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Mandibular Fracture Trends in Chennai, India: A Retrospective Analysis

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Keywords:
Speeding automobiles, road traffic accident, retrospective study, mandibular fracture, parasymphysis, Chennai

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ABSTRACT

Background: With the rising trend of speeding automobiles and violation of safety measures, there has been an increasing trend of facial bone fractures. This retrospective study aims to analyze the incidence, anatomical pattern, etiology, age and gender-wise distribution of mandibular fractures.

Methods: Data of 123 patients belonging to different age groups, gender and etiologies with facial bone fractures visiting our center at Government Kilpauk Medical College Hospital, Chennai, between January 2023 and December 2023 were considered for the study. Patients who discontinued treatment and lost follow-up were excluded from the study.

Results: 81 patients presented with mandibular fracture with an incidence of 6.5%, with road traffic accident being the major etiologic factor. Most of the study population were men of 20 to 40 years age group. Parasymphysis was the most common fractured site in the study. Most of the patients presented with bilateral involvement. 71 of 81 patients were managed surgically.

Conclusion: Road traffic accidents have been the major etiological factor. Most of the population was men between 20 and 40 years. Unlike the literature, parasymphysis was the most common anatomical site of injury found in my study. With the help of the data collected in this study, ergonomics for the safety measures in road traffic accidents and facial trauma can be formulated in the upcoming studies.

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INTRODUCTION:

With the increasing trend of road traffic accidents, there has been a rising trend in facial traumas.[1,2] Contributory factors for motor vehicle collision injuries are related to the increase in the volume of traffic, rural to urban drift of the population, poor road conditions, increased import of secondhand vehicles, driving under the influence of alcohol, noncompliance with seatbelt or crash helmet use, and the lack of airbags. Assault and self-fall also have contributory roles to play in the incidence of facial trauma.

The mandible and nasal bone are the most common facial bones to be injured.[1] The prominence, anatomic configuration, and position of the mandible make it prone to injuries.[1,3-5] Malocclusion and difficult mouth opening are the common presenting symptoms.

The mandible is a U-shaped, mobile bone comprising horizontal and vertical segments, from the symphysis to the body, angle and rami, respectively. The mandible articulates with the skull through the condyle and temporomandibular joint. Fracture-prone sites of the mandible are the mental

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foramen, distal body and angle, and subcondyle. Unerupted lower third molar, dental extraction of the same weakens the angle of the mandible further. Mandibular angle and body fractures can be grouped into horizontally, vertically favorable and horizontally, vertically unfavorable fractures. Favorability is determined by the direction of a fracture line and its relationship to muscle's action on the fracture segment.[3,4] Horizontally favorable fractures resist upward vertical pull of the masseter, temporalis, and medial pterygoids on the proximal segment in the horizontal plane. Vertically favorable fractures resist the medial pull of the medial pterygoids on the proximal segment in the vertical plane. The mylohyoid muscle counteracts the upward displacement in mandibular body fractures with forward displacement.

The primary goal of surgery is to restore occlusion; aesthetics becomes a secondary goal. Forces of mastication impart tensional forces along the upper border and compressive forces along the lower border. Plates and screws fixation along the Champy's line of osteosynthesis neutralizes the forces.

MATERIALS AND METHODS

Records of all the patients belonging to different age groups, genders, and etiologies with facial bone fractures visiting Government Kilpauk Medical College Hospital between January 2023 and December 2023 were considered for this retrospective study.

Inclusion criteria:

1. Patients of all age groups, genders, and etiologies with mandibular fractures.
2. Patients who underwent surgical management and were on regular follow-up
3. Patients who were managed conservatively and were on regular follow-up.

Exclusion criteria:

1. Patients who had facial bone fractures other than mandible
2. Patients who discontinued treatment.
3. Patients who lost follow-up.

