

Epidemiology and Management of Isolated Maxillofacial Trauma: A Prospective Study in a Tertiary Care Hospital

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Abstract

Background: Maxillofacial injuries remain a serious clinical problem because of the sensitivity of this anatomical region. They are linked with various factors including social, cultural and environmental factors and therefore vary with populations. **Objectives:** To study the epidemiology, patterns, treatment modalities and complications of maxillofacial trauma patients in a tertiary care hospital. **Design:** The study was carried out at Post Graduate Department of General Surgery GMC Jammu from 1st August 2023 to 31st July 2024. It was a single institutional prospective study. **Subjects/Patients:** A total of 100 patients admitted with maxillofacial injuries who fulfilled inclusion and exclusion criteria were included in the study. **Results:** Median age of patients included in our study group was 26 years. Maximum number of patients were in the age group 11-20 years (26%) Male to female ratio was 4:1, 70% belonged to urban areas 36% were College going Students, whereas Office Workers and Farmers contributed to 14% and 24% each in the study group. Isolated Nasal bone fracture (35%) was followed by Isolated mandible fracture (25%). 64% of the total cases were due to RTA followed by fall from height (20%), Nasal bone fractures were seen in 35 patients. 15 patients had fracture of maxilla out of which 10 patients had Lee Fort 1 fracture and 5 patients had Lee Fort 2 fracture. Non Contrast CT of face was the most common diagnostic modality used and 70% of maxillofacial injuries were managed conservatively. 15% patients had Post treatment complications **Conclusion:** Knowledge of epidemiology of maxillofacial injuries can help to strengthen institutional protocols for their effective management.

Keywords: Maxillofacial. Injuries, nasal bone, fracture, Trauma.

Introduction

Maxillofacial injuries constitute a major global health concern due to the anatomical complexity and functional significance of the facial region. Their incidence and patterns vary widely across populations, influenced by social, cultural, environmental, and economic factors [1]. Owing to the exposed position of the face, these injuries are common and frequently associated with trauma to other organ systems, thereby increasing morbidity and complicating management.

Maxillofacial trauma refers to any physical injury involving facial soft tissues, bones, or both, occurring either in isolation or as part of polytrauma. Common causes include road traffic accidents, assaults, falls, industrial injuries, sports trauma, and animal bites. Among these, road traffic accidents remain a leading cause worldwide. The concept of the “golden hour” highlights the critical importance of timely intervention in reducing morbidity and mortality [2].

The anatomical location and fracture patterns depend on the mechanism and direction of injury, with the mandible being the most frequently fractured bone [3]. Due to the proximity of the facial region to the airway and cranial structures, maxillofacial trauma

often presents with life-threatening complications, particularly airway compromise caused by hemorrhage, edema, foreign bodies, or fracture displacement [4]. Effective management requires prompt airway assessment, adherence to ATLS principles, and simultaneous cervical spine protection [5].

Diagnosis is based on detailed clinical examination supported by imaging modalities such as computed tomography, the gold standard for evaluation Failure to identify [6] and manage these injuries appropriately may lead to long-term functional and aesthetic impairment [7].

Present study was conducted to study the epidemiology and patterns of isolated maxillofacial trauma, to study the cause of trauma, treatment modalities and complications in a tertiary care hospital.

Material and Methods

Present study was a prospective study conducted in the emergency of the Post Graduate Department of General Surgery of a tertiary care hospital. All the patients admitted with isolated Maxillofacial injury over a period of one year (1st August 2023 to 31st July 2024) were included in the study.

Inclusion Criteria

1. All the patients admitted through emergency under the Department of Surgery with isolated maxillofacial trauma

Exclusion Criteria

1. Patients with other associated injuries.
2. All the patients not consenting to be part of study

A sample size of 100 was obtained as per the inclusion and exclusion criteria from the admitted patients in the institution during the time frame of the study. The initial patient examination was performed by the attending surgeon. A consultation with the Maxillofacial surgeon, neurosurgeon or other specialities was sought where ever needed. Patients after admission were reviewed, the diagnosis and treatment planning was done and intervention done if required.

