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PATTERNS & INCIDENCE OF MANDIBULAR FRACTURES: AN EPIDEMIOLOGICAL STUDY

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ABSTRACT:

Aim: The purpose of our research was to study various patterns as well as incidence of mandibular population amongst Indian population.

Methodology: The medical records of 1842 patients with mandibular fractures treated over a 3 years period were identified and analyzed supported age, sex, mechanism of trauma, seasonal variation, drug/alcohol abuse, number and anatomic location Results: 464 Patients who were in age range of 7 to 89 years participated in the study. The highest incidence (37.5%) of mandibular fractures was in the age group of 21–30 years. Most prominent cause for mandibular fracture was due to road traffic accidents which accounted for 68.8 % of all cases followed by free falls as well as assault cases. It was observed that parasymphyseal fracture was the most common site affected in mandible and the least affected was the angle of mandible. Mandibular angle fractures were found mostly to be related to assault victims.

Conclusion: The mechanism of injury correlates significantly with the anatomic location of fracture and knowledge of those associations should guide the surgeons for appropriate and timely management.

Keywords Etiology, incidence, India, location, mandibular fracture

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INTRODUCTION

The strenuous pace of recent life with high speed travel also as an increasingly violent and dictatorial society has made facial trauma, a sort of venereal disease from which no one is immune. There are changes in patterns of facial injuries, extent, clinical features, then forth leading to mild-to-massive disfigurement of maxillofacial skeleton alongside functional loss. Apart from road traffic accidents (RTA), direct/indirect trauma due to sports activities etc was also observed. Occasionally, it's going to even be secondary to certain disease entities like cystic lesion, neoplasms, and metabolic diseases.[1] The fracture is defined as -breach within the continuity of bone.[2] Facial area is one of the most frequently injured areas of the body, accounting for 23%–97% of all facial fractures.[3]

The mandible is a exceptional bone having a multifaceted role in defining the beauty of the face as well as establishing ideal occlusion. Because of the prominent position of the mandible, mandibular fractures are the foremost common fractures of the facial skeleton. It has been described that fractures of the mandible consists of 36%–59% of all fractures of the maxillofacial area.[4] Even being the hardest bone structure in the body, it is still the tenth most often injured bone in the body[5] and second to nasal bone fractures,[6] and it is fractured two or three times more often than other facial bones.[7] Maltreated mandibular fractures leads to a deranged functional and esthetic outcomes like distorted facial architecture, malocclusion, temporomandibular joint disorders (TMJDs), and osteomyelitis. The age distribution of people sustaining craniomaxillofacial injuries differs from one country to a different. Most commonly, it has been observed that there is a high male-to-female ratio amidst craniomaxillofacial injury victims. Recently there has been equal incidence of fractures in both the genders.[5] Bone fractures at site of tensile strain, since their resistance to compressive forces is greater.[8] Areas that exhibit weakness include the area lateral to the mental protuberance, mental foramen, mandibular angle, and the condylar neck.[9] The thickening on the inner aspect of the condylar neck or crest of the neck apparently acts as a main buttress of the mandible because it transmits pressure to the TMJ and the base of the skull. Hagan and Huelke stated the following point related to pattern of mandibular fractures -

(1) Condyle region is the most vulnerable site for fracture.
(2) Angle is the second most common site of fracture.
(3) But if just one fracture is there, then angle is that the commonest site of fracture than condyle.
(4) Multiple fractures are more common than single (ratio, 2 : 1), 4.80% of the patients were dentate.

Clinical examination could also be sufficient to form a provisional diagnosis of a fracture, but the presence of edema, usually prevents an accurate assessment of the underlying skeletal damage. With maxillofacial radiography, at least two radiographs at right angles to each other are recommended. As indirect fractures of the mandible are frequently seen, it is vital to record radiographs for jaw in each trauma case.[10] Despite many reports about the incidence, diagnosis, and treatment of mandibular fracture, there is limited there is limited knowledge about the specific type or pattern of mandibular fractures in Indian and subcontinental countries.

AIM OF THE STUDY

The purpose of our research was to study various patterns as well as incidence of mandibular population amongst Indian population.

METHODOLOGY

This study is a retrospective analysis of medical records available with different secondary and tertiary trauma centers located at various metropolitan cities of India. The medical records of patients with facial trauma treated over the last 3 years (January 2018 to January 2021) were retrieved and reviewed. A total of three principal investigators, who were maxillofacial surgeons as well; carried out this study so as to minimize bias. A total of 1842 facial trauma cases were identified, of that 464 were having some sort of mandibular fracture. The complete medical records of those 464 patients were obtained viz., history , clinical notes, radiographs, photographs, if any, surgical notes etc., Then data were analyzed supported the following parameters-age, and sex, mechanism of trauma, seasonal variation, drug/alcohol abuse at the time of trauma, number and anatomic location of fractures with the help of descriptive statistical measures as well as chi square test for inter group variability analysis utilizing SPSS 25.0.

RESULTS

Out of the 1842 patients suffering from panfacial injury, 464 patients (25%) recorded mandibular fractures with their age ranging from 7 to 89 years and there have been 343 men (79.1%) and 91 women (20.9%). Male: Female was 3.7:1. The highest incidence of mandibular trauma was in the age group of 21–30 years (37.5%), followed by the age group of 31–40 (22.4%).(Table 1)

The main cause was RTA (68%) particularly in those travelling by motorcycles followed by falls (17%), assaults (11%) and miscellaneous (4%) which included animal bites, gunshot injuries, sports, pathological fractures etc.

