Statistical significance was considered at $p < 0.05$.

RESULTS

Demographic Characteristics

A total of 100 patients with ENT trauma were included in the study. The mean age of patients was 31.4 ± 12.6 years. The most affected age group was 16–30 years (46%).

Table 1: Age Distribution of Study Participants

Age Group (Years)	Frequency	Percentage
0–15	4	4%

Age Group (Years)	Frequency	Percentage
16–30	46	46%
31–45	34	34%
46–60	14	14%
>60	2	2%

Male predominance was observed, with 83 males and 17 females, resulting in a male-to-female ratio of 4.9:1.

Mechanism of Injury

Road traffic accidents accounted for the majority of injuries (59%), followed by assault (29%) and accidental falls (12%).

Table 2 Mechanism of Injury

Mode of Injury	Frequency	Percentage
Road traffic accidents	59	59%
Assault	29	29%
Accidental falls	12	12%

Injury Pattern

Combined skeletal and soft tissue injuries were present in 78% of patients.

Table 3 Distribution of Injury Pattern

Injury Type	Frequency	Percentage
Skeletal injury only	16	16%
Soft tissue injury only	6	6%
Combined skeletal and soft tissue injuries	78	78%

Soft Tissue Injuries

Facial lacerations were the most common soft tissue injury.

Table 4 Distribution of Soft Tissue Injuries

Soft Tissue Injury	Frequency	Percentage
Abrasions	18	18%
Lacerations	65	65%
Soft tissue avulsion	4	4%
No soft tissue injury	13	13%

Skeletal Injuries

Nasal fractures were the most common skeletal injuries.

Table 5 Distribution of Skeletal Injuries

Site of Fracture	Frequency	Percentage
Nose	68	68%
Mandible	15	15%
Maxilla	8	8%
Zygoma	6	6%
Orbit	3	3%

Among mandibular fractures, parasymphysis was the most common site.

Associated Injuries

Associated systemic injuries were present in 53% of patients. Orthopaedic injuries were the most common associated injuries, followed by head injuries.

Management

Surgical intervention was required in 84% of patients.

Table 6 Treatment Modalities

Treatment Modality	Frequency	Percentage
Conservative management	16	16%
Soft tissue repair	42	42%
Closed reduction	28	28%
Open reduction and internal fixation	12	12%
Combined procedures	2	2%

Emergency tracheostomy was performed in four patients with severe facial trauma and airway compromise.

Complications

Early complications included wound infection (6%), haematoma formation (4%), and persistent epistaxis (3%). Late complications included nasal deformity (5%), malocclusion (3%), and facial asymmetry (2%).

Outcomes

At 3-month follow-up, satisfactory functional and cosmetic outcomes were achieved in 92% of patients.

Delayed presentation beyond 24 hours after injury was significantly associated with increased complication rates ($p = 0.028$).

DISCUSSION

The present study demonstrated that ENT trauma predominantly affects young adult males, with road traffic accidents representing the leading mechanism of injury. These findings are consistent with previous Indian and international studies evaluating maxillofacial and ENT trauma patterns [9–12].

Young adults aged 16–30 years constituted the largest affected group in the present study. Increased outdoor activity, occupational exposure, high-risk driving behaviour, and interpersonal violence may explain the greater vulnerability of this economically productive age group.

Male predominance observed in the present study is comparable to findings reported by Ravindran et al. and Gadicherla et al. [9,10]. Greater male involvement in driving, outdoor occupations, and high-risk activities likely contributes to this disparity.

Road traffic accidents accounted for 59% of cases in the present study. Similar findings have been reported in several Indian studies, highlighting the growing burden of vehicular trauma in developing countries [7,9]. Poor road conditions, low helmet compliance, overspeeding, alcohol consumption, and inadequate traffic regulation enforcement contribute substantially to facial trauma incidence.

Nasal fractures were the most common skeletal injury encountered in the present study. The anatomical prominence and relatively weak structural support of the nasal bones predispose them to fracture even with moderate trauma [13]. Most nasal fractures were simple fractures that were successfully managed with closed reduction.

Mandibular fractures constituted 15% of cases, with parasymphysis being the most common fracture site. Similar fracture distributions have been reported by Gadicherla et al. and Saluja et al. [10,14]. The biomechanical stress concentration around the canine region may explain the higher frequency of parasymphyseal fractures.

Combined skeletal and soft tissue injuries were observed in the majority of patients, reflecting the high-energy nature of trauma mechanisms, especially road traffic accidents. These findings emphasise the importance of comprehensive trauma assessment and multidisciplinary management.

Surgical intervention was required in most patients. Early soft tissue repair and timely fracture reduction contributed to favourable functional and cosmetic outcomes. Open reduction and internal fixation using titanium miniplates provided satisfactory stabilisation in complex fractures.

The overall favourable outcome rate of 92% in the present study highlights the importance of early diagnosis, appropriate imaging, multidisciplinary care, and timely intervention.

Strengths of the Study

- Prospective observational study design
- Standardised trauma evaluation protocol
- Comprehensive assessment of both soft tissue and skeletal injuries
- Evaluation of functional and cosmetic outcomes
- Provides regional epidemiological data from Central India where published literature remains limited

LIMITATIONS

The present study was conducted at a single tertiary care centre with a relatively limited sample size, which may affect generalisability. Patients with severe neurological trauma managed primarily by neurosurgical services were excluded, potentially underrepresenting the most severe injury spectrum. Long-term quality-of-life outcomes beyond 3 months were not evaluated.

CONCLUSION

ENT trauma remains a significant cause of morbidity among young adult males in Central India, with road traffic accidents representing the predominant etiology. Nasal fractures and facial soft tissue injuries were the most frequently encountered lesions. Early diagnosis, multidisciplinary management, and timely surgical intervention resulted in favourable functional and cosmetic outcomes in the majority of patients. Strengthening road safety measures, improving public awareness, and encouraging the use of protective equipment may substantially reduce the burden of preventable ENT trauma.

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Author Contributions

Dr. Kanhaiya Hariyale contributed to study conception, patient recruitment, data collection, statistical analysis, manuscript drafting, and literature review. Prof. Dr. Kavita Sachdeva supervised the study, critically revised the manuscript, and approved the final version for publication.

DECLARATIONS

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

The study was approved by the Institutional Ethics Committee of Netaji Subhash Chandra Bose Medical College, Jabalpur (Approval No.: _____ IEC/2022-25/17335-128 _____).

Informed Consent

Written informed consent was obtained from all participants or their legal guardians.

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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