

Research Article

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Maxillofacial Fracture Prevalence in Kabul: Insights from A Five-Year Retrospective Study

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Abstract

Background: Maxillofacial trauma is a significant public health problem worldwide. They often cause significant medical costs, psychological and social effects - such as stress, irritation, reduced self-esteem and social isolation- as well as functional impairments and facial deformities. The aim of this study is to analyze the prevalence of maxillofacial fractures among patients treated at the Stomatology Hospital in Kabul.

Methods: A retrospective cross-sectional study was conducted in which patient records were analyzed from January 2018 to December 2022 at the Stomatology National Curative and Specialized Hospital in Afghanistan. Data were collected from the medical records of 290 patients who had suffered trauma, with results documented as percentages.

Results: Among the patients examined, the majority were male, with a smaller number being female. The most common cause of injuries was road traffic accidents. Other common causes included assaults and falls from heights. The most frequently observed type of fracture was midface fractures. Mandibular fractures were also significant, found in a number of patients.

Conclusion: The findings underscore the importance of focusing on the prevention of road traffic accidents as a key strategy to reduce trauma-related injuries. Additionally, the high incidence of midface and mandibular fractures emphasizes the need for specialized care and intervention in these areas.

Keywords: midface fracture; mandibular fracture; road traffic accidents; kabul

Introduction

The maxillofacial region comprises vital anatomical structures, including the nasal complex, zygomatic bone, maxilla, mandible, and frontal bone. Trauma to this area can affect the teeth, skeletal framework, and soft tissues of the face, posing a significant global public health concern [1]. Maxillofacial trauma (MFT) is associated with not only considerable medical expenses but also profound psychological and social consequences, such as heightened stress, anxiety, reduced self-esteem, and social isolation. Furthermore, MFT can lead to functional impairments, including loss of masticatory efficiency, and aesthetic complications, such as facial deformities [2-5].

The incidence and severity of maxillofacial trauma (MFT) have been increasing, primarily due to the growing dependence on road transportation and intensified socioeconomic activities [6,7]. MFT frequently co-occurs with head trauma, which can

result in life-threatening brain injuries and respiratory complications. This underscores the critical need for emergency surgical intervention, often following stabilization of the airway, breathing, and circulation (ABC) [8-10]. The etiology of MFT is multifactorial, encompassing a wide range of contributing factors. Common causes include road traffic accidents, assaults, falls, sports-related injuries, industrial accidents, and firearm-related incidents [6,11-13]. Risk factors such as driving under the influence of alcohol or drugs, and inadequate helmet use by cyclists and motorcyclists, significantly increase the likelihood of maxillofacial trauma (MFT). The causes of MFT can vary widely based on a region's socioeconomic conditions, cultural practices, lifestyle habits, and demographic characteristics [14,15]. Additionally, the severity of the trauma is heavily influenced by factors such as the force, duration, and nature of the impact, which can determine the extent of injury to the maxillofacial region [16]. Given Afghanistan's complex social and economic

landscape, it is crucial to understand the contextual factors contributing to MFT in order to develop effective public prevention strategies and inform future treatment interventions. This study aims to investigate the epidemiology of maxillofacial fractures at the Stomatology Hospital in Kabul over a five-year period. Specifically, it seeks to identify the most common causes of MFT, analyze demographic patterns, and classify the types of fractures observed in the patient population.

Materials and Methods

Study Design

This retrospective cross-sectional study was conducted to analyze the prevalence of maxillofacial fractures at the Stomatology National Curative and Specialized Hospital in Kabul, Afghanistan. The study reviewed patient data spanning from January 2018 to December 2022.

Study Population

The study included a total of 290 trauma patients who were admitted to the Department of Maxillofacial Surgery at the hospital during the study period. These patients were selected based on the inclusion criteria, which involved individuals with documented jaw and facial injuries that required surgical intervention or management. All age groups were included in the study. Patients with incomplete medical records were excluded from the study to ensure accurate and complete data collection.

Ethical Approval

Ethical approval for this study was granted by the Institutional Review Board of Stomatology National Curative and Specialized Hospital. All procedures followed were in accordance with the ethical standards of the institution and the Declaration of Helsinki.

Data Collection

Data relevant to the diagnosis and treatment of maxillofacial fractures were extracted from the patients' medical records, including clinical notes, radiographs, and surgical reports. Digital radiographs were reviewed to confirm the presence and location of fractures.

Data Review and Analysis

The data were reviewed for completeness and accuracy, and missing or incomplete records were excluded from the analysis. Descriptive statistical analysis was conducted using SPSS software version 26.0 (IBM, Armonk, NY, USA). Statistical measures included frequencies, means, and standard deviations (SD) to summarize the demographic characteristics, etiological factors, and fracture patterns of the patients.