The total number of mandibular fractures found in our study amongst 464 patients was 751, almost 1.6 fractures/ mandible. The most common mandibular fracture was found in the location of parasymphysis region (203, 39.8%), and the next most preferred location was shared by condyle and angle with equal distribution (135, 124 respectively) at 18% for both. Rather astonishingly dentoalveolar fractures were amongst the least common fractures (49, 6%).The parasymphysis fractures was found to be most commonly affected area in RTAs (203, 39.8%), followed by free fall resulting in maximum fractures at the condylar region (60, 46%) and was statistically significant as well (p=0.096). (Table 3)Mandibular angle fractures were frequently seen in assault cases (30, 36%), although symphysis and condyle fractures were infrequent. Of the total number of mandibular fractures, 204 (44.5%) patients had only one fracture, while 230 (49.5%) had two fractures and 30 (6%) had three fractures. There was history of drug/alcohol abuse in 36% of total patients of which 98% were males.

Table 1- Distribution of mandibular fracture according to age

Age	Number (%)
0-10	21 (4.5)
11-20	83 (17.8)
21-30	174 (37.5)
31-40	104 (22.4)
41-50	33 (7.1)
51-60	24 (5.1)

61-70	14 (3)
>70	11 (2)
Total	464

Table 2- Distribution of location of mandibular fractures according to aetiology

Site of Fracture	Etiology				
	RTA	Assault	Fall	Misc	Total
Symphysis	64 (12.5%)	05 (6%)	17 (13%)	02 (6.8%)	88 (11.7%)
Parasymphysis	203 (39.8%)	17 (20.4%)	14 (10%)	06 (20.6%)	240 (32%)
Condyle	69 (13.5%)	03 (3.6%)	60 (46%)	03 (10.3%)	135 (18%)
Angle	72 (14%)	30 (36%)	16 (12.0%)	06 (20.6%)	134 (18%)
Body	52 (10%)	10 (12%)	03 (2.3%)	02 (6.8%)	67 (9%)
Ramus	26 (5%)	07 (8.4%)	06 (4.6%)	03 (10.3%)	42 (5.5%)
Coronoid	03 (0.5%)	-	02 (1.5%)	01 (3.4%)	06 (0.8%)
Dentoalveolar	22 (4.3%)	11 (13.2%)	10 (7.8%)	06 (20.6%)	49 (6%)

Table 3-Statistical Association of site of mandibular fractures with aetiology

Site	Chi square value ($\chi 2$)	P value
Symphysis	0.193	0.660
Parasymphysis	0.017	0.096
Condyle	0.551	0.458
Angle	0.321	0.571
Body	0.321	0.571
Ramus	0.551	0.458
Coronoid	1.851	0.174
Dentoalveolar	1.851	0.174

$p<0.05$= significant

DISCUSSION

Mandible is the strongest facial bone and is second most commonly involved bone in maxillofacial trauma after nasal bone accounts for 15.5-59% of all facial bone fractures.[11] Most common age group affected with mandibular fractures is 21-30 years with male preponderance and the most common cause detected is road traffic accidents and impatient driving, driving under the influence of alcohol, failure to wear helmets, and poor road maintenance include some of the attributing factors.[12,13] There is variability in the pattern of mandibular fractures resulting from different causes of injury, such as road traffic accidents (RTAs), assaults and falls.[14] Parasymphysis is the most common site involved.[15,16] This is consistent with the report of Adi et al.17 When multiple area of fractures was considered, it was found that parasymphysis and condyle were the commonest grouping which associates with the study carried out by Natu et al[18] and were conflicting to the study carried out by Dongas and Hall[19] in which parasymphysis and angle is the most common combination. It is also contrary to the study by Ogundare et al. who reported commonest combination as body and angle. The variable distribution of fractures according to etiology may be related to factors associated with the way the injury occurs.[20] The direction and magnitude of force, the nature of object resulting in impact, and should be the characteristics of the host bone are

liable for the numerous clinical outcomes. Knowledge of the direction of force can assist the clinician to identify the associated fractures better. An anterior blow directed to the chin may result in bilateral condylar fracture and an angled blow to the parasymphysis may cause a contralateral condylar or angle fracture.[21]
Multiple modalities of treatment are prevalent to manage mandibular fractures. It includes conservative methods with soft diet, intermaxillary fixation, open reduction and internal fixation, closed treatment with external fixation and treatment with Kirschner wire.[22] Most commonly used is open reduction and internal fixation in which the fractured fragment is anatomically reduced and fixed. Closed reduction treatment is carried out mainly in cases of condylar fractures as well as in cases of medically compromised patients.
As Bither et al. described, various causes for augmented RTAs in India mostly are associated with socioeconomic reasons such as meagre traffic sense of the drivers and pedestrians as well as poor road conditions, inadequate enforcement of road safety regulation and regulation , reluctance to use helmets, use of illicit drugs, decreasing tolerance, and increasing personal competitions among young, could be the positive explanations in particular in this part of the country.[21]

CONCLUSION

Epidemiological studies are important to know the prevalence, to identify particular aetiology and to formulate ideal preventive measures. Also, multiple fractures are becoming more prevalent, so it is important for the clinician to do thorough examination not to miss out multiple findings and to provide appropriate care.

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