Our institutional protocols in the management of facial bone fractures are:

1. Stabilization of patient's airway, breathing, and circulation. In case of a poor Glasgow coma scale, the patient would be intubated.
2. *Clinical examination*: (a) Extraoral: Clinically examined for restricted mouth opening, facial bony tenderness, step deformity, reduced or loss of vision assessment, diplopia, loss of extraocular movements, and soft tissue injury. (b) Intraoral: clinically examined for malocclusion, loosened or loss of dentition, position of tongue, sublingual hematoma—Coleman sign, fracture line tenderness, soft tissue injury.
3. Imaging—computerized tomography of the facial skeleton—coronal, sagittal, axial, bone windows, axial soft tissue window, and 3D reconstruction.
4. Further imaging (CT brain, CT abdomen, X-rays of extremities or long bones) and spine and their respective specialist's opinion.
5. Anti-edema measures such as head end elevation, injection of dexamethasone 4 mg IV 12th hourly, and tablet serratiopeptidase thrice daily liquified in water.
6. Dental and oral hygiene—Chlorhexidine mouthwash 3 to 4 times daily.
7. Liquid diet, non-chewable diet
8. Routine blood investigations (complete blood count, liver and renal function test, electrolytes, blood coagulation profile, serology)
9. Selection of patients for fracture fixation was according to the "KAZANJIAN & CONVERSE" classification:
   a. Class I fractures with desired stability
   b. Class II and III fractures
   c. Comminuted fracture segments
   d. Mandibular fractures with other facial bone fractures
10. Selection of patients for nonsurgical management included maintained occlusion and surgically unfit patients.

11. Management:

(a) Class I favorable fracture with occlusion was managed with an Erich arch bar with mandibulomaxillary fixation (MMF) for 3 weeks followed by arch bar removal at the 4th week.

(b) Other categories with malocclusion were managed with fracture fixation with mandibulomaxillary fixation (MMF) + open reduction and internal fixation using plates and screws. 24 to 48 hours post-procedure, intermaxillary fixation was applied and was retained for 3 weeks. The arch bar was eventually removed in the 4th week.

(c) If mandibular fractures were associated with other facial bone fractures, other fracture fixation was done too, along with the mandible's.

(d) X-rays of the face were taken in the immediate postoperative and follow-up periods.

12. Follow-up: Patients were followed up for 6 months. During which, they were examined for oral hygiene, adequate mouth opening, and occlusion, along with signs of wound healing. Completion of treatment is marked by occlusion with soft tissue homeostasis in the form of a healed fracture and wound. Some of the cases performed at our center have been depicted in Figures 1 to 5.

RESULTS

The data collected were analyzed, and the results below were obtained:

1. The total number of plastic surgical emergencies was 1255, of which the total number of patients with oromaxillofacial fractures was found to be 123. 81 out of 123 patients had sustained mandibular fractures. Incidence of oromaxillofacial and mandibular fractures was found to be 9.8 % and 6.5%, respectively. The number of patients with isolated mandibular fractures was found to be 22, whereas the number of patients with combined fractures were 59 (Table I).
2. (Table II) infers that 42 out of 81 patients amongst the mandibular fracture study population had bilateral involvement, whereas 39 were found to have unilateral involvement. Amongst the unilateral mandibular fracture group, 21 patients had right-sided involvement, whereas the remaining 18 had left-sided involvement.
3. The result inferred from (Table III) is that 52 patients with mandibular fractures belonged to

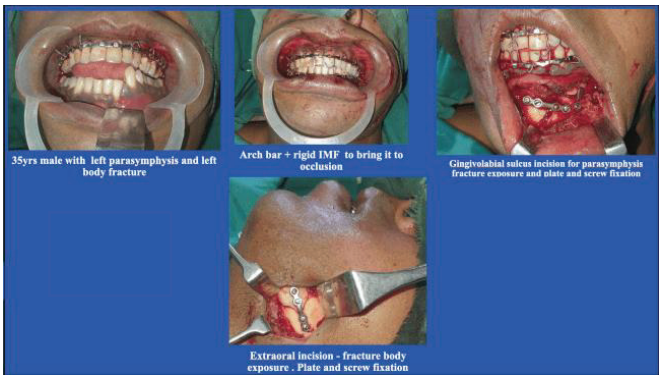


Figure 2: Fracture of left parasymphysis and left body - Open reduction and internal fixation done

