

Frequency of Diplopia in Zygomatic Fractures

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ABSTRACT

Background: A zygomatic fracture is a type of face fracture resulting from a break in the zygomatic bone. It is frequently the result of facial injuries caused by automobile accidents, physical assault, falls, etc, often associated with pre and post-operative ocular complications.

Objectives: Therefore, this research was conducted to determine frequency of diplopia in zygomatic fractures.

Methods: The study was executed from June 2020 to November 2022 on 241 patients admitted to the MMT Hospital, Dera Ismail Khan and data pertaining to diplopia due to zygomatic fractures was recorded at the initial and final visits of the patients. The preoperative and postoperative adverse effects of diplopia were critically examined.

Results: The frequency of diplopia in the zygomatic fractures of the study group was determined to be 38.58 percent, with 93 individuals affected. It was also seen that 52 individuals out of 132 were affected with diplopia in road accidents, followed by 16 in physical assaults, 9 in fall injury, 9 in the workplace, and 7 individuals were injured while playing sports, with the respective frequencies being 39.39, 35.55, 42.85, 42.85, and 25.92%.

Conclusion: It was concluded from the study that zygomatic fractures continued to be one of the most prevalent maxillofacial fractures and were commonly caused by road accidents. The highest occurrence was observed in young male patients and was frequently linked to ocular problems and the incidence of diplopia was significant among patients with zygomatic fractures (38.58%). In order to limit the frequency of diplopia in cases of zygomatic fractures, it was recommended that surgical treatment of zygomatic fractures be performed promptly to prevent ocular complications.

Keywords: Diplopia; Mandibular fractures; Ocular complications; Road accidents; Zygomatic fractures.

INTRODUCTION

One of the most widespread types of injuries seen in both general and hospital settings is maxillofacial. Zygoma occupies a prominent location on face; hence, zygomatic fractures are reported as 2nd most prevailing fractures of facial bones, following nasal fractures^{1,2}. Zygoma is an important face contour and is located on the lateral mid-face. It articulates at the zygomatico-frontal suture with frontal bone and along the orbital floor with maxillary bone³. The infraorbital nerve exits the orbit through infraorbital foramen in maxilla. Consequently, damage to the zygomatic arch results in hypoesthesia in pretentious locations⁴.

Typically, zygomatic fractures are categorized as either pure or impure. Impure orbital fractures affect the orbital rim and the inner orbital walls, while the majority of orbital pure fractures occur on medial walls or floor. Orbital wall fractures are also categorized as isolated fractures, affecting a single orbital wall, or mixed fractures, affecting multiple orbital walls⁵. In accordance with the anatomical region of fracture rim, orbital fractures can be categorized as median, orbital floor, lateral wall and orbital roof fractures; floor is the most commonly wounded region since it includes the most open room and lack of support⁶.

Accidents on road and trauma are the most common causes of zygomatic fractures characterized by prominent indications like cheek flattening, trismus, nasal hemorrhage, edema, and ocular problems. Fractures of the zygoma are usually accompanied by orbital fractures, with varying degrees of orbital floor comminution and ejection into the maxillary sinus. Diplopia, traumatic mydriasis, subconjunctival hemorrhage, corneal laceration, canthal laceration, enophthalmos, reduced visual acuity, retinal detachment, ruptured globe, retinal hemorrhage, hyphema and angle recession are ocular complications of zygomatic fractures⁷⁻⁹.

Early diagnosis is essential for optimal therapy and is directly dependent on initial evaluation, injury assessment, and prompt intervention. Various surgical procedures have been utilized to treat zygomatic complicated fractures. The optimal surgical method should give adequate exposure to the shattered segments, reduce the risk of future harm to important structures, and permit satisfactory cosmetic outcomes¹⁰.

The rationale of this study was to determine the frequency of diplopia in zygomatic fractures treated in MMT Hospital, Dera Ismail Khan, Pakistan.