Patients with maxillofacial fractures were seen in the outpatient department or in the emergency room. Patients were primarily admitted to the hospital. The treatment option was planned as soon as the diagnostic results were available. Patients were diagnosed and operated wherever required. Antibiotics and pain medications were administered pre- and postoperatively. In case of orbital involvement, an examination by eye specialists was done. Patients were discharged after meeting the criteria for discharge. Patients after discharge were kept on regular follow up. Complications if any were managed adequately.

The institutional ethical committee clearance has been obtained. This study has been conducted in accordance with the rules and regulations set by IEC. Patients were interviewed in a separate room assuring anonymity. They were assured that their participation in the study will not affect their treatment plan.

Results

In the study, median age of patients was 26 years. Maximum number of patients were in the age group 11-20 years accounting for 26% of total cases. 10 patients were in the age group 1-10 years; 26 patients were in the age group of 11-20 years; 24 patients were in the age group of 21-30 years; 24 patients were in the age group of 31-40 years; 12 patients were in the age group of 41-50 years and 4 patients were in the age group of 51-60 years. Male to female ratio was 4:1. Maximum number of Patients (36%) were College going students, whereas farmers contributed to 24% as depicted in Table 1 and fig

1. Out of a total of 100 Patients, Isolated Nasal bone fracture was found in 35%; Isolated mandible fracture in 25%; Isolated maxilla fracture in 15%; Isolated fracture of Orbit in 10% of total cases. Combined Nasal bone and Maxilla fractures were found in 10% and combined Maxilla and Mandible fractures were seen in 5% of cases (**Table 2, Fig 2**). Figure 3 shows that Road Traffic Accident was the most common cause of maxillofacial injuries accounting for 64% of the total cases followed by fall from height (20%), assault (12%) and animal inflicted injuries accounting for 4% of the cases. Nasal bone fractures were seen in 35 patients. 15 patients had type 1 nasal bone fracture, 15 patients had type 2 nasal bone fracture and 5 patients had type 3 nasal bone fracture. Mandible fractures were seen in 25 patients out of which 15 patients had parasymphiseal fractures, 5 patients had fractures of body of mandible, 3 patients had fractures of condyle of mandible and 2 patients had fracture of angle of mandible. 15 patients had fracture of maxilla out of which 10 patients had Lee Fort 1 fracture and 5 patients had Lee Fort 2 fracture. Orbital fractures were seen in 11 patients out of which 5 patients had fracture of floor of orbit, 3 patients had fracture of lateral wall of orbit, 2 patients had fracture of medial wall of orbit and 1 patient had fracture of floor of orbit (**Table 3**). Non Contrast CT of face was the most common diagnostic modality used for diagnosis of maxillofacial injuries. 70% of the cases were diagnosed using NCCT face. Roentgenogram of face was useful in diagnosing 20% of the patients with maxillofacial injuries (especially in cases of nasal bone injuries). 10% of patients of maxillofacial injuries in our study were diagnosed using Orthopantomogram as depicted in table 4. 70% of maxillofacial injuries were managed conservatively. Open reduction and internal fixation was the treatment modality in 10% cases. Nasal bone reduction (closed) was done in 10% of total cases. Interdental wiring was done in 10% of cases (**Table 5, Figure 4**). Out of a total of 100 patients, post treatment complications were encountered in 15% of the patients during follow up. The most common post treatment complication encountered was numbness over the cheek particularly in cases of maxillary fractures. Nasal deformity was second most common post treatment complication encountered in 4% of cases. Trismus was seen in 3% cases of mandibular fracture which were treated by Heisters Mouth prop. Malocclusion was seen in 2 cases of mandibular fracture which were later managed by orthodontist. Diplopia was present in one case of orbital floor fracture which was managed conservatively. This data is graphically represented in figure 5.

