Patterns of Maxillofacial Fractures in Goa

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Abstract

Background The maxillofacial skeleton is commonly fractured due to its prominent position. The pattern of maxillofacial fractures varies from one country to another. The aim of this retrospective study was to analyze the patterns of maxillofacial injuries in the state of Goa and compare the results with similar studies in India and rest of the world.

Patients and Methods The data were collected from the records of the patients who reported to the Department of Oral and Maxillofacial Surgery, Goa Dental College and Hospital between 2005 and 2010. The site of fracture, age of patient, etiology of trauma, daily and monthly variation of the fractures was analysed.

Results Records of 2,731 patients sustaining maxillofacial injury were examined. The most commonly fractured facial bone was the mandible followed by zygomatico-maxillary complex. Most fractures occurred in the third and fourth decade of life with male and female ratio of 6:1. Main etiology was road traffic accidents.

Conclusion Despite strict traffic legislation, road traffic accidents are the main cause of maxillofacial injuries.

Keywords Mandibular fractures · Mid-face fractures · Maxillofacial trauma

Introduction

The face is susceptible to injury in a modern, mobile and mechanized society hence it is more vulnerable in a crowded urban community. An understanding of maxillofacial trauma helps us to assess the patterns of trauma in different countries and to establish effective measures through which injuries can be prevented [1].

Fractures of the facial skeleton are common following assault, road traffic accidents, falls, and sporting injuries. The frequency of fractures of the mandible, zygomatic complex and maxilla has been reported in a ratio of 6:2:1. Surveys of facial injuries have shown that the etiology varies from one country to another and also within the same country depending on the prevailing socioeconomic, cultural and environmental factors [2, 3].

In the more economically advanced countries maxillofacial injuries are more often caused by interpersonal violence in the form of fights, assaults and gunshot injuries. Studies from most developing countries have shown that road crashes are the predominant cause of maxillofacial trauma.

The objective of this retrospective study was to analyze the maxillofacial injuries with special attention to the age, incidence, fractures pattern, seasonal and daily variations and compare the results with similar studies in India and rest of the world.

Patients and Methods

All patients with maxillofacial injuries, who reported to the Department of Oral and Maxillofacial Surgery, Goa Dental College and Hospital between 2005 and 2010, were included in the study. Relevant data of the patients were

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Table 1 Frequency of maxillofacial fractures

Column	Males	Females	Total
Soft tissue injuries	149	23	172
Dentoalveolar	516	35	555
Mandibular fractures	843	92	935
Middle-third of the face #	714	86	800
Panfacial #	288	29	317

fractures

Table 2 Etiology of maxillofacial fractures

Mode	Male	Female	Total	Percentage
MVA	1,817	269	2,086	76
Fall	236	24	260	10
Assault	281	34	315	12
Sports related	24	30	54	1.9
Occupational	12	4	16	0.5
	2,370	361	2,731	

retrieved from the case records. Etiologies of fractures were grouped into road traffic collisions, fall, violence and other causes that include sports accidents, occupational accidents and gunshot fractures. For this study, the mandibular fractures were classified as condylar, coronoid, angle, body, symphysis, parasymphysis and dentoalveolar fractures. In the middle-third of the face, fractures were recorded as Le Fort I, II, and III types, zygomatic bone, nasal bones and dentoalveolar. Radiographical assessment using para nasal sinus (PNS) view, submentovertex, postero-anterior, lateral oblique, reverse Towne's view, orthopantomogram (OPG) and computed tomography (CT) scan were done to confirm the clinical diagnosis.

Results

A total of 2,731 patients (2,370 men and 361 women) reported to Department of Oral and Maxillofacial Surgery, Goa Dental College and Hospital during the study period. Among them 172 had only soft tissue injuries and 555 had dentoalveolar fractures. Table 1 shows the frequency of maxillofacial fractures observed in this study. Table 2 shows the frequency of etiologic factors associated with maxillofacial fractures. The most frequent cause of injury was road traffic collision (76 %). The patients were divided in age groups, as listed in Table 3. The age of the patients ranged between 1 and 77 years. 56 % of the patients who sustained maxillofacial fractures were between 19 and 35 years. Mandibular fractures were more frequent than other injuries representing 34 % of all maxillofacial fractures as shown in Table 4. Parasymphysis was the most

Table 3 Age groups and fracture distribution

Age (years)	Male	Female	Total
1–7	38	30	68 (2.5 %)
8–18	163	44	207 (7.6 %)
19–35	1,408	127	1,535 (56.2 %)
36–40	263	37	300 (11 %)
41–59	398	78	476 (17.4 %)
>60	116	98	214 (7.8 %)
	2,386	345	2,731

Table 4 Distribution of mandibular fractures

Symphysis	117 (12 %)
Parasymphysis	312 (33 %)
Body	92 (9 %)
Angle	149 (15 %)
Condyle	292 (31 %)
Ramus	9 (0.9 %)
Coronoid	4 (0.4 %)
Total	935

Table 5 Distribution of mid-face fractures

	Male	Female	Total
Le Fort I	74	9	83
Le Fort II	137	11	148
Le Fort III	43	5	48
Zygomaticomaxillary complex #	407	52	459
Nasoorbitoethmoid #	53	9	62
	714	86	800

fractures

common mandibular fracture (33 %). The zygoma was the most frequent bone fractured in the middle-third of the face (57 %) as in Table 5.

