

## INCIDENCE, AETIOLOGY AND PATTERN OF MANDIBULAR FRACTURES IN PONDICHERRY

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### ABSTRACT

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#### BACKGROUND

The mandible is the second most commonly fractured part of the maxillofacial region after nasal bones. The incidence, etiology and pattern of mandibular fractures vary considerably among the different study population, there is a need to evaluate aspects of mandibular trauma in Pondicherry. This study was undertaken to evaluate the results of mandibular fractures treated in a population of Pondicherry.

#### PATIENT AND METHOD

A total of sixty nine patients treated for mandibular fractures at the Department Of Dentistry, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry from January 2011 to December 2014 were retrospectively evaluated. The variables analyzed in the study were gender, age, aetiology, fracture site, method of treatment and complications.

#### RESULTS

This study included 106 fractures in 69 patients. The ratio of male to female was 16:1. The highest prevalence of fracture occurred in 21 to 30 years (37.7%) and the minimum in patients over 61 years old. The most common cause of fractures were road traffic accident (RTA, 56.5%) followed by fall. In our study most commonly reported fracture site was parasymphysis (37.7%), followed by angle (19.8%) and condyle (19.8%). Mandibular fractures were generally treated by Open Reduction and Internal Fixation (ORIF) in 76.4% of the patients.

#### CONCLUSION

The retrospective study of mandibular fractures has shown, road traffic accidents are main cause of fracture and young men in their 20s are predominantly affected.

#### KEYWORDS

Mandibular Fractures, Road Traffic Accidents, Pondicherry.

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#### INTRODUCTION

The mandible is the only facial bone that has mobility and second most frequently fractured part of the facial skeleton because of its prominence and location.<sup>1,2</sup> Mandibular bone fractures constitute a substantial proportion of facial trauma cases, which consisted of 36% to 59% of all maxillofacial fractures.<sup>3</sup> The epidemiological studies related to mandible fractures are difficult to evaluate and vary among countries and mostly depending on demographic, socioeconomic, cultural and environmental factors. The main causes of mandible fractures are Road Traffic Accidents (RTA), assault, fall, sports related injuries and industrial trauma. The literature study on mandibular fractures shown RTA is the most frequent etiologic factor in developing countries and assault is the most common cause of fractures in developed countries. The management of mandibular fractures can be very complex which requires early diagnosis and intervention if treated incorrectly, significant functional and aesthetic sequel may happen which includes malocclusion, temporomandibular joint disorders and facial asymmetry.<sup>4</sup>

This retrospective study was performed to evaluate the incidence, etiology and pattern of mandible fractures among different age groups treated at Sri Manakula Vinayagar Medical College and Hospital, Pondicherry, India from January 2011 to December 2014.

#### Patient and Method

A total of sixty nine patients who sustained mandibular fractures and were admitted in the Department of Dentistry, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry, India, from January 2011 to December 2014 were selected for this retrospective study. After obtaining permission from the Research Ethics Committee of the institution medical records of all the patients included in the study were analyzed. A standardized maxillofacial trauma proforma was used to record the data in relation to age, gender, etiology, anatomic site of fracture, unilateral or bilateral fractures, method of treatment and complications.

The mandible fractures were classified based on the anatomic location such as symphysis, parasymphysis, body, angle, ramus, condyle, coronoid and dentoalveolar process. Patients were divided in to seven age groups: 0 to 10 year group, 11 to 20 year group, 21 to 30 year group, 31 to 40 year group, 41 to 50 year group, 51 to 60 year group, and 61 above year group. Data obtained were analyzed by simple descriptive statistics.

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## RESULTS

### Age and Gender Distribution

A total of sixty nine patients with one hundred and six mandible fractures were analyzed for the study in which 65 (94.2%) were male and 4 (5.8%) were female. The ratio of male to female is 16:1. The age of the patients ranged from 8 to 61 years with a mean age of 31.8. The highest prevalence of fracture occurred in the age group of 21 to 30 years (26/69, 37.7%) followed by 11 to 20 years group (13/69, 18.8%). The age group of >61 years reported least in this study (1/69, 1.4%). Around three-fourth of patients (74%) were in the age range of 11 to 40 years Table 1.

### Etiology

The mandibular fractures were predominantly caused by RTAs which consisted of (39/69, 56.5%). The second common cause was fall (16/69, 23.3%) followed by assault (11/69, 15.9%). RTA was the main cause of trauma in all the age group except 0 to 10 years and 51 to 60 years. Fall was the main cause of injury in 0 to 10 years (3/3, 100%) and 51 to 60 years (4/6, 66.7%). RTA remains the predominant cause of mandibular fractures in 21 to 30 years (18/26, 69.2%), 11 to 20 years (8/13, 61.5%) and 31 to 40 years (7/12, 58.3%; Table 1).