Table 1: Distribution of patients with maxillofacial injury registered during the study period based on Socio demographic profile

Variable	No. of Patients (N=100) (N)	Percentage (%)
Age group in years		
1-20	36	36
21-40	48	48
41-60	16	16
Gender		
Male	80	80
Female	20	20
Residence		
Urban	70	70
Rural	30	30
Occupation		
College Going	36	36
Office workers	14	14
Farmers	24	24
School Going	10	10
House Wife	12	12
Labourer	04	04

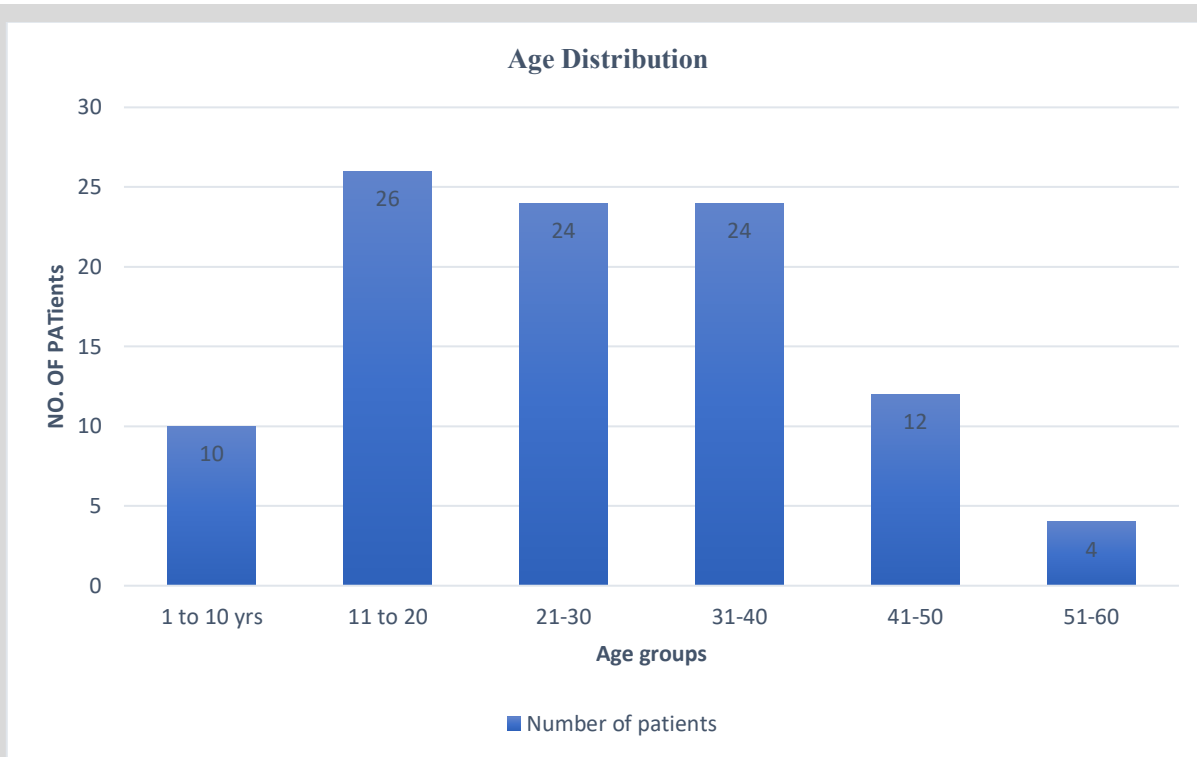


Figure 1: Bar Diagram showing distribution of Patients of Maxillofacial Injuries according to age group.

