An Analysis of Etiologies, Patterns and Treatment Modalities of Fracture Mandible

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Etiologies of maxillofacial trauma, and thus the pattern of fractures, differ in various setups depending upon socioeconomic status, life style, type of industry, and out door activities. All these factors further dictate on management of these cases. Record of 457 cases of fracture mandible was reviewed to analyze the incidence, pattern of fractures and various treatment modalities. It included 384 males and 73 females with second and third decades of life being most commonly involved age subgroups. Isolated mandible fractures were noted in 345 (75.49%) cases while in rest of the 112 (24.51%) cases either zygomatic bone or maxilla or both of them were also found involved. Most common etiology was road traffic accidents recorded in 230 (50.33%) cases, followed by fall from height in 114 cases. Body of mandible was the most commonly effected area, i.e. 177 (38.73%) cases, followed by parasymphysis region in 139 (30.42%) cases. A total of 317 (69.37%) cases were treated with closed reduction and intermaxillary fixation and 108 (23.63%) cases had open reduction and fixation with interosseous wiring or miniplates.
Key words: Fractures, Mandibular fractures, Maxillofacial trauma. Facial skeletal injuries

Maxillofacial trauma has multiple etiologies which keep on changing with changes in the life style, process of industrialization and modernization. Various social cultures have their own patterns of injuries.[1] As a result, causes and incidence of maxillofacial trauma vary from one country to another.[2] Therefore it is quite evident that various analyses of the incidence, etiologies, and pattern of injuries may help to suggest measures to reduce the trauma, find out the most appropriate treatment modalities, and suggest any changes in the management of these cases[3].

In this paper, etiologies, various age groups, patterns of injuries and treatment modalities being utilized for maxillofacial trauma are analyzed and being compared with reports from other centers.

Material and methods:

This retrospective, observational study was carried out at The Department of Oral and Maxillofacial Surgery, Mayo Hospital Lahore. Record of all the cases presenting with fracture mandible during the period from Jan 2001 to Dec 2002 was collected. The available record was then fed in a proforma mentioning age, sex of the patient, determination of the side involved, bones involved, number of fractures noted in the mandible and etiology of the incident. The fracture was confirmed radiologically and on the operative findings.

Results:

In this study, 457 cases of fracture mandible that presented for management were analyzed. This total included 384 (84.03%) males and 73 (15.97%) females. Youngest case in the series was 2 years of age while the eldest was 70 years of age. It was third decade of life where most of the male patients i.e., 116 (25.38%) cases came with fracture mandible while in female patients it was first decade of life where a maximum of 31 (6.78%) cases were registered. On the whole it was third decade of life in which majority of the cases presented. A total of 125 (27.35%) cases were noted in this decade followed by the second decade with 120 (26.26%) cases. Table 1

In this study, a total of 345 (75.49%) patients presented with fracture mandible alone while rest of 112 (24.51%) cases had fractures of zygoma and maxilla as well. In 61 (13.35%) cases mandible was fractured in combination with maxilla, in 29 (6.35%) cases it had simultaneous involvement of zygoma while in rest of 22 (4.81%) cases, all these three bones were found involved. Table 2

The most common etiology was road traffic accidents which were recorded in 230 (50.33%) cases. In this category 101 (22%) cases were the result of motorcycle accidents. This figure might have gone up but in 24 cases of road traffic accidents the record did not show the type of vehicle involved in the accident. Second most common cause in the series was fall from height in 114 (24.95%) patients, followed by fire arm injury in 50 (10.94%) cases and interpersonal violence in 29 (6.35%) cases. Industrial and household trauma was noted in 26 (5.68%) cases. Table 3

Body region of mandible was involved in most of the cases i.e., in 177(38.73%) patients. Left side involvement was found in 82 cases, right side in other 73 cases while bilateral involvement was found in 22 cases. Next common area was parasymphysis, which was involved in 139 (30.42%) cases. Involvement was on left side in 76 cases, on right side in 57 cases and bilateral in 6 cases. Subcondylar area was the third most common site involved with 32 cases on each side and 34 cases had bilateral involvement making a total of 98 (21.44%) cases. Angle area was involved in 92 (20.13%) cases, 45 were left sided, 41 on right side and 8 had bilateral involvement. In 36

(7.885) cases fracture line passed through symphysis, other 12 cases had fracture in ramus. There were 32 (7%) cases with dentoalveolar fractures. Table 4

Mandibulomaxillary fixation was the most commonly utilized modality to immobilize these fractures after close reduction in 317 (69.37%) cases. Interosseous wiring was carried out in 86 (18.82%) cases while plating was done in only 22 (4.81%) cases. Arch bar fixation was done in 95 (20.97%) cases. Treatment was conservative in 20 (4.38%) cases while 12 of the cases left against medical advice. Table 5.

Table 1: Age distribution.