MATERIAL AND METHODS

This cross-sectional study was conducted from June 2020 to November 2022 on 241 patients admitted to the MMT Hospital, Dera Ismail Khan, during the study period.

This study covered individuals of either gender with a history of maxillofacial trauma within time frame. Patients from the outdoor patient department with oral and maxillofacial trauma were also included. This study examined patients with solitary unilateral moderate- or high-energy zygomatic fractures. Excluded from the study were patients with non-displaced zygomatic and bilateral zygomatic fractures, old midfacial trauma or surgery; pure orbital fractures; ophthalmic disorders and surgeries before the trauma; and cases associated with acute ocular injuries requiring urgent surgical intervention, such as ruptured globe, traumatic optic neuropathy, retrobulbar hemorrhage, muscle incarceration and the patients sustaining other facial fractures.

The recorded parameters were clinical sheets: gender, age, etiology of trauma, and clinical presentation analysis. After the initial consultation with the maxillofacial surgeon, all patients with fractures were examined for ocular complications including diplopia. The demographic information, pattern of injury, and manner of fracture was collected, as well as the severity of serious eye disorders. The data pertaining to diplopia was recorded at the initial and final visits. Preoperative and postoperative adverse ocular effects including diplopia were critically examined.

The study was authorized by institution's research ethical committee. Consent and written releases were acquired from patients, and the research was done in strict accordance with ethical standards.

For statistical analysis, SPSS version 24 (SPSS Inc) was implemented. A p-value of 0.05 was deemed statistically significant. Qualitative variables were compared using a one-way ANOVA with Tukey's HSD and comparison of two parameters was done by chi square test.

RESULTS

Two hundred forty-one patients hospitalized in MMT Hospital, Dera Ismail Khan with zygomatic fractures participated in the study between 2020 and 2022. After obtaining the patients' agreement, a questionnaire was used to record the demographic characteristics of the patients. The majority of patients with zygomatic fractures were male (81.74%), whereas 18.25% were female (44/241). A major proportion of the population affected by zygomatic fractures was between the ages of 11 and 25 (48.96%), followed by those between 26 and 40 (27.38%), those over 40 (12.44%), and those under 10 (11.2%). 149 patients (61.82%) were literate, while 92 (38.17%) were illiterate. Significantly more (p<0.05) rural patients (60.16%) than urban patients (39.83%) were seen (Table 1). Road accidents (n=132) were the leading cause of zygomatic fractures (p<0.05) in the study population, followed by physical assault (n=45), sports (n=27), fall injury (n=21), and workplace trauma (n=16), with the occurrence rates of 54.77, 18.67, 11.20, 8.71, and 6.63%, respectively (Table 2). 24% of participants with zygomatic fractures presented with facial asymmetry, 23% with edema of the eyelids, 15% with edema of the orbits, 12% with facial swelling and pain, 9% with ecchymosis, 9% with restricted mandibular chewing, and 8% with malocclusion (Figure 1). The frequency of diplopia in the zygomatic fractures of the study group was determined to be 38.58 percent, with 93 individuals affected (Figure 2).

The frequency of diplopia in zygomatic fractures was also correlated with the demographic characteristics of the patients (Table 3). It was revealed that 84 out of 197 (42.63%) males with zygomatic fractures were affected with diplopia and 9 out of 44 (20.45%) females were affected and there was significant difference among the different age and sex groups (p<0.05).

The frequency of diplopia in patients with zygomatic fractures concerning the etiological agents was also studied, and it was determined that 52 individuals out of 132 were affected with diplopia in road accidents, followed by 16 in physical assaults, 9 in fall injury, 9 in the workplace, and 7 individuals were injured while playing sports, with the respective frequencies being 39.39, 35.55, 42.85, 42.85, and 25.92% (Figure 3).