Table 2: Distribution of patients with maxillofacial injury registered during the study period based on bone involvement

Bone Involved	Number of Patients (N) (N=100)	Percentage (%)
Nasal Bone	35	35
Mandible	25	25
Maxilla	15	15
Orbit	10	10
Nasal Bone and Maxilla	10	10
Mandible and Maxilla	5	5

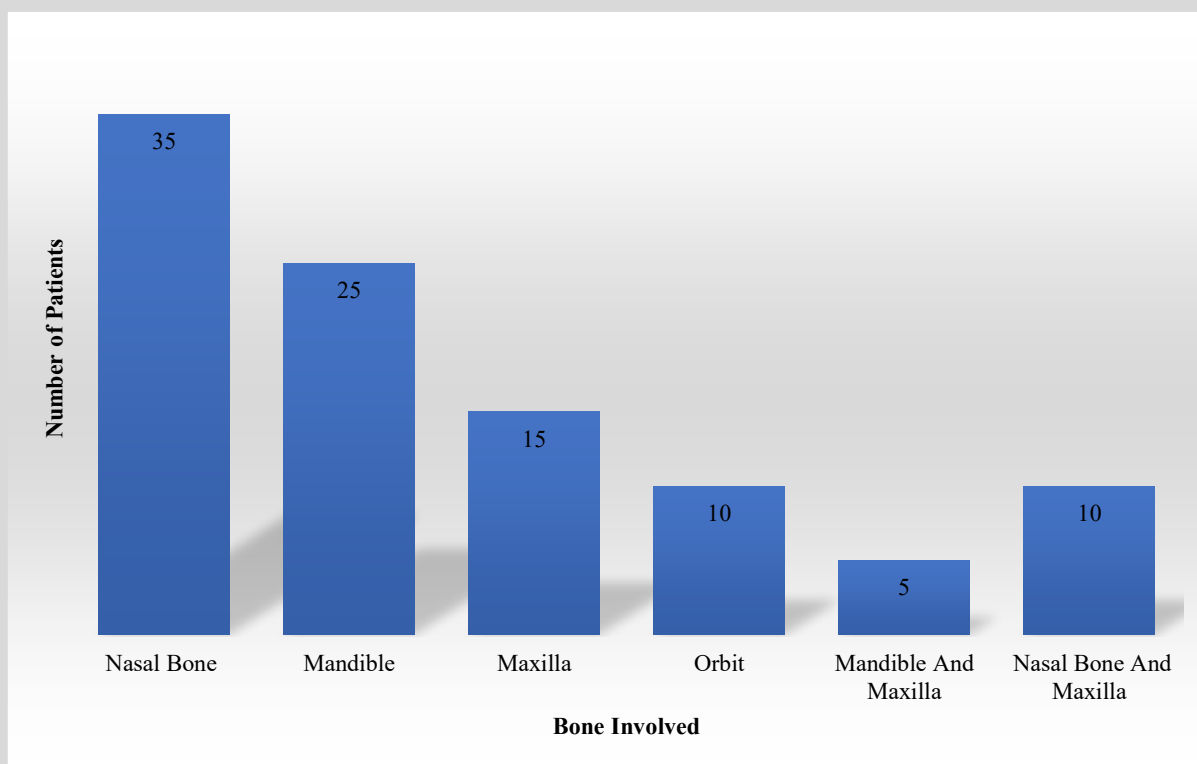


Figure 2: Bar diagram showing per individual bone involvement in Maxillofacial Injuries.