### Distribution of Fracture Site and Pattern

The total number of mandible fractures reported in the study was 106. 53.6% patients had a unilateral mandibular fracture while 46.4% patients had bilateral fractures. The commonest site of mandible fracture reported in this study was parasymphysis (40/106, 37.7%) followed by angle (21/106, 19.8%), condyle (21/106, 19.8%), body (14/106, 13.2%), symphysis (8/106, 7.5%). Least common fracture in the study was dentoalveolar fracture accounting (2/106, 1.9%; Table 2). Ramus and coronoid fractures were not reported in our study population. In unilateral mandible fractures, parasymphysis (12/37, 32.4%) was most common followed by body (9/37, 24.3%). Among patients having bilateral mandible fractures, fracture of parasymphysis with angle (3/32, 40.6%) was common followed by fracture of parasymphysis with condyle (9/32, 28.1%; Table 3). The parasymphysis fracture was the most common fracture irrespective of the cause of trauma. Distribution of mandibular fractures in relation to the site of fracture, etiology and gender differences is shown in Table 4.

### Treatment Modalities and Complications

Treatment modalities performed is shown in Table 5. ORIF by miniplate osteosynthesis was the main treatment modality in this study accounting to (81, 76.4%), followed by intermaxillary fixation (18, 17.0%). The most common complication encountered was surgical site infection (5, 7.2%), other complications reported were paresthesia (2, 2.8%) and scar (2, 2.8%).

## DISCUSSION

The maxillofacial region is the most commonly injured areas of the body because it is the most prominent part of the body and unprotected. Mandibular bone fracture constitutes a substantial proportion of the maxillofacial fractures accounting 36% to 59%.<sup>3</sup> The incidences of mandible fractures varies among countries and mostly depending on the geographical, socio-economical, lifestyle and cultural factors.

Data related to gender in our study shows male predominance in a rate of 16:1. The occurrence of mandible fracture among the male gender in our study correlates with other studies.<sup>5-8</sup> Male predominance may be due to the higher social activity, driving vehicle, alcohol and drug abuse and contact sports. The majority of patients (74%) were in the 11 to 40 year age range. In particular, 21 to 30 years (37.7%) and 11 to 20 years (18.8%) were most commonly involved. The incidence of mandibular fracture in our study increased with increasing age from 0 to 30 years, and then relatively decreased from 31 years of age. This finding correlates with the finding by Mittal et al.<sup>9</sup> and Natu et al.<sup>10</sup> Lesser occurrence of fracture in 0 to 10 year group is mainly attributed to good parental care prevents them from serious injuries and the elastic nature of bone makes them less prone to fracture.<sup>10</sup>

The incidence of mandible fractures is increased in adulthood due to more active participation in vehicle driving, interpersonal violence, contact sports, alcohol abuse, social and cultural activities. The most frequent causes of mandible fracture in our study were RTAs with 56.5%, fall with 23.2%, assault with 16% and others with 4.3%. This finding is consistent with the previous studies by Vyas et al.<sup>11</sup> and Barde et al.<sup>12</sup> In developing countries RTA remains the main etiology of trauma, whereas assault related injury was found to be the prime cause in developed nations.<sup>13-16</sup> RTA related mandibular trauma in developing countries is mainly due to deficiency in road traffic legislations, bad road condition, low driving standard, more number of vehicle use, less use of safety features such as helmets, seat belts and airbags. Assault is the main cause of trauma in developed nations, and most of the cases associated with alcohol abuse. Higher socioeconomic standard, late night partying, alcohol and drug abuse are believed to be the causes of assault related mandibular trauma in developed countries.<sup>13</sup>

Among the 106 fracture sites recorded in this study, most of the patients suffered fracture in the parasymphysis which accounted (40, 37.7%) followed by angle (21, 19.8%), condyle (21, 19.8%), body (14, 13.2%), symphysis (8, 7.5%) and dentoalveolar (2, 1.9%). The parasymphysis being the commonest site of fracture in this study is similar to the other previous studies.<sup>2,4,9,10</sup> In contrary to our study, the authors also reported body (Anyanechi et al.<sup>6</sup> and Martini et al.<sup>17</sup>), angle (Kubilius et al.<sup>8</sup>), condyle (Patrocino et al.<sup>2</sup>, Marinho et al.<sup>5</sup> and Andreas et al.<sup>18</sup>) as the most commonly fractured site in their studies. The parasymphysis region is the most affected site, which is attributable to the anatomical location. The mandible is a horse shoe shaped bone, when external force is applied the parasymphysis region, which protrudes due to anatomical position (Convex curvature and long canine root) will be fractured first.

In cases with unilateral fractures, the parasymphysis (32.4%) was the most common fractured region followed by body (24.3%) in this study. The commonest combination of mandible fractures in this study was parasymphysis and angle (40.6%) followed by parasymphysis and condyle (28.1%). This finding was similar to the studies by Vyas et al.<sup>11</sup>, Elgehani et al.<sup>19</sup> and Jung et al.<sup>20</sup> and contrary to the studies by Kubilius et al.<sup>8</sup> and Natu et al.<sup>10</sup> In our study, 76.4% of mandible fractures were treated by ORIF with the use of miniplates and screws. However, 23.6% of mandibular fractures were treated by closed reduction.

