

Incidence, Aetiology and Pattern of Maxillofacial Injuries in a Tertiary Trauma Hospital, Nepal: A 5-year Retrospective Study

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ARTICLE HISTORY

Received : Jul 25, 2023

Accepted: Nov 26, 2023

ACCESS THE ARTICLE ONLINE



DOI: <https://doi.org/10.37080/nmj.167>

ISSN : 2645-8438

KEYWORDS

Aetiology; incidence; maxillofacial fractures; soft tissue injury

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CONFLICT OF INTEREST : None

ACKNOWLEDGEMENTS: We would like to thank Dr. Basant K. Mathema, MD for his support.

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ABSTRACT

Introduction: The aim of the present study was to evaluate the incidence, aetiology and patterns of maxillofacial injuries in a tertiary trauma hospital in Nepal.

Methods: A retrospective analysis of all the maxillofacial trauma patients operated at the Department of Plastic, Cosmetic and Maxillofacial Surgery, B and B Hospital, Lalitpur, Nepal between 1st March, 2015 and 31st December, 2020 was performed. Data were collected for each patient in regards to age, gender, cause and nature and type of the injury and the treatment provided.

Results: Among 409 patients operated in this period for maxillofacial injuries, 83% (n=356) were male and 17% (n=73) were female. Patients in the second and third decade of life were found to be more prone to sustain maxillofacial injuries. Road traffic accident was the most frequent cause (n=331; 77%) followed by physical assault (n=46; 10.7%) and falls (n=42; 9.7%). Mandible was the most commonly fractured bone (n=125; 26.5%). Fracture of parasymphysis, combined symphysis and condyle fracture and parasymphysis and angle fracture were the most common patterns of mandible fracture.

Conclusions: The major cause of maxillofacial injuries among patients operated in our hospital was road traffic accident which directly reflects the poor traffic system and improperly planned roads.

INTRODUCTION

Maxillofacial injuries constitute a significant portion of the overall traumatology. Management of injuries in the maxillofacial region presents one of the most difficult challenges for the healthcare professionals worldwide as these are invariably associated with substantial morbidity, disfigurement and functional deficit.¹ This in turn may have a negative influence on the quality of life of the victims.²

The incidence of maxillofacial fractures varies widely between different countries.³ The main causes worldwide are road traffic accidents (RTAs), physical assaults, falls and sports injuries.^{4,5} However, there's a large variability in reported incidence and aetiology based on the environmental, cultural and socioeconomic factors of different regions.⁶⁻⁸ Therefore, we aim to evaluate the incidence, aetiology and pattern of maxillofacial injuries in a tertiary trauma hospital in Nepal through this retrospective study.

How to cite (Vancouver Style)

Maharjan M, Sakya PR, Gurung J, Rai A, Tandukar A. Incidence, Aetiology and Pattern of Maxillofacial Injuries in a Tertiary Trauma Hospital, Nepal: A 5-year Retrospective Study. Nepal Med Jor. 2023;6(2):1-6.

METHODS

A retrospective analysis of all the patients operated for maxillofacial injuries at the Department of Plastic, Cosmetic and Maxillofacial Surgery, B and B Hospital, Lalitpur, Nepal between 1st March, 2015 and 31st December, 2020 was performed. The data such as age, gender, cause and pattern/site of injury and treatment performed were derived from the medical records of the hospital. This study was approved by the Institutional Review Board/Ethical Committee of the hospital.

Cause of injury was grouped into the following categories:

1. Road traffic accidents (RTAs)
2. Physical Assault
3. Falls
4. Sports
5. Occupational
6. Natural calamities (e.g. earthquake)

Injuries were divided into 2 types: Soft tissue injury and Fractures of facial skeleton

Fractures were subdivided according to the anatomic regions as follows:

1. Mandible fractures (symphysis, parasymphysis, body, angle, ramus, coronoid process and condyle)
2. Midface fractures (Le Fort I, Le Fort II, Le Fort III and isolated maxillary bone fracture)
3. Zygomatic complex fractures

4. Isolated zygomatic arch fractures
5. Nasal bone fractures
6. Naso-orbito-ethmoidal (NOE) fractures
7. Isolated orbital bone fractures
8. Frontal bone fractures
9. Dentoalveolar fractures

Since the data of only the patients treated surgically were obtained, treatment methods were classified into Closed reduction (CR) and Open reduction and internal fixation (ORIF) for facial bone fractures and Debridement and Primary repair for the soft tissue lacerations.