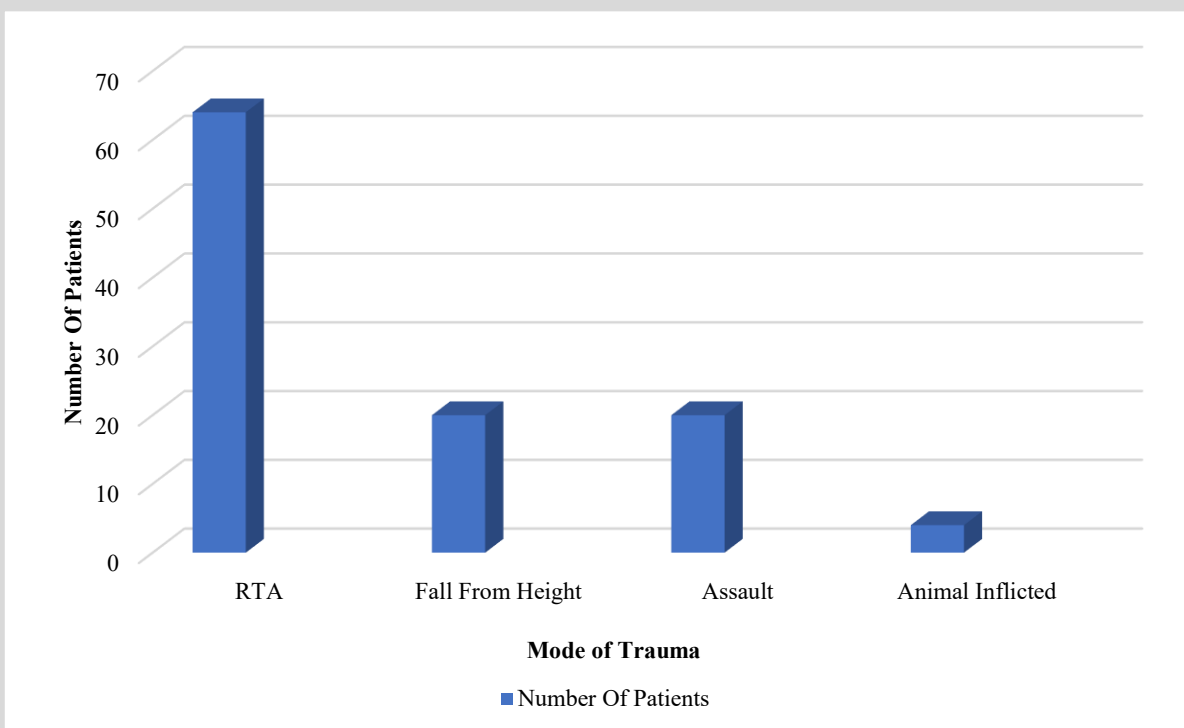


Figure 3: Distribution of patients according to mode of trauma.

Table 3: Distribution of patients with maxillofacial injury registered during the study period based on bone involved and type of fracture

Bone Involved	Type of Fractures	No of Cases
Nasal Bone Fractures	Type 1	15
	Type 2	15
	Type 3	5
Mandible Fractures	Parasymphyseal	15
	Body Of Mandible	05
	Condyle Of Mandible	3
	Angle Of Mandible	2
Maxilla	Lee Fort 1	10
	Lee Fort 2	5
Orbit	Floor of Orbit	5
	Lateral wall	3
	Medial Wall	2
	Orbital Floor	1

Table 4: Distribution of patients with maxillofacial injury registered during the study period based on Investigation modalities used for diagnosis.

Variable	No. of Patients (N=100) (N)	Percentage (%)
CT Face	70	70%
Roentgenogram Face	20	20%
Orthopantomogram.	10	10%

Table 5: Distribution of patients with maxillofacial injury registered during the study period based on Treatment modalities used.

Management	No of Patients (N=100) (N)	Percentage (%)
Conservative	70	70
ORIF	10	10
Nasal Bone Reduction	10	10
Interdental wiring	10	10