Discussion

The incidences of maxillofacial fractures vary with the geographic region, socioeconomic status, culture and religion [3]. Maxillofacial injuries are more predominant in men than in women. In the present study, the male to female ratio was 6:1, which is comparable to most studies except for in Pakistan where the ratio was 32:1 [4] (Table 6).

The most commonly affected age group was 19–35 years, which is similar to the results of other studies [1–3, 5–11]. The least affected age group was between 1 and 7 years as their facial skeleton is more elastic and less

Table 6 Seasonal variation

Season	Number
January–March	479
April–June	763
July–September	629
October–December	760

brittle than in adults. Only 7 % of fractures were recorded in the age group 8–18 years, as they are under parental supervision and are less likely to be exposed to major injuries. As they grow older they acquire more adult anatomical and social characteristics (going out at night, interpersonal violence, the beginning of working life, and legal permission to drive cars and motorcycles after the age of 18 years), and hence become more prone to facial injuries [12].

In the present study, road traffic accidents constituted the most common cause of injury. The incidence of maxillofacial injuries due to road traffic accidents in this study is 76 %. The incidences in other parts of India were 62 % in Chennai [5], 68.3 % in Mysore [10], 87 % in Pune [9] and 80.31 % in Odhisa [13].

Assault and daily activities were reported to be the leading causes of maxillofacial trauma in developed countries and certain other studies [7, 14]. The reductions in road traffic accidents in developed countries are largely attributed to a wide range of road safety measures such as the use of seat belts, traffic calming measures and traffic law enforcement [12]. Alcohol as a causative factor is generally recognized in case reports; it being a prominent contributing factor in fights and traffic accidents [13].

Various studies have confirmed the mandible as the most commonly affected bone in isolated fractures. This preponderance could be due to the fact that the mandible is the most prominent and only movable facial bone, and hence has a greater chance of being fractured than the well-articulated mid-facial bones [15].

Similar to our study, all studies across the country, have reported the mandible as the most commonly fractured bone in the maxillofacial region. The incidence of mandibular fractures was more predominant in many countries and the main etiologic factor being road traffic accidents. In contrast, mid-face fractures were more predominant in one study [3] and relatively lower incidence of mandibular fractures were reported in another [11]. The main etiologic factors in these studies were activities of daily life and falls respectively, which explain the difference in the distribution of maxillofacial fractures based on etiology.

Fracture at the parasymphysis region was the most common site of mandibular fractures, followed by condylar fractures. This is similar to other Indian studies [5, 9, 13]

except for one study where sub condylar fractures were more common [10]. Studies with road traffic accidents as the main etiology for maxillofacial fractures have reported parasymphysis and condyle to be the common site of fracture. The mandibular body and angle fractures are common after assault [9]. The bilateral condylar fracture was the most common fracture in bilateral fracture category. The maximum combinations of fractures were symphysis with condyle followed by parasymphysis and angle.

Mid-face fractures were comparatively lower than mandibular fractures. This low incidence is related to the protection provided by the mandible and the cranium, which absorb most of the traumatic impact, as well as the fact that the mid facial bones are extremely elastic. The maxilla has been reported to be the most common site for mid-facial fractures in elderly patients because of greater degree of pneumatization of the paranasal sinuses. However, some studies have reported the zygoma as the most common site of mid-facial fractures due to its prominent location in the face [12].

Among fractures of the mid-facial region, zygomatic complex fractures were the most common, followed by Le Fort II fractures. This finding is similar to the other studies in the subcontinent except for one study, where nasal bone fractures were more common followed by zygomatic complex fractures [10].

In this study there were 317 fractures involving both the maxilla and the mandible, constituting 12 % of the total fractures. Pan facial fractures constituted 4.7 % of cases in another study in India [9].

The highest incidences of maxillofacial fractures were seen during April–June and October–December, the tourist season in Goa. In a study conducted in India the highest incidence of maxillofacial fractures occurred during September and October, the monsoon season. Increased outdoor activity in holiday destinations and decreased visibility during the monsoons are significant contributing factors for increase in road traffic accidents [5].

Most patients with maxillofacial fractures were seen late in the day, which is consistent with other studies in India. This high incidence, in excess of the expected average, suggests the effect of variations in traffic density and the influence of additional exposure risk factors, including alcohol and possibly other intoxicating agents [5, 9, 10, 13].

All maxillofacial trauma patients were treated either by open reduction or closed reduction. We have not elaborated on the treatment as it is beyond scope of this article.

Conclusion

Though traffic regulations are strict, people do not follow the rules which have lead to maxillofacial injuries.

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