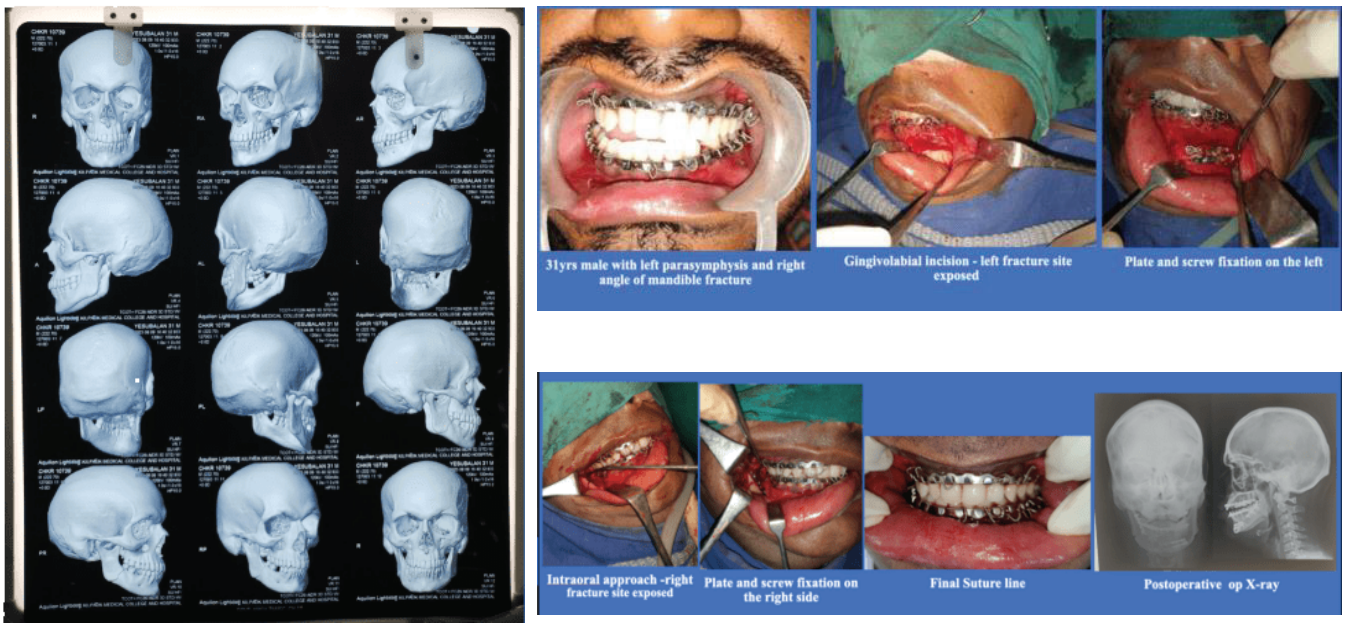


Figure 1: Left Parasymphysis with right angle of mandible fracture – Open reduction and internal fixation done