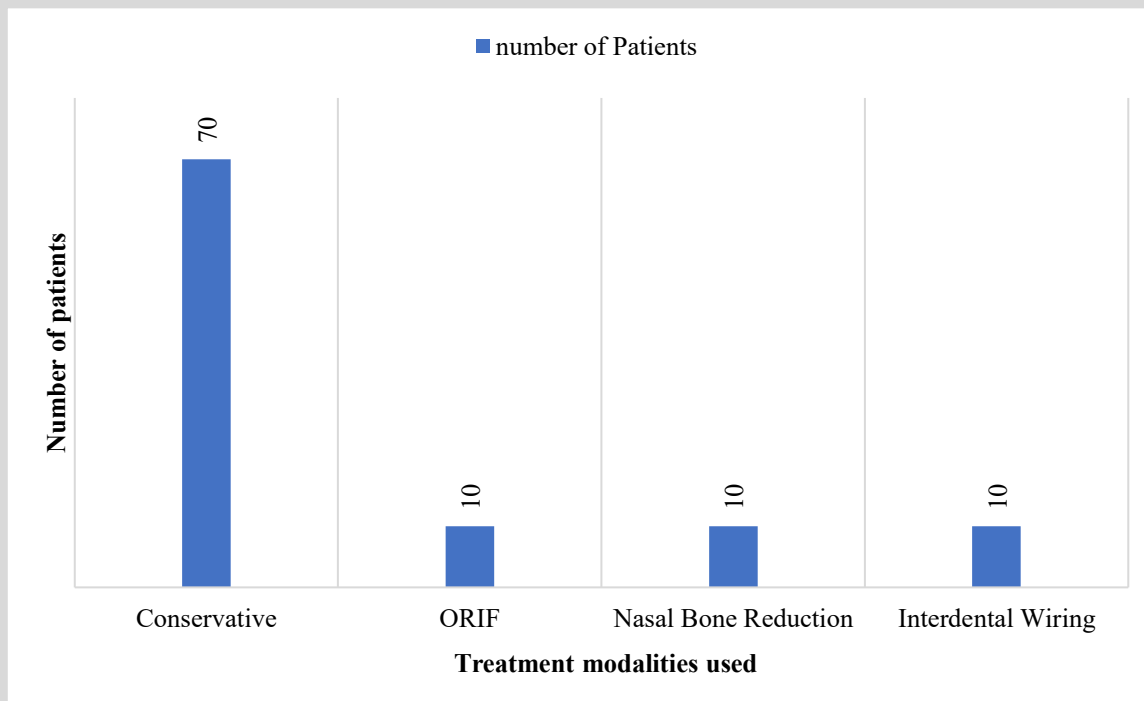


Figure 4: Bar Diagram showing Treatment modalities used in patients with Maxillofacial Injuries

