

INCIDENCE AND PATTERN OF JAW FRACTURE AT TERTIARY CARE CENTRE IN MAHARASHTRA -A RETROSPECTIVE STUDY

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ABSTRACT

Background: Jaw fractures are a significant maxillofacial injury that commonly result from trauma, including road traffic accidents, falls, physical assaults, and sports injuries. Mandibular fractures are more prevalent than maxillary fractures due to the mandible's prominence and mobility. Understanding the incidence, pattern, and associated factors of jaw fractures is essential for improving preventive measures and clinical management, especially in high-risk populations. **Materials and Methods:** A retrospective observational study was conducted at a tertiary care center in Maharashtra, India. Data were collected from medical records of 97 patients diagnosed with jaw fractures between January 2021 and December 2022. Key variables analyzed included age, gender, affected jaw, fracture site, cause of injury, treatment method, and complications. Data analysis involved descriptive statistics and comparison with similar studies. **Result:** The majority of patients were males (68.04%), with the highest incidence observed in the 21-40 age group (37.12%). Mandibular fractures (72.16%) were significantly more common than maxillary fractures, with the most frequently affected sites being the condyle, symphysis, and parasymphysis (12.37% each). Falls (21.65%) were the leading cause of injury, followed by physical assaults (15.46%) and road traffic accidents (11.34%). Surgical management (ORIF) was the preferred treatment method (62.89%), with conservative management utilized in 37.11% of cases. The most common complications were delayed union (47.37%) and infection (42.11%), while malocclusion was notably absent. **Conclusion:** This study highlights the predominance of mandibular fractures among young adult males, with falls being the most common cause of injury. The preference for surgical management, particularly ORIF, resulted in low complication rates, reflecting effective clinical practice. Understanding demographic and etiological factors aids in developing targeted preventive strategies to reduce the burden of jaw fractures.

INTRODUCTION

Jaw fractures, also known as maxillofacial fractures, involve the disruption of the bone continuity in the mandible (lower jaw) or maxilla (upper jaw).^[1] These fractures can result from various etiologies including road traffic accidents, falls, physical assaults, and sports injuries.^[2,3] The mandible is more commonly affected due to its prominence and mobility.^[4]

The pathogenesis of jaw fractures is multifactorial. The force and direction of impact, bone density, and the anatomical structure of the jaw influence the fracture pattern.^[5] Common fracture sites include the condyle, angle, symphysis, and body of the

mandible.^[6] The parasymphyseal region is particularly vulnerable, often associated with road traffic accidents.^[7] Fracture displacement is influenced by muscle traction, particularly by the masticatory muscles.^[8]

Understanding the pattern and incidence of jaw fractures is critical for improving clinical management and preventive strategies. This study aims to provide data that can help in resource allocation, surgical planning, and formulating public health policies.^[9] It also contributes to better prognostic evaluation and tailoring rehabilitation protocols to patient demographics.^[10]

Maharashtra, being one of the most populous states in India, has a high incidence of road traffic accidents and urban violence, contributing to a significant burden of maxillofacial injuries.^[11] Limited regional studies exist that focus specifically on the patterns of jaw fractures in this demographic setting. Conducting this study at a tertiary care center will provide valuable insights into age, gender, and site-specific data, aiding in the development of targeted interventions.^[12]

This study will explore key variables such as the affected jaw, age and gender distribution, and the specific anatomical site of fractures to identify high-risk groups and prevalent injury mechanisms. Such evidence-based insights are essential for enhancing clinical outcomes and preventive measures.

MATERIALS AND METHODS

This retrospective observational study was conducted at Dentistry Department of a tertiary care center in

Maharashtra from January 2021 to December 2022, focusing on the incidence and pattern of jaw fractures. The study included 200 patients of all ages and genders with clinically and radiographically confirmed jaw fractures, excluding cases with pathological fractures, incomplete records, or neoplastic lesions. The sample size for this study was calculated using a 35.4% prevalence of jaw fractures from a previous study^[4], with a 95% confidence level and a 10% margin of error, adding a 10% non-response rate, the final sample size was adjusted to 97 patients, and data were extracted from medical records, anonymized, and analyzed using SPSS version 25.0. Descriptive statistics summarized categorical and continuous variables, with chi-square tests assessing associations between variables ($p < 0.05$ considered significant). Ethical approval was obtained from the Institutional Ethics Committee, and patient confidentiality was strictly maintained, adhering to the Declaration of Helsinki guidelines.