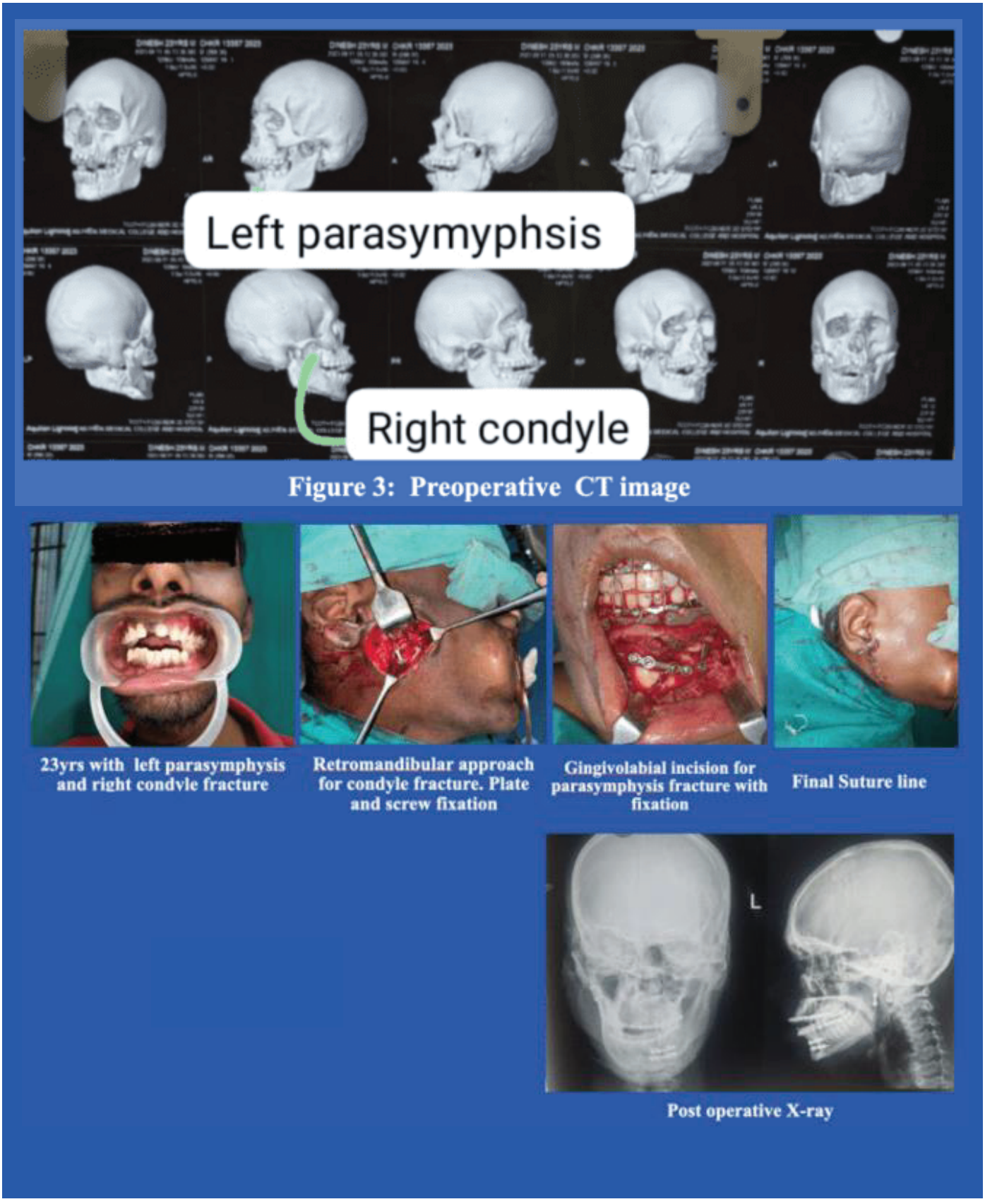


Figure 3: Fracture left parasymphysis and right condyle – Open reduction and internal fixation done