Table 2: Various etiological aspects resulting in zygomatic fracture in study population

S. No	Etiology of zygomatic fracture	No. of patients (n)	Frequency (%)	p-value
1	Road accidents	132	54.77	0.00001* (p-value is significant at p<0.05)
2	Physical assault	45	18.67	
3	Fall injury	21	8.71	
4	Sports	27	11.20	
5	Workplace trauma	16	6.63	

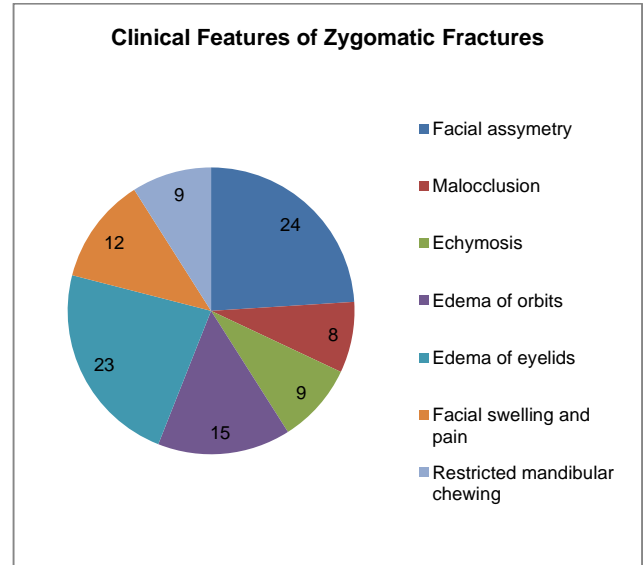


Figure 1: Frequency of clinical features of zygomatic fractures in the subjects

Table 1: Demographic characteristics of the individuals admitted with zygomatic fractures

S. No	Variable	No. of subjects (n)	Frequency (%)
1	Sex		
	Male	197	81.74
	Female	44	18.25
2	Age (Years)		
	<10	27	11.20
	11-25	118	48.96
	26-40	66	27.38
	>40	30	12.44
3	Literacy level		
	Educated	149	61.82
	Uneducated	92	38.17
4	Location		
	Rural	145	60.16
	Urban	96	39.83

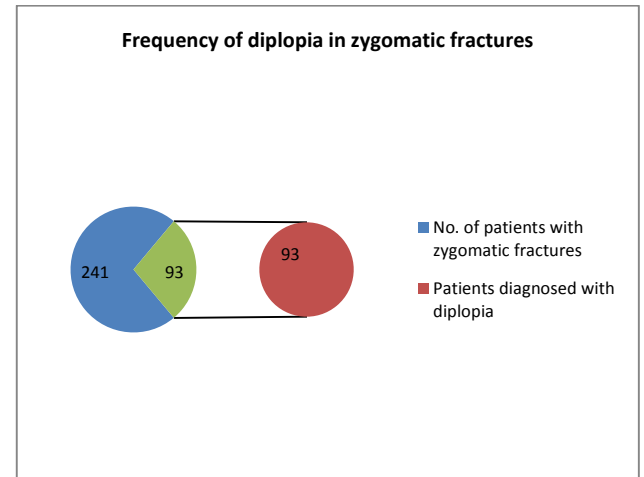


Figure 2: Frequency of diplopia in zygomatic fractures in the study group

Table-3: Stratum of frequency of diplopia in zygomatic fracture with reference to demographics of patients

Age (years)	Frequency of diplopia				χ ²	P-value	
	No Ocular complications		Affected with Diplopia				
	Male n (%)	Female n (%)	Male n (%)	Female n (%)			
1	<10	9	6	8	4	0.0556	0.8135
2	11-25	63	9	43	3	3.4096	0.0648
3	26-40	31	13	20	2	4.298	0.0381*
4	>40	10	7	13	0	0.1392	0.7091
Total		113 (76.35)	35 (23.64)	84 (90.32)	9 (9.67)	41.742	0.00001*