RESULTS

Table 1: Age Distribution of Patients with Jaw Fractures

Age Group	Number of Patients	Percentage
0-10	11	11.34
11-20	8	8.25
21-30	17	17.53
31-40	19	19.59
41-50	15	15.46
51-60	12	12.37
61-70	17	17.53
71-80	9	9.28
Total	97	100.00

Table 2: Gender Distribution of Patients with Jaw Fractures

Gender	Number of Patients	Percentage
Male	66	68.04
Female	31	31.96
Total	97	100.00

Table 3: Distribution of Jaw Fractures by Affected Jaw

Jaw Affected	Number of Patients	Percentage
Mandible	70	72.16
Maxilla	27	27.84
Total	97	100.00

Table 4: Distribution of Jaw Fractures by Specific Fracture Site

Fracture Site	Number of Patients	Percentage
Condyle	12	12.37
Angle	9	9.28
Body	8	8.25
Symphysis	12	12.37
Parasymphysis	12	12.37
Ramus	7	7.22
Coronoid	10	10.31
Mixed	27	27.84
Total	97	100.00

Table 5: Distribution of Jaw Fractures by Cause of Injury

Cause of Fracture	Number of Patients	Percentage
Road Traffic Accident (RTA)	11	11.34

Falls	21	21.65
Physical Assault	15	15.46
Sports Injuries	11	11.34
Occupational Injuries	39	40.21
Total	97	100.00

Table 6: Treatment Methods Utilized for Jaw Fractures

Treatment Method	Number of Patients	Percentage
Surgical (ORIF)	61	62.89
Conservative Management	36	37.11
Total	97	100.00

Table 7: Complications Observed in Patients with Jaw Fractures

Complication	Number of Cases	Percentage
Infection	8	42.11
Malocclusion	0	0.00
Delayed Union	9	47.37
Non-Union	2	10.53
Total	19	100.00

The age distribution of jaw fracture patients indicates a predominance in the 21-40 year age group, collectively accounting for 37.12% of cases. This finding is consistent with global epidemiological trends where young adults are disproportionately affected due to higher exposure to trauma-related activities such as occupational hazards, road traffic accidents, and interpersonal violence. The relatively lower incidence in the 0-10 (11.34%) and 71-80 (9.28%) age groups suggests that both pediatric and elderly populations are less frequently exposed to high-impact injuries that typically cause jaw fractures.

The gender distribution shows a clear male predominance, with 68.04% of cases occurring in males compared to 31.96% in females. This disparity aligns with previous literature indicating that males are at greater risk of sustaining jaw fractures, likely due to increased participation in high-risk activities, outdoor occupations, and greater exposure to interpersonal violence and road traffic accidents. The difference may also reflect cultural and societal factors influencing risk exposure.

Mandibular fractures are significantly more common than maxillary fractures, comprising 72.16% of cases compared to 27.84%. This pattern is consistent with the anatomical and functional characteristics of the mandible, which is more exposed and susceptible to direct impact. Additionally, the mobility and prominence of the mandible increase its vulnerability, particularly in situations involving falls, physical assaults, and vehicular accidents.

Among mandibular fractures, the most affected sites are the condyle, symphysis, and parasymphysis, each accounting for 12.37% of cases. The prominence of these fracture sites may be attributed to their anatomical positioning and biomechanical stress points during impact. Notably, the "Mixed" category, comprising 27.84% of cases, likely represents complex fractures involving multiple anatomical locations, reflecting the high-energy trauma involved in such cases. The relatively lower incidence of fractures in the ramus (7.22%) and body (8.25%)

suggests that these regions are somewhat protected or less susceptible to the most common injury mechanisms.

Falls are the leading cause of jaw fractures (21.65%), followed by physical assaults (15.46%) and road traffic accidents (11.34%). This pattern reflects the demographic profile of the patient cohort, which includes individuals from both urban and rural backgrounds, where falls are common due to occupational hazards and environmental factors. Notably, occupational injuries accounted for the highest proportion (40.21%), highlighting the occupational risks faced by the working-age population in the region. The substantial proportion of fractures resulting from physical assaults underscores the social dynamics that contribute to maxillofacial injuries.

The majority of patients (62.89%) underwent surgical management, primarily via Open Reduction and Internal Fixation (ORIF), which is the standard of care for displaced or complex fractures to ensure anatomical realignment and functional recovery. Conservative management was employed in 37.11% of cases, typically for non-displaced or minimally displaced fractures. The preference for surgical intervention underscores the clinical objective of achieving optimal occlusion and structural stability, minimizing the risk of long-term functional impairment.

The most common complication observed was delayed union (47.37%), followed by infection (42.11%), while non-union was relatively rare (10.53%), and no cases of malocclusion were reported. The high incidence of delayed union may indicate factors such as inadequate fixation, patient non-compliance, or compromised vascularity at the fracture site. The rate of infection, while notable, is within acceptable limits given the complexity of surgical intervention in a contaminated maxillofacial environment. The absence of malocclusion as a complication suggests effective surgical planning and execution, ensuring accurate occlusal alignment post-reduction.

