Maxillofacial Injuries in Women: A Retrospective Study of 10 Years

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Abstract

Introduction Diversities exists in incidence, etiology and epidemiology of facial fractures among male and female individuals due to various reasons. Many of the epidemiological studies published during the millennium have shown male predilection. This study was carried to evaluate the etiology, patterns and distribution of facial fractures among different age groups in women.

Materials and Methods This Retrospective epidemiological study dealt with a total of 302 women with 422 fractures in maxillofacial region during a period of June 1st 2005 to May 31st 2015 at Mamata Dental College and Hospital, Khammam, Telangana, India.

Results Mean age of incidence was 31.58 years, mandibular fractures were highest (44.07 %) followed by zygomaticomaxillary complex injuries (ZMC) (20.37 %). Road traffic accidents (RTA) injuries (53.7 %) were highest, followed by assault (23.9 %) and other causes. Highest number (33.8 %) of fractures were sustained in the 3rd decade and least (0.7 %) in the 8th decade of life.

Among soft tissue injuries most commonly seen were lacerations (51 %).

Conclusion Results of this study suggest that there is an increase in the number of maxillofacial injuries in women, representing changes in the society, exposing women to similar conditions like men and increased number of working women. This study helps to identify trauma burden, assess the awareness of current preventive measures, women protection laws, for instituting new guidelines for prevention and planning health care services for women.

Keywords Facial fractures · Road traffic accidents · Assault · Women

Introduction

Maxillofacial trauma accounts for approximately 5–33 % in poly-trauma patients [1–3]. Maxillofacial region is vulnerable to injuries quite commonly due to its more prominent position in human body [4]. Etiology of maxillofacial trauma varies from one country to another, even within the same country, as well as among the male and female populations. This diversity depends on the prevailing awareness, education about road traffic rules, socioeconomic, cultural and environmental factors, so remains to be a topic of discussion for researchers [4]. These injuries are invariably associated with substantial morbidity, disfigurement and functional deficit, if not diagnosed and treated early [5].

Over the past 3–4 decades etiology of maxillofacial trauma has been changing and continues to do so [6, 7]. For instance, Motor vehicle accidents (MVA) are more common in developing countries [8–10], where as assault and other causes have outnumbered MVA in developed countries [6, 7].

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Reasons for differences in the epidemiology of facial trauma in male and female populations appear to be multifactorial, but have not yet been analyzed in depth with respect to facial trauma. Assault or interpersonal violence injuries (IPV) are more prevalent in women [11]. An analysis of 48 population based studies by World Health Organisation indicated that 10–69 % of women had been physically assaulted by intimate partner at some point of time in their life [11]. Epidemiological study regarding fractures of facial bones reflects standards of living, culture and after laws concerning wearing of safety belts and helmets.

As with other diseases and injuries periodic verification of etiology of maxillofacial trauma can aid in assessing proficiency of road safety measures, women protection acts and access to treatment. It also helps in resource allocation, planning within the health services and information about quality of care provided [12].

This retrospective study was carried out to evaluate distribution of facial fracture patterns over different parts of the face based on etiology, age and frequency in women.

Materials and Methods

This Retrospective Epidemiological study dealt with a total of 302 women patients with 422 fractures in maxillofacial region during a period of June 1st 2005–May 31st 2015 at Mamata Dental College and Hospital, Khammam, Telangana, India. Patients with other associated injuries (chest, Abdomen, long bones etc.) were excluded from the study.

Fractures were divided into mandibular, maxillary, palatal, dentoalveolar, nasal, orbital, naso-orbitoethmoid (NOE), frontal, Zygomatico maxillary complex, lefort I, lefort II, lefort III. Mandibular fractures were further divided into symphysis, parasymphysis, body, angle, ramus, condyle and coronoid. Further fractures were divided into each side as right and left.