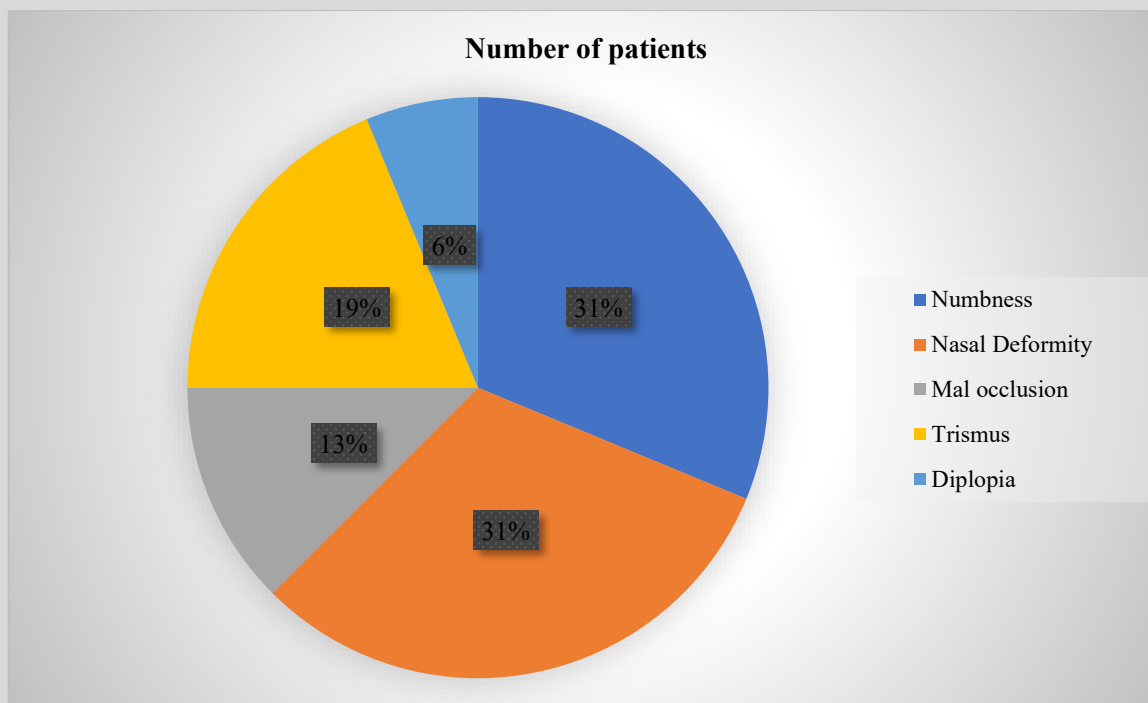


Figure 5: Pie diagram showing Distribution of patients based on Post treatment complications.

Discussion

Maxillofacial region being the most exposed part of the body is highly susceptible to trauma. Globally, the primary causes of maxillofacial injuries include interpersonal violence, road traffic accidents, falls, and sports injuries. Road traffic accidents (RTAs) are a significant contributor to both mortality and morbidity worldwide, particularly in developing countries. The prevalence of maxillofacial injuries is variable, with the variation attributed to factors such as environmental conditions, socioeconomic status, cultural practices, and traffic regulations.

Median age of patients included in our study group was 26 years. Maximum number of patients were in the age group 11-20 years accounting for 26% of total cases. Singaram M *et al.*, (2016)

[8] in their study Prevalence, pattern, etiology, and management of maxillofacial trauma in a developing country reported that adults between 20 to 40 years of age were more commonly involved and mean age of the patients included was 35 years. In a study by Aleksanyan LV *et al.*, (2022) [9] adults aged between 21 and 40 years had the highest rate.

Out of a total of 100 patients, 80 were males and 20 were females Male to female ratio was 4:1. Cabalag MS *et al.*, (2014) [10] in their study Epidemiology and management of maxillofacial fractures in an Australian trauma centre reported that Males were more frequently affected accounting for 80% of the population and females accounting for 20% of the population. This study goes well with our observation. Gupta P *et al.*, (2023) [11] in their study of Maxillofacial Fractures at a Tertiary Care Centre in North India: A

Review of 1674 Cases concluded that and males were more frequently affected (80.3%) with male to female ratio of 4.7:1. This study goes well with our observation. Out of a total of 100 patients who sustained maxillofacial injuries in our study group, 70(70%) belonged to urban areas whereas 30 (30%) belonged to rural areas. Vaibhav N *et al.*, (2021) [12] in their study Maxillofacial Injuries as an Occupational Hazard of Farming in Rural and Semi-urban Population: A 3-Year Retrospective Epidemiological Study concluded that rural population was more prone to maxillofacial injuries due to farming as compare to semiurban population.

Maximum number of Patients (36%) were College going Students followed by farmers (24%) in the present study, Singaram M *et al.*, (2016) [8] in their study concluded that the incidences of maxillofacial injuries were more commonly seen in school going children. Among children below the age of 15 with injury due to falling while playing, the injury was mild, causing only soft tissue laceration or dentoalveolar or tooth fracture, rather than being a severe injury. Kuriadom ST *et al.*, (2021) [13] found that most commonly affected persons were the pedestrians, followed by the drivers, passengers, motorcyclists, and cyclists.