Results

In this retrospective study, data from the medical records of 290 trauma patients were collected and analyzed, with results presented as percentages. Among the participants, 230 (79.31%) were male and 60 (20.68%) were female. The cohort was categorized into five age groups: under 10 years, 11-26 years, 27-42 years, 43-58 years, and over 59 years, with a mean age of 30.05 years (SD = 13.75). The majority of patients were young adults, particularly within the 11-26 age group, which represented 44.8% of the cohort. Males predominated in all age groups, resulting in a male-to-female ratio of 3.8:1 (Table 1). Road traffic accidents were the leading cause of trauma, accounting for 47.9% of cases, followed by assaults (20.3%), falls (15.2%), gunshot wounds (7.6%), and sports-related incidents (5.2%). Pressure stove explosions were the least frequent cause, contributing to 3.8% of cases (Table 2). The most common fractures observed were midface fractures, identified in 228 cases (78.4%) out of 484 fractured areas in maxillofacial injuries. Mandibular fractures were the second most common, found in 107 patients (36.8%). Among midface fractures, zygomatic fractures were the most prevalent, accounting for 24.8%, followed closely by orbital fractures at 24.4%. Le Fort II fractures comprised 10.5%, Le Fort I fracture 9.1%, and Le Fort III fractures 2.5%. Regarding mandibular fractures, condylar fractures were the most frequent (14.7%), followed by angle fractures (6.2%) and ramus fractures (4.8%). Symphyseal fractures (2.1%) and parasymphyseal fractures (1%) were the least common (Table 3).

Table 1: Demographic distribution of fractures in different age groups and gender.

	< 10 Years	11-26 Years	27-42 Years	43-58 Years	> 59 Years
Male(n=230)	3.04%	46.95%	31.3%	13.9%	4.8%
Female(n=60)	13.3%	36.6%	28.3%	11.6%	21.06%

Table 2: Etiology of maxillofacial fractures.

Etiology	Number	Percentage
Assault	59	20.3%
RTA	139	47.9%
Gunshot Injuries	22	7.6%
Sports	15	5.2%
Fall	44	15.2%
Pressure Cooker Explosion	11	3.8%

Table 3: Distribution of maxillofacial fractures.

	Fractures	
	Number	Percentage
Le Fort I	44	9.1%
Le Fort II	51	10.5%
Le Fort III	12	2.5%
Zygomatic	120	24.8%
Orbital	118	24.4%
Mandibular Symphysis	10	2.1%
Mandibular Parasymphysis	5	1.0%
Mandibular Angle	30	6.2%
Condylar Process	71	14.7%
Ascending Ramus	23	4.8%

Discussion

Maxillofacial trauma, which is characterized by its multifactorial etiology, remains a leading cause of damage to the soft tissues and bones of the face. Understanding the patterns and characteristics of these injuries is essential for both effective treatment and prevention [17]. In our retrospective study involving 290 trauma patients, we observed a male predominance of 79.31% in maxillofacial fractures, which is consistent with findings from other regions. For example, in Saudi Arabia, the male-to-female ratio varies by city: Aseer reports a ratio of 10:1, AlHofuf 8.3:1, and AlQurayyat 2:1 [18]. Similarly, in the Middle East and North Africa (MENA) region, males outnumber females in maxillofacial injuries with an overall ratio of 4.5:1 [19]. The higher incidence of maxillofacial fractures among males can be attributed to their increased participation in high-risk activities such as driving, occupations in construction or manufacturing, and sports, all of which elevate their risk of injury. Additionally, males are more likely to engage in physical confrontations compared to females. Cultural, historical, and social norms have also historically restricted women's participation in outdoor activities without supervision, further contributing to the disparity in trauma rates [6,20]. In contrast, countries like Austria [21] and Canada [22] have reported lower male-to-female ratios for

maxillofacial fractures, with ratios of 2.1:1 and 1.6:1, respectively. The reduced male-to-female ratio in certain regions has been attributed to the increasing participation of females in social activities, which may expose them to higher risks of road traffic accidents and urban violence. In our study, young adults aged 11-26 years accounted for 44.6% of patients with maxillofacial fractures. This finding is consistent with recent studies conducted in various countries. For example, A 10-year retrospective study conducted in Hofuf, Saudi Arabia, indicated that young adults aged 19-44 years represented a significant portion of maxillofacial fracture cases, primarily due to road traffic accidents. This demographic accounted for 65.6% of the cases, highlighting the prevalence of such injuries in this age group [23]. Similarly, a study from sub-Saharan Africa highlighted those maxillofacial injuries disproportionately affect young adults, emphasizing the vulnerability of this age group [24]. These findings likely reflect the higher levels of physical activity and mobility associated with the younger demographic. Young adults often navigate a life stage characterized by self-discovery, social engagement, reckless driving, and increased exposure to violent situations [25]. Additionally, high-speed driving, inadequate safety measures, and greater participation in physically demanding activities such as sports contribute to the increased risk of injuries. These evolving lifestyle habits are likely a significant