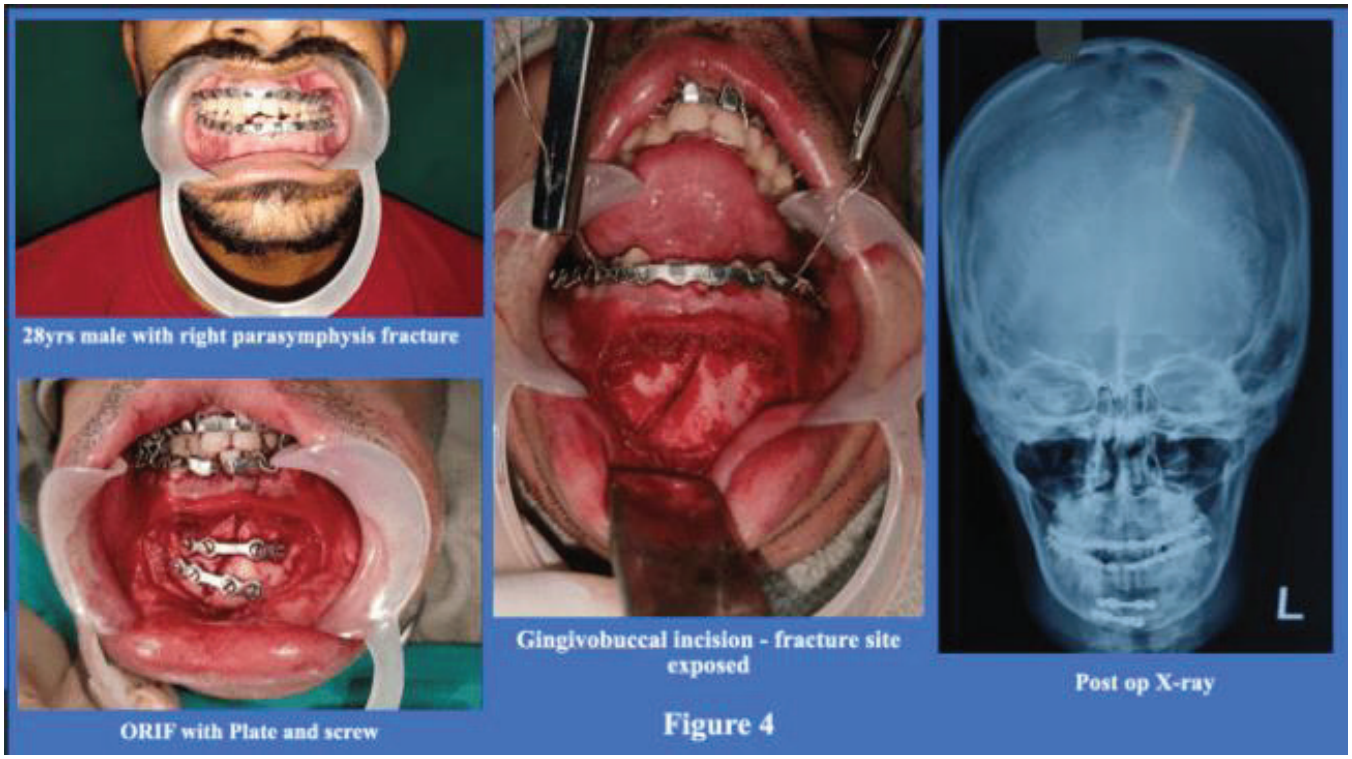


Figure 4: Fracture left parasymphysis – Open reduction and internal fixation done