Out of a total of 100 Patients, Isolated Nasal bone fracture was found in 35% cases, Abhinav RP *et al.*, (2019) [14] reported that 64% patients had had isolated lower facial fractures (19%). Gupta P *et al.*, (2023) [11] found that Mandibular fractures accounted for 38% of all fractures, with the parasymphysis being the most common site for fractures. Alvi A *et al.*, (2003) [6] concluded that Orbital fracture was the most common overall facial fracture (24.2%), with nasal fractures being the most common isolated fracture (23.2%).

In our study group, RTA was the most common cause of maxillofacial injuries accounting for 64% of the total cases followed by fall from height (20%), Alvi A *et al.*, (2003) [6] reported that the most common cause of facial fractures was assault (41%), followed by motor vehicle accident (26.5%). Arslan ED *et al.*, (2014) [15] observed that the most common cause of injuries were violence, accounting for 39.7% of the sample, followed by falls 27.9% and road traffic accidents 27.2%.

Nasal bone fractures were seen in 35 patients. 15 patients had type 1 nasal bone fracture, 15 patients had type 2 nasal bone fracture and 5 patients had type 3 nasal bone fracture in our study, Kuriadom ST *et al.*, (2021) [13] in their study Incidence of maxillofacial fractures in motor vehicle accidents treated in Dubai concluded that Unilateral mandibular fractures (56.4%) were more common than bilateral mandibular fractures (43.6%). Eighteen cases of mandibular and maxillary dentoalveolar fractures were reported.

In our study group 70% of maxillofacial injuries were managed conservatively. Open reduction and internal fixation was the treatment modality in 10% cases. Nasal bone reduction (closed) was done in 10% of total cases. Kar IB *et al.*, (2016) [16] concluded that Soft tissue injuries were managed by simple debridement and primary closure in 75% of cases. The majority of bony injuries were managed with open reduction and internal fixation by either miniplate fixation or trans-osseous wire fixation (78.9% of the cases). Maxillo-mandibular fixation was used in the rest of the cases as a treatment modality for bony injury. Two cases required local or regional flaps for tissue coverage, while three cases required free tissue transfers for reconstruction of the defects.

Ansari MH (2004) [17] in their study observed that Naso-frontal fractures were treated with open reduction and trans-osseous wiring. Nasal complex fractures were treated with closed reduction and supported by plaster of Paris splints and nasal packing.

Out of a total of 100 patients, post treatment complications were encountered in 15% of the patients during follow up. The most

common post treatment complication encountered was numbness over the cheek particularly in cases of maxillary fractures. Nasal deformity was second most common post treatment complication encountered in 4% of cases.

Kuriadom ST *et al.*, (2021) [13] concluded that, 18.4% of the patients had postoperative complications in which paresthesia was most common. Other complications included double vision and infection, flattening of the cheek, epiphora, and enophthalmus and limited mouth opening, nasal deformity, anterior open bite, permanent paresthesia, mandibular deviation, and telecanthus.

Kar IB *et al.*, (2016) [16] in their study observed complications like parotid fistulas, hypertrophic scars and enophthalmus.

Conclusion

Maxillofacial injuries are very common among trauma patients especially in cases of Road traffic accidents. College going male students are the most commonly affected population. Although trauma management has advanced significantly, leading to reduced mortality rates within the golden hour, challenges still remain, particularly in managing maxillofacial injuries in polytraumatized patients. These injuries are critical because their proximity to the airway and brain poses an immediate threat to life.

Surgery for maxillofacial trauma, especially in cases involving extensive or complex fractures, remains challenging. Maxillofacial injuries often occur alongside other injuries, which may delay early surgical intervention and increase the risk of infection, non union, and malocclusion. This knowledge of epidemiology of maxillofacial injuries and utilities of diagnostic and treatment modalities along with post treatment complication profile will guide us to further strengthen our institutional protocols regarding the management of maxillofacial injuries.

Declaration

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Conflict of Interest

None

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Nil

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Ethical Clearance

Taken

Trial Details

Not Applicable

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