Age	Male	Female	Total	%age
1-10	056	31	87	1904
11-20	105	15	120	2626
21-30	116	09	125	2735
31-40	55	06	61	1335
41-50	33	06	36	788
51-60	15	04	19	416
61-70	07	02	09	196
Total	384	73	457	

Table 2: Bone involvement. (n=457)

Bone	Total	%age
Mandible	345	75.49
Mandible+ maxilla	61	13.35
Mandible + Zygoma	29	6.35
Mandible + zygoma + maxilla	22	4.81
Total	457	

Table 3. Etiologies (n=457)

Etiology	Total	%age
Road traffic accident	230	50.33
Fall from height	114	24.95
Free arm injury	50	10.94
Interpersonal violence	29	6.35
Trauma	26	5.68
Others	8	1.75

Table 4: Fractures sight (n-457)

Area	Right	Left	Bi-lateral	Total	%age
Body	73	82	22	177	38.73
Parasymphysis	57	76	6	139	30.42
Subcondylar	32	32	34	98	21.44
Angle	41	45	8	92	20.13
Ramus	5	6	1	12	02.6
Symphysis				32	7%

Table 5: Modalities of treatment

Modality	Total	%age
MMF	317	69.37
Arch bar	95	20.79
Interosseous wiring	86	18.82
Plating	22	4.81
Conservative	20	4.38

Discussion:

Maxillofacial trauma involves the most prominent part of the body. While dealing this trauma, both, form and function of the area need to be addressed. Etiologies of the maxillofacial trauma are multiple and keep on changing parallel to the changes in the life style, social cultures, industrialization and modernization. Social patterns and legislative changes, such as the 'drinking driving' and 'seat belt' laws, affect injury statistics. [4]

Male dominant pattern is almost universal as is evident in this study. Male to female ratio in this study was 5:1. Whereas this ratio is consistent with that of 6:1 reported from Islamabad [5], it is quite low as compared to the ratio of 9:1 reported in another study from Lahore.[3] Similarly another study from Balochistan [6] has reported this ratio as high as 32:1. This once again reflects the influence of social patterns as in Balochistan women are not much exposed to the out door activities and hence the ratio of male population involved rises immediately.

Most common age group involved in this injury, 125 (27.35%) cases, was in third decade of life followed by 120 (26.26%) cases in second decade of their life. This again is consistent with the findings in most of the studies, as this is the age in which one is more mobile, active and involved in out door activities. [2, 3, 5.]

The most alarming aspect was involvement of 87 (19.04%) children below ten years of age. It is these cases in which poor management may lead to temporomandibular joint ankylosis. It has been recognized in one of the studies that previous trauma in the condylar region is the most common cause of temporomandibular joint ankylosis in our setup[7].

Like most of the countries[2,8,9], road traffic accidents were the most common cause of maxillofacial trauma in this series with 230 (50.33%) cases. At least three of the other reports from Pakistan also speak this etiology responsible for 48%-56% of the maxillofacial trauma[3,5,10]. It is very important that about 43.91% of these incidents involved motorcyclists in one way or other. In the light of previous studies it can be suggested here that certain precautionary measures, like compulsory wearing of helmets may help to reduce this number[4].

Second most common cause of maxillofacial trauma in this series was fall from height and a total of 114 (24.95%) cases presented in this category. This was found most common etiology of maxillofacial trauma in children below ten years of age as 68 (57%) out of 120 children presented with history of fall.

According to study by Thoren[11], the decisive age limit seems to be 10 years. After this age the etiologies and fracture types become similar to those occurring in young adults.

This study agrees with other reports that road traffic accidents remain the commonest cause in developing countries while assault is emerging as commonest cause in the developed countries.[12, 13] In this study there were 79

(17.29%) cases of assault including 50 (10.94%) cases of fire arm injuries and 29 (6.35%) that of interpersonal violence.

According to this study, most common location of the fracture was body in 177 (38.73%) cases followed by 139 (30.42%) cases having fracture line in parasymphysis area. Condylar region was the third most common site with 92 (20.13%) patients while 98 (21.44%) cases had involvement of the angle region. This is contradictory to other report from Lahore which declares parasymphysis region as most commonly fractured site followed by condylar and subcondylar region.[3] Other studies showed condylar region[2], parasymphysis[14], and angle[15,16] as commonest sites of fractures.

Different treatment modalities are utilized to treat these fractures. Ideal treatment method depends not only on the fracture type and localization but also the surgeon's experience and preference.[14] It can be added that it further depends upon the economical status of the population.[6]

In the present study, a total of 317 (69.37%) cases had closed reduction and fixation was done with intermaxillary fixation. Open reduction was done in 108 (23.63%) cases and 86 (18.82%) of them had interosseous wiring while only 22 (4.81%) cases had plating done. Treatment was conservative in 20 (4.38%) cases.

In this regard, study agrees with the views of Zia ul Haq et al [6] where 50% of the cases were treated with simple MMF. It is quite contradictory to the conclusion reached by Shahid et al[5] which suggests that these fractures must be treated with open reduction and miniplate rigid fixation. Although the obvious advantage of rigid miniplate osteosynthesis is the avoidance of MMF, [17] but MMF is still a widely used treatment modality.[18] Reports also suggest that mini plates should not be used in infected fractures or in delayed treatments[19].

Brown et al have audited the use of MMF compared with miniplate osteosynthesis and found little difference between over all costs or clinical variables[20]. Conservative treatment of a mandibular fracture may include the prescription of analgesics and antibiotics and perhaps splint support of the arch[21]. This study included 20 cases which were treated conservatively.

Maxillofacial trauma may lead to extensive injury to this vital area and at time both the skeletal and soft tissue defects have to be addressed. High velocity injuries inflict predictably greater damage to bone and soft tissue, with massive disruption of supporting structures.[22] It is here that a team work is required and role of a reconstructive surgeon begins. Soft tissue injuries require meticulous debridements, and removal of any foreign particles, dead or devitalized part. Soft tissue injures with doubtful viability in this area are dealt conservatively as one cannot afford even minimal loss of soft tissue. It is important that both the soft tissue and skeletal elements are dealt simultaneously to get the desired results.

Conclusion:

Maxillofacial trauma is common in the youth and road traffic accidents are the most common etiology. This trauma can be significantly reduced by simple measures like compulsory seat belts and wearing helmet. Management of this trauma in children should focus on prevention of future temporomandibular joint ankylosis. Firearm injuries of the region need to be dealt by a team approach.

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