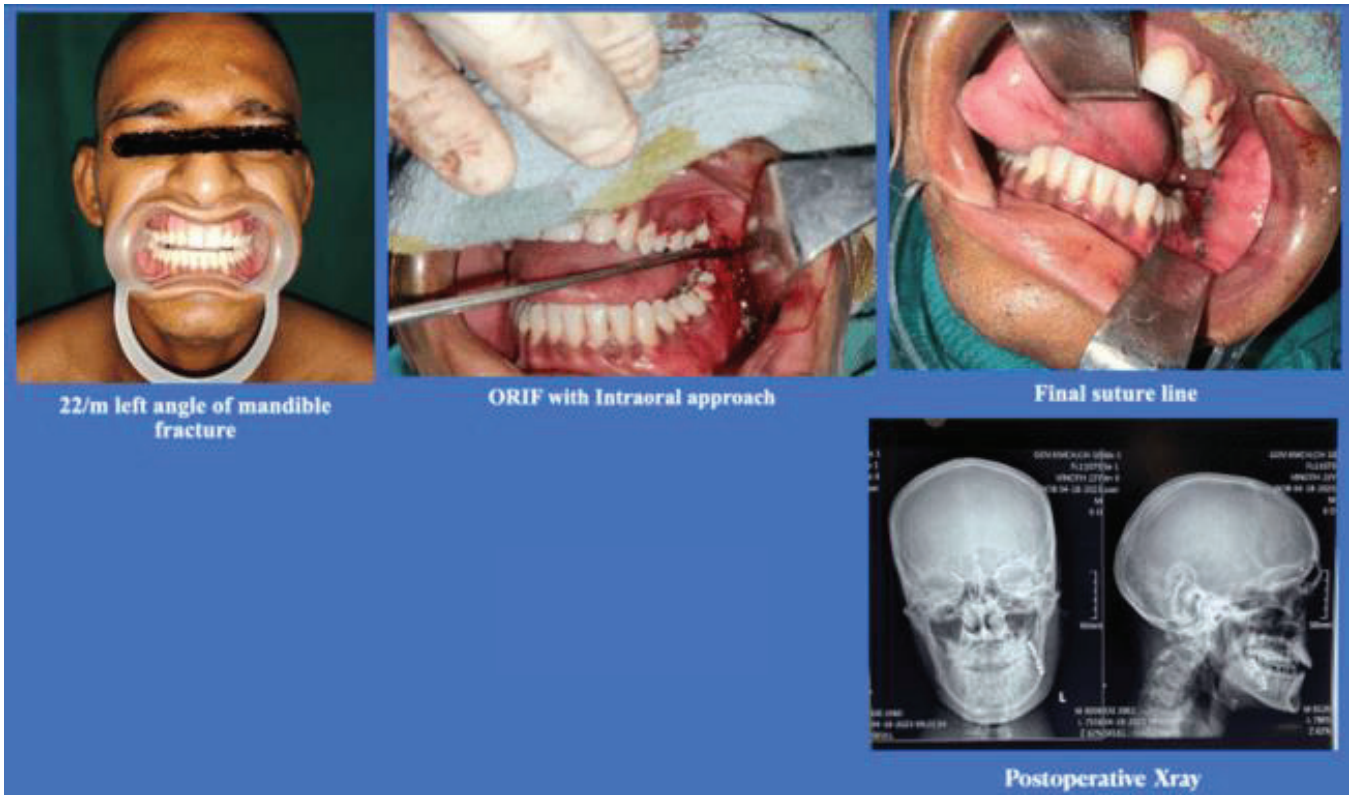
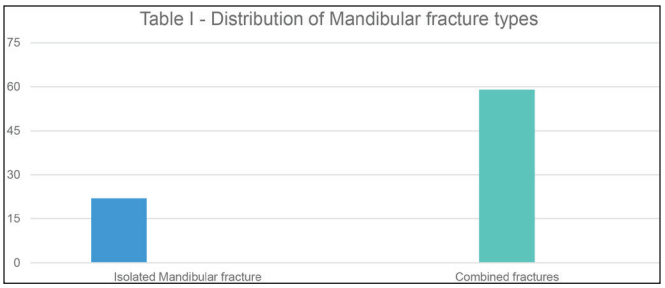
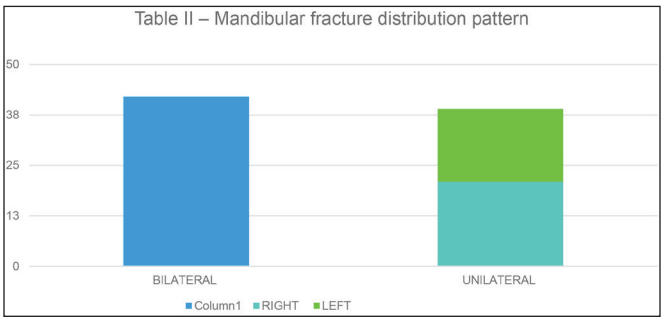
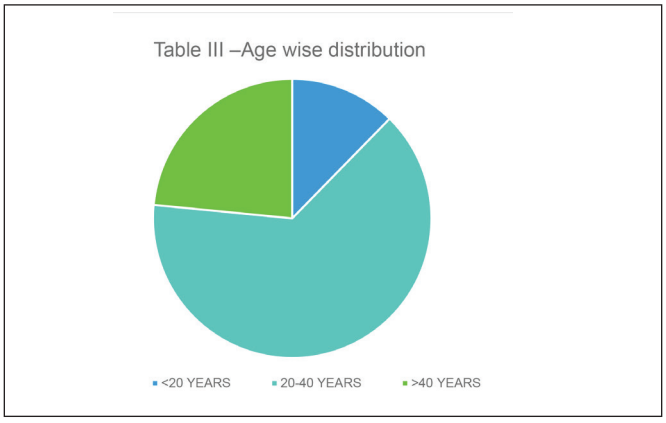
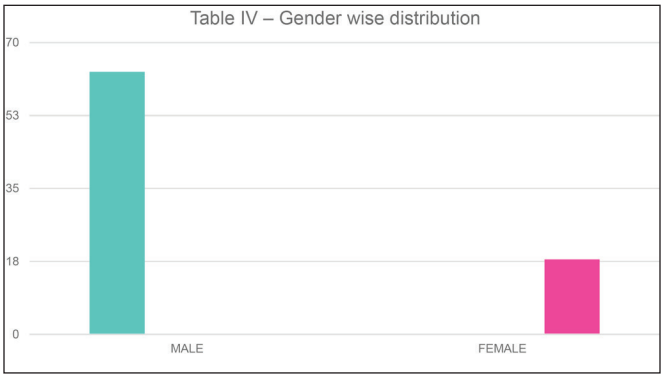


Figure 5: Fracture left angle of mandible – Open reduction and internal fixation done





