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Original Research Article

# Evaluation of mandibular angle fractures in patients with maxillofacial injuries, in and around Indore- A retrospective and prospective study

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ABSTRACT

**Introduction**: Mandibular angle fracture is a common type of maxillofacial injury that can lead to significant morbidity if not managed properly. The management of mandibular angle fracture depends on various factors such as the severity of the injury, associated injuries, patient's age and overall health, and availability of resources. The purpose of this study is to evaluate the incidence, etiology, management, and outcomes of mandibular angle fracture in patients with maxillofacial injuries in and around Indore, using a combined retrospective and prospective approach.

**Materials and Methods**: A combined retrospective and prospective study was conducted at a tertiary care hospital in and around Indore. Data were collected on patient demographics, injury characteristics, diagnostic evaluation, treatment, and outcomes.

**Results:** A total of 1510 patients with maxillofacial injuries were included in the study, out of which 114 patients had mandibular angle fractures. The incidence of mandibular angle fracture in our study population was 19%. The majority of the patients with mandibular angle fracture were males (80.9%) and in the age group of 21-40 years (56.1%). The most common cause of mandibular angle fracture was road traffic accidents (77.7%), followed by assault (17.7%). The most common associated injuries were fractures of para symphysis (63.6%) followed by fractures of the condyle (25.3%). The follow-up of patients with mandibular angle fracturs showed a good clinical outcome in the majority of cases.

**Conclusion:** Mandibular angle fracture is a common type of maxillofacial injury in our study population, with road traffic accidents being the most common cause. Early diagnosis and appropriate management of mandibular angle fractures can prevent long-term complications and improve patient outcomes.



## 1. Introduction

In this modern world, the sheer pace of life with high-speed travel as well as an increasingly violent and intolerant society has made facial trauma a form of social disease. Changes in patterns of facial injuries, extent, clinical features, and so forth result in mild-to-massive disfigurement of the maxillofacial skeleton along with functional. There are various reasons for maxillofacial trauma like road traffic accidents, violence, fall, sports injury, and industrial injuries, of which road traffic injuries account for the most among them1These types of trauma usually cause maxillofacial injuries and other causes may include interpersonal violence, falls from height, and home injuries.[1]

Various factors during injury affect the pattern and incidence of injuries like age, sex, speed, side of a direct hit, alcohol or drug abuse,[2] the activity of patient (driver, passenger, pedestrian) type of vehicle, and use of safety measures like seat belts and helmet. The increase in road traffic injuries can be due to increasing economic patterns in society and more use of motor vehicles and lack of proper

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implementation of traffic regulations.[3]

Maxillofacial injuries thus cause physical as well as psychological impacts on the patient.

The mandibular angle fracture consists of a "fracture line that begins where the anterior border of the mandibular ramus meets the body of the mandible, extending inferiorly through the inferior border or posterior towards the gonial angle." The angle of the mandible is a weak point because there is a change in the direction of the grain of the bone and the presence of 3rd molar in the mandible.[4]

Champy et al. demonstrated that a single non-compression miniplate should be used on the superior border of the mandible for angle fractures instead of absolute rigid fixation, which they found was not necessary for the healing of mandibular fractures.[5]

## 2. Materials and Methods

1. All the patients reported to the Out Patient Department, In-patient Department, and Emergency Department undergoing treatment at Sri Aurobindo College of Medical Sciences, were evaluated for maxillofacial trauma involving mandibular angle fractures.
2. Total of 1500 patients between the year 1 April 2017-31 March 2022, with mandibular angle fractures with or without associated other maxillofacial injuries were screened, retrospectively and prospectively.
3. Data were segregated based on different variables like age groups, etiology of trauma, type of maxillofacial trauma, side of the fracture, driver or pillion, and alcohol consumption at the time of injury.
4. Etiology of trauma included RTA, fall at home, fall from height, and other miscellaneous causes.
5. Maxillofacial fractures were divided into an isolated angle, angle, and associated fracture and other fractures (not associated with angle).

## 3. Results

The present study included 1510 patients with a mean ± standard deviation age of 33.6 ± 13.66 years (range- 2 years to 85 years).

Figure 1 Most of the subjects having fracture of maxillofacial region belonged to the age group of 21-40 years (56.1%). The fractures were of maxillofacial region were comparatively less common in the age group of ≤ 10 years (1.4%) and >70 years (0.5%).

Figure 2 The number of male subjects was more than the number of female subjects (80.9% vs 19.1%) showing male preponderance amongst patients with maxillofacial trauma.

Figure 3 Most of the subjects were observed to have trauma on right side of face (50.2%) followed by those having trauma on left side of face (46.7%). Very few (3.1%) subjects suffered from trauma in the front of the face.

Figures 4 and 5 Amongst the majority of the patients, fracture of the angle of the mandible was results of the road traffic accident and comprised of drivers (85.2%).