Miniplate osteosynthesis is the treatment of choice in our center because it offers more precise and stable fracture reduction, allows early return to function and less recovery time. ORIF has become the standard procedure in most of the centers due to the advancements in biomaterials and technology. Surgical site infection (7.2%) was the most common postoperative complication reported in this study followed by temporary paresthesia (2.8%) and scar (2.8%).

### CONCLUSIONS

A retrospective study of patients who were treated for mandible fractures was carried out in the Department of Dentistry, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry from January 2011 to December 2014.

### The following results were summarized in this study

1. The incidence of mandibular fractures has shown that the male-to-female ratio was 16:1, which showed a higher occurrence in male patients.
2. The most affected patients were young men in their 20s.
3. The most common causes of mandible fractures were RTA, followed by fall.
4. The parasymphysis region is the most affected, followed by the body and condyle.
5. ORIF by miniplate osteosynthesis was the main treatment modality.

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Age Groups	Etiology				Total	
	RTA	Fall	Assault	Others		
0-10	Count	0	3	0	0	3
	% within age	0%	100%	0%	0%	100%
	%within etiology	0%	18.75%	0%	0%	4.3%
11-20	Count	8	3	1	1	13
	%within age	61.5%	23.1%	7.7%	7.7%	100%
	%within etiology	20.5%	18.75%	9.1%	33.3%	18.8%
21-30	Count	18	1	5	2	26
	%within age	69.2%	3.8%	19.2%	7.7%	100%
	%within etiology	46.2%	6.2%	45.4%	66.7%	37.7%
31-40	Count	7	2	3	0	12
	%within age	58.3%	16.7%	25%	0%	100%
	%within etiology	17.9%	12.5%	27.3%	0%	17.4%
41-50	Count	4	3	1	0	8
	%within age	50%	37.5%	12.5%	0%	100%
	%within etiology	10.3%	18.75%	9.1%	0%	11.6%
51-60	Count	1	4	1	0	6
	%within age	16.7%	66.7%	16.7%	0%	100%
	%within etiology	2.6%	25%	9.1%	0%	8.7%
>61	Count	1	0	0	0	1
	%within age	100%	0%	0%	0%	100%
	%within etiology	2.6%	0%	0%	0%	1.4%
<b>Total</b>	Count	39	16	11	3	69
	%within age	56.5%	23.2%	15.9%	4.3%	100%
	%within etiology	100%	100%	100%	100%	100%

**Table 1: Age and etiology distribution of mandible fractures**

RTA- Road Traffic Accident.

Age Group	Mandibular Fractures						Total (%)
	Symphysis	Parasymphysis	Body	Angle	Condyle	Dentoalveolar	
0-10	1	1	1	0	0	0	3(2.6)
11-20	2	7	2	7	2	1	21(19.8)
21-30	2	13	5	7	11	1	39(36.8)
31-40	3	8	3	2	4	0	20(18.9)
41-50	0	5	2	3	3	0	13(12.3)
51-60	0	5	1	2	1	0	9(8.5)
>61	0	1	0	0	0	0	1(0.9)
<b>Total (%)</b>	<b>8 (7.5)</b>	<b>40 (37.7)</b>	<b>14 (13.2)</b>	<b>21 (19.8)</b>	<b>21 (19.8)</b>	<b>2 (1.9)</b>	<b>106(100)</b>

**Table 2: Distribution of Mandible Fractures based on age group**

Anatomic Site of Fracture	No. of Fractures	Percentage
Symphysis+Condyle	3	9.4
Symphysis+Angle	1	3.1
Bilateral Parasymphysis	1	3.1
Parasymphysis+Angle	13	40.6
Parasymphysis+Condyle	9	28.1
Parasymphysis+Body+Condyle	1	3.1
Body+Angle	1	3.1
Body+Condyle	3	9.4

**Table 3: Mandibular fracture combinations**

Anatomical Site	Cause of Fractures				Gender		Total (%)
	RTA	Fall	Assault	Others	Male	Female	
Symphysis	3	3	2	0	6	2	8 (7.5)
Parasymphysis	27	7	4	2	39	1	40 (37.7)
Body	7	5	2	0	14	0	14 (13.2)
Angle	8	7	6	0	20	1	21 (19.8)
Condyle	16	4	1	0	21	0	21 (19.8)
Dentoalveolar	1	0	0	1	2	0	2 (1.9)
<b>Total</b>	<b>62</b>	<b>26</b>	<b>15</b>	<b>3</b>	<b>102</b>	<b>4</b>	<b>106 (100)</b>

*Table 4: Distribution of Mandible Fractures in relation to the anatomical site, cause and gender*

Treatment Modalities	No. of Fractures	Percentage
ORIF	81	76.4
Closed reduction	25	23.6
Intermaxillary fixation	18	17.0
Circummandibular wiring	5	4.7
Arch bar/wiring	2	1.9

*Table 5: Treatment Modalities*

ORIF- Open Reduction and Internal Fixation