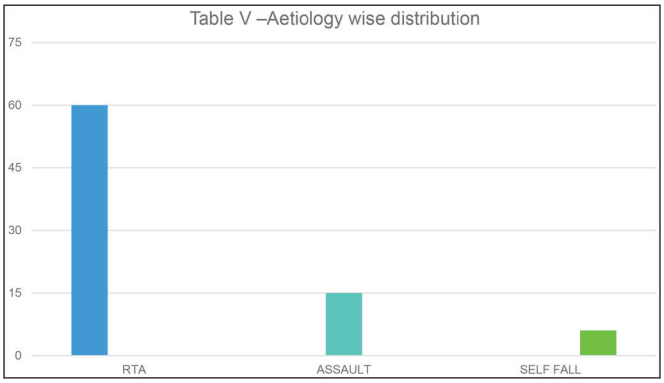


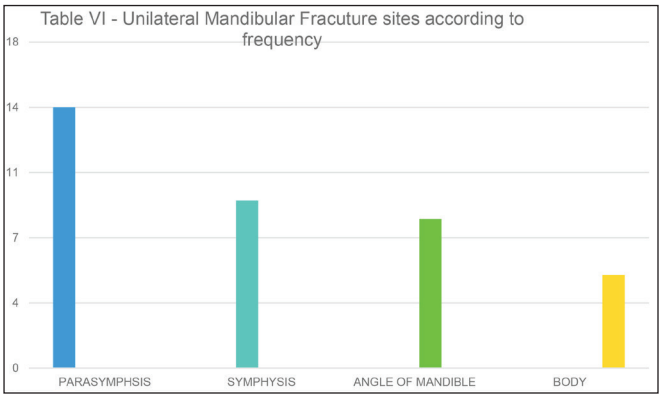


the age group between 20 and 40 years, followed by 19 patients in the group above 40 years and 10 patients below 20 years.

4. The minimum and maximum age groups in this study were 16 and 65 years, respectively.
5. (Table IV) shows that 63 out of 81 patients with mandibular fractures were found to be men and 18 were women.
6. (Table V) infers that 60 out of 81 patients with mandibular fractures sustained injury due to road traffic accident (RTA), followed by 15 due to assault and 6 due to self-fall.
7. (Table VI) shows that 14 out of 39 patients amongst the unilateral mandibular fracture group were found to have parasymphyseal fracture, followed by 9 with symphysis, 8 with angle of mandible, 5 with fracture body, and 3 with fracture condyle. The most common distribution patterns amongst patients with bilateral mandibular fractures were found to be parasymphysis and angle, followed by parasymphysis and condyle.
8. (Table VII) shows that 71 out of 81 patients with mandibular fractures underwent surgical management, whereas 10 underwent conservative management. 5 out of 10 patients in the conservative management group had maintained occlusion; hence, surgery was not done, whereas another 5 were surgically unfit; hence, surgery couldn't be done.

The postoperative period was eventful in 4 patients with infection as the main contributory factor. 3 out of 4 patients recovered with conservative management, whereas 1 patient underwent implant exit.





DISCUSSION

Though the mandible is the strongest facial bone, due to its prominence, position, and anatomic configuration, it is prone to fractures.[1] Road traffic accidents were found to be the most common mode of injury due to reckless, high-speed driving and violation of safety rules.[1,2] With progression in the age group, physical activity, exposure, and access to habits increase with more aggressive behaviour, thus making the patients between 20 and 40 years more prone to road traffic accidents, assaults, and self-falls when intoxicated.[1] Former mentioned points also hold true for male dominance.[1]

In this study, isolated mandibular fractures were found to be less common than combined fractures. The most common combination was noted to be parasymphysis with angle. Overall, fractures of parasymphysis were found to be more common as per this study.[2,5,6] The force per unit area is more in parasymphysis, thus increasing the tensile strength and compressive forces and resistance, thus leading to fracture. Also, the canine tooth's length weakens the structure, thus predisposes it to fractures.

Most parasymphyseal fractures were found to be associated with road traffic accidents, whereas mandibular body fractures were associated with assault as per this study. Fractures of the condyle, symphysis, and parasymphysis are encountered when the impact is delivered anteriorly, whereas the body and contralateral angle are fractured when the impact is delivered laterally.[7,8]

Most of the study population with mandibular fractures underwent surgical management, whereas the minority underwent conservative management in view of maintained occlusion and a few others, as they were surgically unfit.

4 patients had surgical site infection as a post-operative complication, out of which 3 were managed conservatively, and 1 had to undergo implant exit.

This study sheds light on the importance of restoration of facial symmetry following facial trauma for better functional and aesthetic outcomes, and also better quality of life. With rising concern regarding road traffic accidents, strict laws and new policies need to be formulated and passed, and the existing policies should be checked to reduce the burden of rising mortality and morbidity. With the help of the data collected in this study, ergonomics for the safety measures in road traffic accidents and facial traumas can be formulated in future. This study also aims at spreading awareness on road safety and sound mental health, aiming at various causes to defy the current safety norms, as the majority of the affected belonged to the male gender of the active age group between 20 and 40 years of age.

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