Figure 6 Amongst those having fracture of mandible, involvement of condyle (40.0%) and Parasymphysis of the mandible was the commonest finding (31.6%) followed by the body of the mandible (21.7%) followed by angle (18.9%) then symphysis (8.1%), then dentoalveolar bone (7.3%). The least common was the involvement of Ramus (1.6%).

Figure 7 Shows the distribution of patients with fracture of mandible based on the involvement of the third molar.

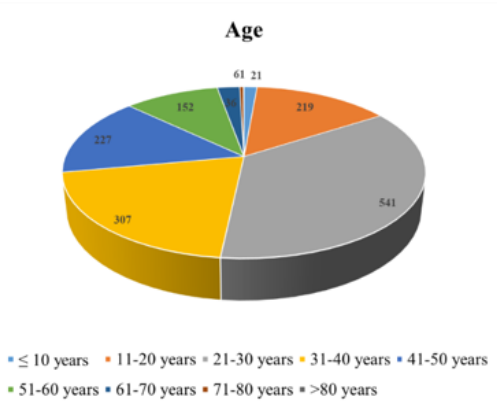


**Fig. 1:** Distribution of study subjects based on age

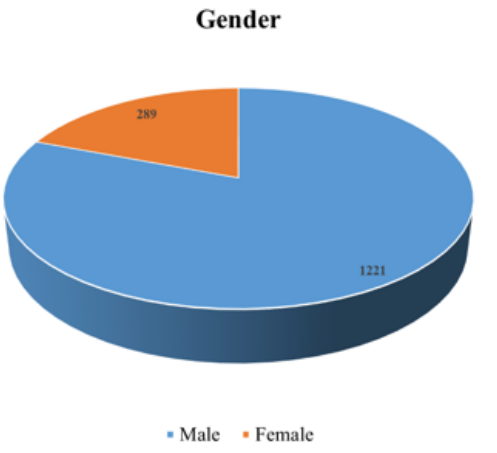


**Fig. 2:** Distribution of study subjects based on gender

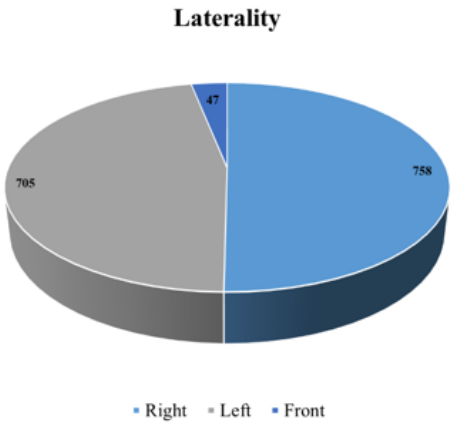


**Fig. 3:** Distribution of study subjects based on laterality

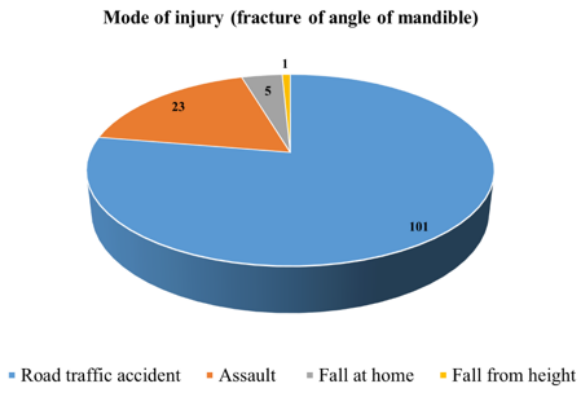


**Fig. 4:** Distribution of patients with fracture of angle of mandible based on mode of injury.

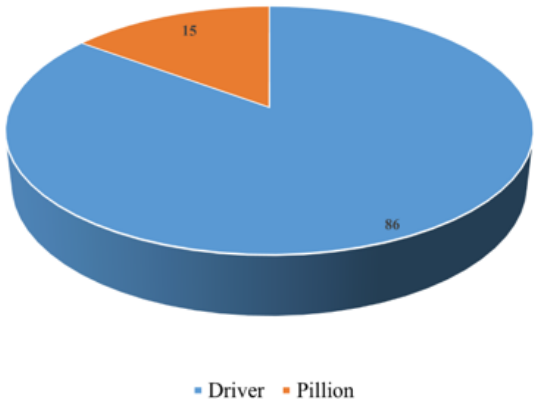


**Fig. 5:** Distribution of patients with fracture of angle of mandible based on type of injured in RTA.

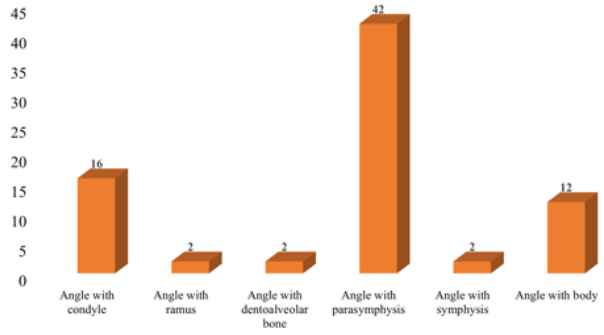


**Fig. 6:** Distribution of patients with fracture of the angle of mandible with other parts of the mandible

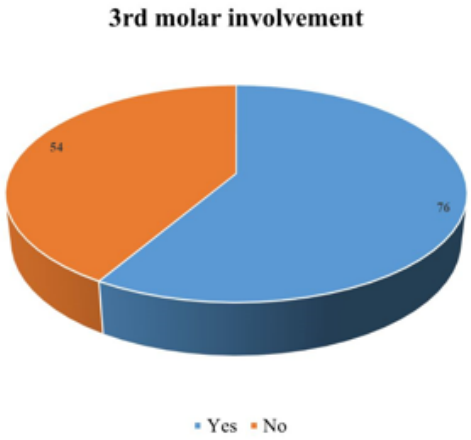


**Fig. 7:** Distribution of patients with fracture of mandible based on involvement of third molar.

## 4. Discussion

Road accidents have emerged as one of the major leading causes of death of youngsters in Indore; no other disease claims as many young lives as road accidents.

Among the 1510 patients recorded in our study, the incidence of maxillofacial fractures was about 80.9% predominantly males.

In our study of angle fractures, we found 97 males (85.08%) and 17 females (14.9%). The male-to-female ratio was 5.7:1 which is similar to the reported male-to-female ratio of 5.1:1 by Patel et al. (2006),[6] and 4.1:1 by Khan et al. (2009).[7]

On the evaluation of the etiology of maxillofacial trauma, the maximum number of angle fractures were caused by road traffic accidents (77.7%), followed by assaults (17.7%). Other causes of injuries include falls at home (3.8%) and fall from height (0.8%).

The present study shows the subjects of road traffic accidents among angle fracture include drivers (85.2%) and pillion (14.8) in varying percentages. Mehrotra et al.

(2017)[8] in their study reported an average data of drivers (75%) and pillion (19%) which is similar to our study.

The majority of the maxillofacial trauma was found to be on the right side (50.2) followed by 46.7% on the left side. This is owing to the fact that India has right-hand drive vehicles with left-lane traffic which makes the right side of the body more vulnerable to injury.