RESULTS

Between 1st March, 2015 and 31 December, 2020, a total of 429 patients had been treated surgically for maxillofacial injuries. Of the total patients, 356 (83%) were male and 73 (17%) were female with male-female ratio of about 5:1. (**Table 1**)

The peak incidence of the injury was seen in the age group of 15-24 years (n=156; 36.3%) followed by 25-34 years (n=145; 33.7%) with lesser incidence above 55 years of age. 31 (7.2%) of the total patients were below the age of 14 years. (**Table 2**)

Table 1: Gender distribution

Male	Female
356	73
1.98 %	17.01 %

Table 2: Age distribution

Age group (years)	14 and below	15-24	25-34	35-44	45-54	55-64	65-74	75 and above
No.	31	156	145	55	19	12	8	3
%	7.2 %	36.3 %	33.7 %	12.8 %	4.4 %	2.7 %	1.8 %	0.6 %

Aetiology: The most common cause of maxillofacial injuries was RTA consisting of 331 (77.1%) patients followed by physical assault (n=46; 10.7%) and falls (n=42; 9.7%). Sports and occupational injuries and

injuries secondary to natural calamity (earthquake) together constituted only 2.0% (n=10) of the cases. (**Table 3**)

Table 3: Cause of maxillofacial injuries

Cause	RTA	Assault	Fall	Sports	Occupational	Natural calamity (earthquake)
No.	331	46	42	1	7	2
						10
%	77.1 %	10.7 %	9.7 %	2.3 %		

Site and type of injury: A total of 470 fractures and 185 soft tissue injuries of the maxillofacial region was treated between the mentioned periods. Among the fractures, mandible was the most commonly fractured bone (n=125; 26.5%) followed by fractures of zygomatic complex (n=112; 23.8%) and nasal bone (n=95; 20.2%). Midface fractures constituted about 13% of the fractures. Le Fort I fractures were seen in 32

cases (6.8%), Le Fort II in 17 cases (3.6%) and Le Fort III in 12 (2.5%) cases. 34 (7.2%) cases and 15 (3.1%) cases were isolated zygomatic arch fractures and isolated orbital bone fractures respectively. There were only 9 cases of panfacial fractures, 7 cases of frontal bone fractures and 3 cases of NOE fractures. Similarly, a total of 18 cases (3.8%) of dentoalveolar fractures were recorded. **(Table 4)**

Table 4. Type of injuries

	Mandible #	ZMC/ Zyg- ma#	LeFort I #	LeFort II #	LeFort III #	Zygo- matic arch #	Nasal bone #	NOE #	Frontal bone #	Isolated orbital bone #	DA #	Pan- facial #	Soft tissue injury
No.	125	112	32	17	12	34	95	3	7	15	18	9	185
%	26.5 %	23.8 %	6.8 %	3.6 %	2.5 %	7.2 %	20.2 %	0.6 %	1.4 %	3.1 %	1.8 %		

ZMC: zygomatic complex, NOE: naso-orbito-ethmoidal, DA: dentoalveolar, #: fracture

Patterns of mandible fracture Mandible fractures were categorized into fracture at single site and combined fractures. Among single site fractures, parasymphysis was the most commonly fractured site (n=16; 12.8%) followed by symphysis (n=12; 9.6%), angle (n=10; 8.0%), condyle (n=9; 7.2%), body (n=8; 6.4%), coronoid process (n=4; 3.2%) and ramus (n=3; 2.4%).

Symphysis and condyle fractures (n=16; 12.8%) and parasymphysis and angle fractures (n=16; 12.8%) were the most common patterns of combined mandibular fractures. Combined parasymphysis and condyle fracture (n=12; 9.6%) also constituted a significant proportion. Fractures of body and angle (n=5; 4.0%) and body and condyle (n=5; 4.0%) occurred equally. **(Table 5)**

Table 5. Pattern of Mandible fracture

	S	P	B	A	R	C	Cor	S + P	S + R	S + C	S + A	S + A + C	P + C	P + A	B + A	B + C	S + P + B
No.	12	16	8	10	3	9	4	2	1	16	3	1	12	16	5	5	2
%	9.6 %	12.8 %	6.4 %	8.0 %	2.4 %	7.2 %	3.2 %	1.6 %	0.8 %	12.8 %	2.4 %	0.8 %	9.6 %	12.8 %	4.0 %	4.0 %	1.6 %

S: symphysis, P: parasymphysis, B: body, A: angle, R: ramus, C: condyle, Cor: coronoid process

Management: All of the 185 cases of facial soft tissue injuries were managed with debridement and primary repair. Parotid duct anastomosis and facial nerve repair were performed in 2 cases each.