Patients were classified based on age, etiology, site of fracture, number of fractures and influence of alcohol. Etiological factors were classified as road traffic accidents, falls from same level, falls from height, assault injuries, sports injuries and other causes (work place injuries, animal hit injuries, iatrogenic causes). Road traffic accidents (RTA) included fall from vehicles in motion, collision of vehicles (vehicle accident, motorbike accident, car accident, heavy vehicle accident) and pedestrian injuries hit by vehicles.

Qualitative variables were expressed as frequencies, and quantitative variables were presented as means and standard deviation.

Results

During the period of June 1st 2005–May 31st 2015, a total of 302 female patients with 422 facial fractures were brought to The Department of Oral and Maxillofacial Surgery among all the hospitalized patients.

Age Wise Distribution of Fractures

Patient's age ranged from 3 years to 75 years with a mean age of 31.58 ± 14.32 years and median of 30 years. Highest number (33.8 %) of fractures were sustained in the third decade of life and least (0.7 %) in the eighth decade of life (Fig. 1, Table 1).

Etiology

Fractures were classified according to etiologic factors, of which RTA injuries (53.7 %) were highest, followed by assault (23.9 %), fall (13.2 %), miscellaneous causes (7.9 %) and least frequent were due to sports (1.3 %). The distributions of fractures, fracture type according to various etiological factors are shown in Fig. 2 and Table 2.

Distribution of Number of Fractures According to Site and Side

Of the total, 100 patients were associated with soft tissue injuries. Each patient had a mean of 1.46 ± 0.75 fractures. The highest frequency of fractures caused by various reasons were seen more in the third decade life. Sporting injuries were most commonly seen in the first and second decades as shown in Table 1.

Fig. 1 Age-wise distribution of cases

Table 1 Distribution of no of fractures according to site in various age groups

Fracture type	Age (years)								Total fractures
	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	
Symphysis	0	6	10	8	0	0	0	0	24
Parasymphysis	8	4	32	12	6	4	0	0	66
Body	2	2	6	8	2	2	0	2	24
Angle	0	2	16	12	2	0	0	0	32
Ramus	0	0	0	0	0	0	0	0	0
Coronoid	0	0	0	0	0	0	0	0	0
Condyle	0	6	10	12	4	6	0	2	40
Palate	2	0	8	4	4	4	0	0	22
ZMC	0	8	32	22	14	8	2	0	86
Lefort I	0	0	4	4	2	0	0	0	10
Lefort II	0	4	10	2	0	0	0	0	16
Lefort III	0	0	0	0	0	0	0	0	0
Nasal	2	0	2	4	2	0	0	0	10
Orbit	2	0	2	4	4	0	0	0	12
Dentoalveolar	2	2	10	0	0	0	0	0	14
Tmj Dislocation	0	0	2	0	0	0	0	0	2
Maxilla	0	0	2	2	0	0	0	0	4
NOE	0	4	0	2	2	0	0	0	8
Frontal	16	4	4	16	6	4	2	0	52
Total	34	42	150	112	48	28	4	4	422

Fig. 2 Etiology-wise distribution of cases

Fracture Site

Of all facial bones, mandibular fractures were highest (44.07 %) followed by zygomatic bones (20.37 %) and least were NOE fractures (1.89 %) as shown in Table 1. There was no alleged history of alcohol influence among our study groups. The distributions of fractures based on etiology in various age groups and distribution of fractures in bilateral regions of face (right side is more involved) are shown in Figs. 3 and 4. Of all the mandibular fractures, parasymphysis (66) fractures were highest in number followed by condyle (40) and angle (32) fractures as shown in Tables 1 and 2.