The findings of this study are congruent with global trends in maxillofacial trauma, with mandibular fractures being significantly more prevalent than maxillary ones. The male predominance and peak incidence in young adults align with established epidemiological data, reflecting lifestyle and occupational risk factors. The preference for surgical management, particularly ORIF, indicates adherence to contemporary maxillofacial treatment protocols aimed at restoring function and aesthetics. The relatively low complication rates, particularly in terms of malocclusion, highlight the effectiveness of the surgical approaches employed. Future research should focus on evaluating preventive strategies, particularly addressing occupational hazards and fall-related injuries, to mitigate the incidence of jaw fractures in this demographic setting.

DISCUSSION

The present study on jaw fractures at a tertiary care center in Maharashtra highlights several critical findings that align with, and in some instances differ from, existing literature. The predominance of jaw fractures among young adults aged 21-40 years (37.12%) observed in our study is consistent with previous research by Nalić et al., who reported a peak incidence in the 21-30 age group (36.2%) in Vojvodina, Serbia.^[3] This demographic is particularly vulnerable due to increased exposure to occupational hazards, high-risk activities, and road traffic accidents²⁴. The male predominance (68.04%) identified in our study also mirrors findings from Kruger et al., who noted a similar trend in Western Australia (80.4%).^[2] This gender disparity is commonly attributed to greater male involvement in outdoor and high-risk professions and a higher propensity for physical altercations.

Our study revealed that mandibular fractures (72.16%) were significantly more prevalent than maxillary fractures, a pattern that aligns with Bither et al., who reported mandibular fractures as the most common type (61.9%) in rural India.^[6] The predominance of mandibular involvement is attributable to its anatomical exposure and the biomechanical forces exerted during trauma⁵. Among specific fracture sites, the condyle, symphysis, and parasymphysis were the most affected, each accounting for 12.37% of cases. These sites are particularly susceptible due to their structural position and the direction of impact forces. Similarly, Prajapati et al. identified the parasymphysis as the most commonly affected region (32.63%) in a study from Ranchi, India.^[7]

Regarding etiology, falls emerged as the leading cause of jaw fractures (21.65%), followed by physical assaults (15.46%) and road traffic accidents (11.34%). This differs from the findings of Barde et al., who reported RTAs as the primary cause (68.8%) in Central India.^[13] The prominence of falls in our cohort may reflect local occupational patterns and

environmental factors, particularly in rural and semi-urban settings. Notably, occupational injuries accounted for the largest proportion (40.21%), emphasizing the need for targeted preventive strategies, particularly in high-risk work environments.

Regarding treatment methods, surgical management through Open Reduction and Internal Fixation (ORIF) was performed in 62.89% of cases, while conservative management was utilized in 37.11%. The preference for surgical intervention in displaced or complex fractures aligns with the recommendations by Ataözden et al., who advocated for ORIF to ensure anatomical reduction and optimal functional recovery.^[7] The relatively high rate of surgical management reflects the clinical objective of restoring occlusion and preventing malocclusion, which was notably absent as a complication in our study. The low complication rates observed, particularly the minimal incidence of malocclusion, highlight the success of the chosen surgical approaches.

However, delayed union (47.37%) and infection (42.11%) were the most common complications, consistent with the challenges noted in surgical management of mandibular fractures. Delayed union may result from factors such as poor fixation stability, patient non-compliance, or compromised vascular supply at the fracture site.^[8] The infection rate, while within expected limits, underscores the inherent challenges of maintaining asepsis in the maxillofacial region.^[9]

The findings of this study are consistent with global trends indicating a higher prevalence of mandibular fractures among young males. However, regional differences, particularly in etiology, highlight the importance of contextualizing preventive strategies. In Maharashtra, reducing occupational hazards and fall-related injuries could significantly mitigate the burden of jaw fractures. Future studies should focus on longitudinal follow-up to evaluate long-term functional outcomes and the efficacy of different management protocols.

CONCLUSION

This study highlights a higher prevalence of mandibular fractures, particularly among young adult males aged 21-40 years, with the most affected sites being the condyle, symphysis, and parasymphysis regions. Falls were the leading cause of injury, followed by physical assaults and road traffic accidents. Surgical management, primarily through Open Reduction and Internal Fixation (ORIF), was the preferred treatment method, resulting in low complication rates. The findings align with global trends but reveal regional differences in the causes of jaw fractures, emphasizing the need for targeted preventive strategies and effective trauma care to reduce the burden of maxillofacial injuries.

Conflicts of interest: Non declared

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