factor in the higher prevalence of fractures within this age group [20]. In our study, RTAs were the leading cause of maxillofacial fractures, accounting for 47.9% of cases. This aligns with recent studies from various regions. For example, a study in Pakistan reported that RTAs were the most common cause of maxillofacial trauma, representing 63.6% of cases [6]. This finding is consistent with global trends, underscoring the urgent need for improved road safety measures and public awareness campaigns to reduce these risks [26].

In contrast, research from other countries has identified assaults as the primary cause of maxillofacial injuries. For instance, a study in Australia found that interpersonal violence was the leading cause, accounting for 51.72% of cases [27]. The differences in the causes of maxillofacial injuries can be attributed to socioeconomic factors that distinguish developed from developing countries. The decline in RTA-related maxillofacial fractures in developed nations is largely due to improvements in driving conditions, better education and public awareness, and the enforcement of strict traffic laws and regulations. As RTAs have decreased in these countries, interpersonal violence has emerged as the leading cause of maxillofacial trauma, often associated with factors such as alcohol consumption and unemployment. Despite the increasing enforcement of traffic regulations in many countries, RTAs continue to be a significant contributor to maxillofacial fractures worldwide, including in Afghanistan. Several factors may contribute to this persistent issue, including widespread access to vehicles among young people, high-speed driving, non-compliance with seat belt usage, disregard for traffic laws, and a general lack of awareness regarding traffic regulations, which is often exacerbated by low literacy levels. These findings highlight the need for comprehensive strategies that address both road safety and violence prevention to reduce the incidence of trauma and improve public health outcomes [28].

These findings emphasize the need for comprehensive strategies that address both road safety and violence prevention in order to reduce the incidence of trauma and enhance public health outcomes [28]. The substantial contributions of assaults (20.3%) and falls (15.2%) further highlight the importance of targeted interventions aimed at preventing violence and educating the public on fall prevention, particularly among vulnerable populations [26]. Recent studies continue to underscore the significant roles of assaults

and falls in maxillofacial injuries, reinforcing the necessity for specific interventions. For example, a 2024 study found that assaults were responsible for 24.1% of maxillary fractures, while falls accounted for 23.3% of such injuries [29]. Another study from the same year found that assaults were the predominant cause of maxillofacial trauma, comprising 80.4% of cases, followed by traffic accidents at 6.4% [30].

In our study, midface fractures were the most prevalent, occurring in 78.4% of patients, with Le Fort II (10.5%), zygomatic (24.8%), and orbital (24.4%) fractures being the most common types. This finding is consistent with recent research. For example, a study in Northern India found zygomatic complex fractures to be present in 72.7% of patients with orbital fractures, highlighting a strong association between these injuries [31]. A study from Vietnam reported that 55.2% of midface fractures were zygomatic complex fractures, with 14.4% being Le Fort type II fractures, further emphasizing the need for targeted management strategies for these conditions [32]. These studies underscore the high prevalence of orbitozygomatic fractures in trauma cases, which require precise surgical intervention due to their significant functional implications. The high incidence of mandibular fractures (36.8%), particularly involving the condylar process (14.7%) and mandibular angle (6.2%), further stresses the importance of comprehensive management strategies for maxillofacial injuries. Recent studies also confirm the significant incidence of mandibular fractures, especially those involving the condylar process and mandibular angle. A study in Indore reported that 19% of 1510 patients had mandibular angle fractures, with road traffic accidents being the leading cause [33]. Another study indicated that mandibular condylar fractures accounted for 45% of all mandibular fractures, with a notable prevalence in the pediatric population [34]. While this study offers valuable insights, several limitations should be acknowledged. Firstly, the retrospective design may introduce selection bias, as the data were obtained from existing medical records, potentially leading to incomplete or inconsistent documentation. Additionally, the study's reliance on trauma records from a single institution may limit the generalizability of the findings to broader populations. Future prospective studies involving multiple centers would offer a more comprehensive understanding of trauma demographics and injury patterns.

Conclusion

This study highlights critical trends in trauma-related maxillofacial injuries, emphasizing the need for targeted interventions and tailored treatment approaches. Understanding the demographic and causative factors can inform healthcare providers and policymakers in developing strategies to reduce the incidence of such injuries and improve patient outcomes.

Declarations

Conflict of Interest

The authors report no conflict of interest in this work.

Data Availability Statement

The data that support the findings of the study are available upon request from corresponding author.

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