The total number of cases treated for maxillofacial fractures was 395. Among them, 162 (41%) cases were managed with CR and remaining 233 (59%) cases

with ORIF using titanium mini- and microplates and screws. CR was mostly performed for fractures of nasal bone (n=95; 58.6%), zygomatic arch (n=30; 18.5%), mandibular condyle (n=21; 13%) and dentoalveolar fractures (n=18; 11%). **(Table 6)**

Table 6. Treatment performed

Closed reduction N=162; 41%					ORIF N=233; 59%			Soft tissue repair			
Type of injury	Nasal bone #	Zygo-matic arch #	Con-dyle #	DA # (Splint-ing)	ZMC/ Mandi-ble/ Mid-face #	Zygomat-ic arch/ Frontal bone #	Orbital floor/ Medial or-bital wall	Parotid duct	Facial nerve	Eyeball repair/ Enucle-ation	Others
No.	96	30	21	15	225	4	4	2	2	2	185

DA: dentoalveolar; ZMC: zygomatic complex

DISCUSSION

Maxillofacial fractures have been reported to represent 7.4 – 8.7% of the medical care provided in emergency centres.⁹ Factors such as the geographic location, population density, economic status and cultural differences have a significant impact on etiology and injury patterns of epidemiological investigations.^{10,11} To our knowledge, only few studies have been published regarding the incidence, etiology and patterns of maxillofacial injuries in Nepal.

In this study, 83% of the patients were male and 17% were female. The higher incidence of maxillofacial injuries among men is a universal finding in all other studies. The study by Bali et al.¹² showed similar results (81.08% male and 18.92% female). A study by Arangio et al.¹³ also showed the same results (83% male and 17% female).

The highest incidence of maxillofacial injuries were found in the age groups of 15-24 and 25-34 years which is similar to previous published reports in many countries.^{14,15} A study by Arangio et al. in the province of Latina, Italy¹³ showed that the incidence of maxillofacial injury was highest among the 18-39 year age group. People are usually very active in the second and third decade of life. They are more involved in active transport, outdoor activities, alcohol or substance abuse and interpersonal violence which may explain the increased incidence of the injuries in this age group.¹⁶⁻¹⁸

Aetiology: Our study showed that the most common cause of maxillofacial injury is the RTA (77%) which is in accordance with many other studies. The studies by Kanala et al. in Vijayawada, India¹⁴ and Subhashraj et al. in Chennai, India¹⁵ showed the RTAs as the most common cause (70% and 62% respectively). Another study by Arangio et al. in Italy¹³ also showed that the most number of maxillofacial injuries (33.7%) were caused by RTAs which is lower than in our study. The higher percentage of RTAs in Nepal might be due to the lack of strict traffic rules and lack of separate lane

for pedestrians. However, we have seen a reduction in the number of high-velocity maxillofacial injuries due to RTAs in the recent years following the imposition of strict restriction on drinking and driving in Nepal. In developed countries, RTAs are contributing less than physical assaults to the cause of maxillofacial injuries. A study by Schneider et al. in Germany¹⁹ showed that a significant percentage (45.2%) of the maxillofacial fractures was caused by interpersonal violence which is in contrary to the results of our study.

Site and type of fracture: Many studies have reported zygomatic complex fractures as the most common type of fracture in the maxillofacial region.^{13,19} In contrast to these studies, mandible was the most commonly fractured bone (26.5%) though only slightly more than zygomatic complex fracture (23.8%) in our study. Studies by Manodh et al.¹ and Kanala et al.¹⁴ also showed that mandible was the most commonly fractured bone in maxillofacial region (59.2% and 47% respectively).

Among mandibular fractures, the most common type of fracture at single site in our study is the parasymphysis fracture (12.8%) which is similar to other studies.¹⁴⁻¹⁶ The most common types of combined fractures according to our study are the combined parasymphysis and angle fracture (12.8%) and symphysis and condyle fracture (12.8%). However, studies by Subhashraj et al.¹⁵ and Bart van den Bergh et al.¹⁰ showed that the usual combination of mandible fractures was the parasymphysis and condyle fractures and body and condyle fractures respectively.

Management: In our institution, ORIF using miniplates is the preferred method of treatment for maxillofacial fractures. Closed reduction is mostly restricted to nasal bone fractures, zygomatic arch fractures and mandibular condylar head fractures. Maxillomandibular fixation using arch bars is performed only in cases of complex mandibular fractures and panfacial fractures for aiding in ORIF. Comminuted mandibular condylar head fractures

are treated with maxillomandibular elastic traction using arch bars.

CONCLUSIONS

This study has demonstrated that the major cause of maxillofacial injury treated in our institution is the road traffic accident. Male patients in the second and third decade of life are more prone to sustain maxillofacial injuries. Mandible and zygomatic complex fractures are the most common maxillofacial fractures. Most of these fractures are treated by ORIF with plates and screws.

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