Table 2 Fracture type in different etiology

Fracture type	Etiology				
	RTA	Assault	Others	Falls	Sports
Symphysis	22	2	0	0	0
Parasymphysis	36	22	2	4	2
Body	8	8	2	6	0
Angle	14	12	2	4	0
Ramus	0	0	0	0	0
Coronoid	0	0	0	0	0
Condyle	28	4	2	6	0
Palate	6	4	2	10	0
ZMC	50	20	10	6	0
Lefort I	4	2	2	2	0
Lefort II	12	4	0	0	0
Lefort III	0	0	0	0	0
Nasal	8	2	0	0	0
Orbit	4	4	2	2	0
Dentoalveolar	8	4	0	0	2
Tmj Dislocation	2	0	0	0	0
Maxilla	2	2	0	0	0
NOE	4	4	0	0	0
Frontal	24	14	6	8	0

Fig. 3 Age and etiology wise distribution of cases **Fig. 4** Distribution of fractures in bilateral regions of face

Soft Tissue Injuries

Among soft tissue injuries most commonly seen include lacerations (51 %) followed by abrasions (32 %) and contusions (17 %).

Discussion

Facial trauma is one of the significant components of multiple traumas caused by road traffic accidents, falls and assault injuries [13]. Much of the epidemiological studies published during the millennium have shown male predilection, with study populations ranging from 68 to 91.7 % male patients [9, 13]. This tendency has led to a lack of detailed knowledge on maxillofacial trauma in women, which is generally studied with specific reference to violence-related injuries [14–16].

This epidemiological study was performed at the Mamata Dental College and Hospital, Khammam which is

a level I trauma centre situated at district headquarters with a population of more than 2.5 million. Mean age of fracture incidence was 31.58 ± 14.32 years and median was 30 years, which was less than that of Roccia et al. [17] (43 years) and was slightly higher compared with that of Gassner et al. [13] (25.8 years). Highest percentage (33.8 %) of maxillofacial injuries occurred in the age group of 21–30 years, which was on par with other studies of facial fractures (30 %). Mean age of incidence lies generally in the early third decade of life as individuals are more active and do productive works [18, 19].

RTAs are most frequent cause of maxillofacial injury [20, 21]. Current epidemiological studies state that there is a declining trend of maxillofacial injury due to RTAs mainly in developed countries [6, 7, 22]. Better road conditions, car safety features such as airbags, anti lock breaking system, increased traffic control measures and the implementation of laws related to drunk and driving, speed limits and seatbelts individually or combination of these might have lead to the above trend [6, 23]. Some women

referred to the department might not have revealed the true cause of injury as assault or domestic violence and claiming instead the cause as fall or RTA. This might probably resulted in over estimated percentage of falls and RTAs [16, 24].

RTAs accounted for 53.7 % of injuries in our study, which is higher than that reported by Roccia et al. (38.7 %) [17] and Thorn et al. [25] (36 %), representing the changes in the society, exposing women to similar conditions like men and an increased number of working women. RTA was the leading cause of injuries in all age groups (162/302 patients) except in elderly where it was equal with other causes. Hussain et al. [26] reported that elderly are more likely to be injured as pedestrians, owing to poor proprioception, weakness, tremor, impaired lighting reflexes, and failing vision. Contrary to reports by Arosarena et al. [15] and Huang et al. [27] our series of patients showed approximately equal involvement of the lower and middle third of the face in 17–60 age group (42.1 and 41.4 % respectively).

Assault (23.9 %) was Second most common cause of facial injury in our study, which is higher than that reported by Zachariades et al. [14] but much lower than that described by Huang et al. [27] 35.5 %. In our study, assault injuries were concentrated in the 17–60 age group. Assaultants and victim were linked up in 87 % of the cases, according to Thorn et al. [25] it was more than 50 %. This undoubtedly raises the issue of domestic and intimate partner violence [15, 16]. When a man assaults a woman, he frequently uses his hands (89 %). Fractures of left side middle third of face are more common in assaults, specifically when the aggressor is right-handed [14, 28]. In contrast to the data by Arosarena et al. [15], few nasal fractures (2.37 %) were observed among our patients.