*indicated that the p-value is significant at p<0.05

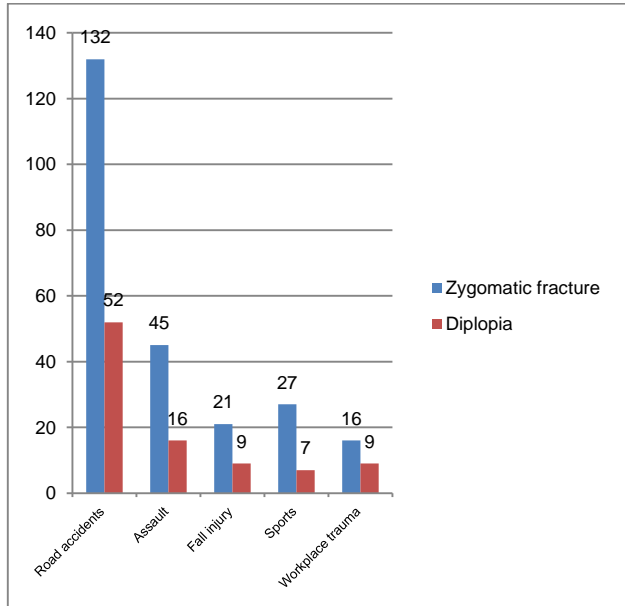


Figure 3: Frequency of diplopia in patients affected with zygomatic fractures in reference to the etiological agents

DISCUSSION

In this analytic exploration, young adult age group (11 to 25 years) was the most frequently affected by trauma, which can be demonstrated by high activity levels and prevalence of outdoor workers during these years. Males' greater social and economic participation than females, particularly in developing nations, may account for the male preponderance. The most common cause of zygomatic complex fractures was automobile collisions, followed by assaults, sports, falls, and finally workplace trauma. Ninety-three patients with zygomatic fractures were diagnosed with diplopia by the ophthalmologists and the frequency of diplopia in zygomatic fractures was thus 38.58%, respectively.

Comparable research of nature reported eye signs that included enophthalmos, diplopia, and ectropion. As a result of periorbital fat atrophy, preoperative enophthalmos was diagnosed in 25 instances, but in the postoperative follow-up, it was seen in just 5 cases. Preoperative diplopia was identified in 22 instances (18.3%), and it persisted in five cases (4.1%)¹⁰. Another study revealed that diplopia persisted in 17% of patients suffering from zygomatic fractures¹¹ and another report revealed that 7.1% of patients still had complaints of diplopia even after surgical corrections post-zygomatic fractures¹². 60% of blowout fractures were associated with ocular problems related to a force directly applied to the eyeball, according to the findings of a study. In other investigations examining blowout fractures, similar incidences were identified¹³. The most serious injuries were globe rupture, choroidal rupture, retinal detachment, and lens displacement¹⁴⁻¹⁵.

Our results were consistent with studies that revealed a prevalence of 19.8% for midfacial fractures⁸, 58% for orbital blowouts, and 16% for ZMC fractures¹⁶. 56% of orbital fractures exhibited diplopia, with sub-distribution of 89.4% in pure blow-outs and 44.6% in impure blow-outs¹⁷. The prevalence of diplopia in midfacial injury was 9%¹⁸, 11.5%¹⁹, or 13.3%¹⁶, according to more recent study. Comparable to a study in which it was observed that diplopia was most prevalent in patients who had undergone surgery for orbital wall fractures (100%) and least prevalent in patients who reported trauma as a result of interpersonal violence (15%) and motor vehicle accidents (11%). The incidence of orbital problems in patients with zygomaticomaxillary complex and solitary

orbital wall fractures implies that diplopia remains the most prevalent pre-surgical ocular complication^{6,20,21}.

CONCLUSION

Zygomatic complex fractures continue to be one of the most prevalent maxillofacial fractures and are commonly caused by automobile accidents. The highest occurrence was observed in young male patients and was frequently linked to ocular problems. The incidence of diplopia was significant among patients with zygomatic fractures (38.58%). To limit the frequency of diplopia in cases of zygomatic fractures, it was recommended that surgical treatment of zygomatic fractures be promptly performed to avoid ocular complications.

Conflict of Interest: None.

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