In our study of 130 patients with angle fractures, 48 patients (36.9%) have isolated mandibular angle fractures while 82 patients (63.2%) have concomitant fractures involving the combination of angle fractures with other parts of the mandible (66 patients) and with other bones other than the mandible (11 patients).

Paza et al. (2008)[9] in their study of 115 patients with mandibular angle fractures reported 47 patients (40.8%) with isolated angle fractures, 60 patients (52.1%) with angle and other parts of the mandible, 16 patients (12.9%) involving angle fractures with bones other than the mandible.

As a result of our study, the most common location of fractures associated with angle is the parasymphysis (42/66), followed by condyle (18/66), then the body (12/66), and last being symphysis and ramus (2/66). Dongas and Hall et al. (2002)[10] in their study reported the most concomitant fracture was angle and parasymphysis in 20/65 patients followed by angle and body pattern in 18/65.

Out of 130 patients with angle fractures, 76 patients (58.5%) have involvement of 3rd molar while 54 patients (41.5%) show no 3rd molar involvement. Armond et al. (2017)[11] said that the presence of the third molar increases the chances of a fracture in the mandibular angle by 3.27 times.

## 5. Conclusion

Maxillofacial injury cause physical as well as psychological impact. This study reflects various factors influencing maxillofacial trauma and angle fracture in particular, in which we found that RTA has emerged as the leading cause in causing maxillofacial injuries. Mandibular fracture is the most common among all maxillofacial injuries. The weakening of the angle is due to abrupt changes in the direction between the body and the ascending ramus in two planes. The main etiology was found to be road traffic accidents. With the increase in demand for two-wheelers in our city, there is an associated rise in maxillofacial injury caused by two-wheelers in the younger age group. In two-wheeler injuries, the right side is more commonly involved, which can be attributed to right-handed driving laws in India. Drivers sustain more maxillofacial injuries when compared to pillion riders.

In India, the majority of mandibular fractures are attributed due to road traffic accidents, and the incidence can be reduced by the enforcement of traffic rules. Using seat belts and helmets has been shown to reduce maxillofacial trauma.

A. combined retrospective and prospective approach provide a comprehensive evaluation of mandibular angle fracture, including long-term outcomes, which can guide future management strategies. Further studies are required to evaluate the effectiveness of different treatment modalities for mandibular angle fracture in a larger sample size.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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