The third most common cause of facial injury in our study was falls (13.2 %) which is in contrast to Roccia et al. (43 %) [22]. It is not uncommon, that falls occurring substantially following domestic accidents are the leading cause of facial injury in the elderly [18, 26, 29]. This type of impact, occurring frequently with the ground, produced injuries of the lower third of the face in 41.6 % of the cases. Bigger numbers of fractures were seen in frontal bone (16.6 %). Even in the 1–10 age group, falls were 2nd most frequent cause followed by RTAs. The incidence of facial fractures in women above 60 years age group was 9.9 % which was on par with that reported by various authors (10 %) [18, 19].

Sports injuries (1.3 %) accounted for least etiological factor producing facial trauma, reflecting the minimal measure of encouragement given to the females in this peculiar field of activity [17]. Relatively smaller number of females exercise and particularly choose nonviolent and nonaggressive sports, including ballet, swimming, diving,

water polo and volleyball [30]. This observation was different from studies conducted in developed countries by Roccia et al. [17] (6.3 %) and Gassner et al. [13] (31 %). Encouragement by media for active involvement of women in sports for attaining benefits in health and beauty have favoured to this rise in contrast with developing nations.

Miscellaneous causes accounted for 7.9 %, of which 10 patients were injured due to animal hit, 4 machinery injuries at work place, 2 iatrogenic followed by extraction of tooth and 8 due to fall of objects and cement wall.

In our small paediatric series of 36 children, RTAs were major cause (65 %) of injury followed by fall, sports and other causes which was similar to that of other studies. Fractures of the lower third of the face were more frequent than middle and upper thirds of face. Falls generally occurred outdoors while walking on road or indoors from heights (Bed, stairs or wall). Paediatric injuries were more prevalent in children over 6 years of age. This may have been due to acquaintance of more independence to children after the age of 5 [31, 32].

The mandible was the most susceptible site of the facial skeleton to fracture (44.07 %) that was in contrast to study of Roccia et al. [17]. In contrast to study by Adebayo et al. [33] in which body fractures (51 %) are dominant, our study revealed the highest frequency of fractures in the parasymphysis region (right, 48.48 %; left, 48.48 %). This is followed by condylar fractures (21.5 %) (right, 45 %; left, 30 %), which is far less than that reported in the study by Marker et al. [34] (41 %). Assault is considered to be the contributing factor in this variation. Nevertheless, Ellis et al. [35] stated that motor vehicle accidents and fall injuries contribute to one-third of fractures compared to assaults that contribute for less than one-fourth. RTAs and fall injuries (66.9 %) were higher compared with assaults (23.2 %) in our study also. Angle fractures account for 17.2 %, which was less than the number revealed in study conducted by Ogundare [36] (36.32 %) in which assaults were more common during which aggressors try to reach this region. In cases of panfacial trauma, a combination of midfacial fractures and mandibular fractures account for 12.5 % and zygomatic complex and mandibular fractures account for 50 %. This is far less than the number revealed in studied conducted by Obuekwe et al. [37]. The compounding of the midface and upper face account for 12.5 %.

Complications are inevitable in any procedure. We haven't noticed significant number of complications in our cases. There was a correlation between etiology and post-operative complications. RTAs were more commonly associated with compound, complex and comminuted fractures. Wound dehiscence, infections, malocclusions were noticed in 4 % of total RTA cases (53.7 %). Delayed healing, non union and fibrous union were noticed in 2 %

of Fall injuries (13.2 %). As they were more common in older age group who generally have poor wound healing capacity, decreased vascularity and osteoporotic changes especially in women. Postoperative complications were minimal (1 %) in assault injuries (23.9 %) when compared to fall and RTAs as there is less possibility of complex and compound fractures.

Conclusion

The benefits of epidemiological studies in maxillofacial traumatology is widely recognized. This retrospective analysis of maxillofacial injuries in females has shown that about one-third of the cases were in age group of 21–30 years and with the mean age 31.58 years. Mandibular region is the most prone area followed by mid-face and upper part of face. Periodical studies on maxillofacial trauma should be planned prospectively, so that continuous change in pattern and distribution of maxillofacial injuries can be updated.

Compliance with Ethical Standards

Conflict of interest The authors declares that they have no conflicts of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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