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Assessment of etiology of zygomaticomaxillary complex fractures

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Abstract---Background: Among facial fractures, zygomatic fractures are some of the most frequently observed types. The epidemiology of zygomatic fractures is constantly changing and is variable across populations. The present study was conducted to assess etiology of zygomaticomaxillary complex fractures. Materials & Methods: 105 patients of zygomaticomaxillary complex fractures of both genders were recorded. Parameters such as cause of injury, pattern of ZMC fracture was recorded. All the patients were managed following AO principles. Results: Out of 105 patients, males were 65 and females were 40. Age group (years) 11-20 had 12, 21-30 had 25, 31-40 had 38 and 41-50 had 30 patients. Etiology was RTA in 60, fall in 36 and physical violence in 9 cases. Fracture type was atypical in 33 and conventional in 72 cases. The difference was significant ($P < 0.05$). Conclusion: Zygomaticomaxillary complex fractures were commonly seen among males in age group of 31-40 years and road traffic accident was the leading cause of fracture.

Keywords---zygomaticomaxillary complex fractures, trauma, etiology.

Introduction

Facial fractures commonly result from various traumatic insults to the face, and can occur in isolation or concomitantly with other injuries. Among facial fractures, zygomatic fractures are some of the most frequently observed types.¹ The epidemiology of zygomatic fractures is constantly changing and is variable across populations. Zygoma is a strong buttress of lateral portion of middle third of facial skeleton, forms the malar prominence and is an integral part of the lateral and inferior orbital rim and the orbital floor.²

The zygoma is composed of 4 regions, the zygomaticofrontal suture, inferior orbital rim, zygomaticomaxillary buttress, and the zygomaticotemporal suture.³ Of these, the zygomaticofrontal suture is the most important region because the collapse of the zygomaticotemporal suture requires the application of a strong, external force. Thus, an estimation of the external force applied may be estimated, based on the condition of the zygomaticotemporal suture.⁴

Because of its prominent position, it is more prone to fractures either alone or in combination with other structures of midface such as maxilla, nasoethmoidal and orbital area. Fracture patterns commonly involve four processes of the complex resulting in distinct facial deformity. Functional impairment like paresthesia, trismus, diplopia, antimongoloid slant is also very much troublesome for the patient which requires surgical correction.⁵ A number of studies have described the etiology of these fractures. However, the relationship between the trauma etiology and the resulting zygomatic fracture pattern has been primarily anecdotal.⁶ The present study was conducted to assess etiology of zygomaticomaxillary complex fractures.

Materials & Methods

The present study comprised of 105 patients of zygomaticomaxillary complex fractures of both genders. The consent was obtained from all enrolled patients. Data such as name, age, gender etc. was recorded. Parameters such as cause of injury, pattern of ZMC fracture was recorded. Neurological and ophthalmic evaluation was performed in patients before any maxillofacial intervention. All the patients were managed following AO principles. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

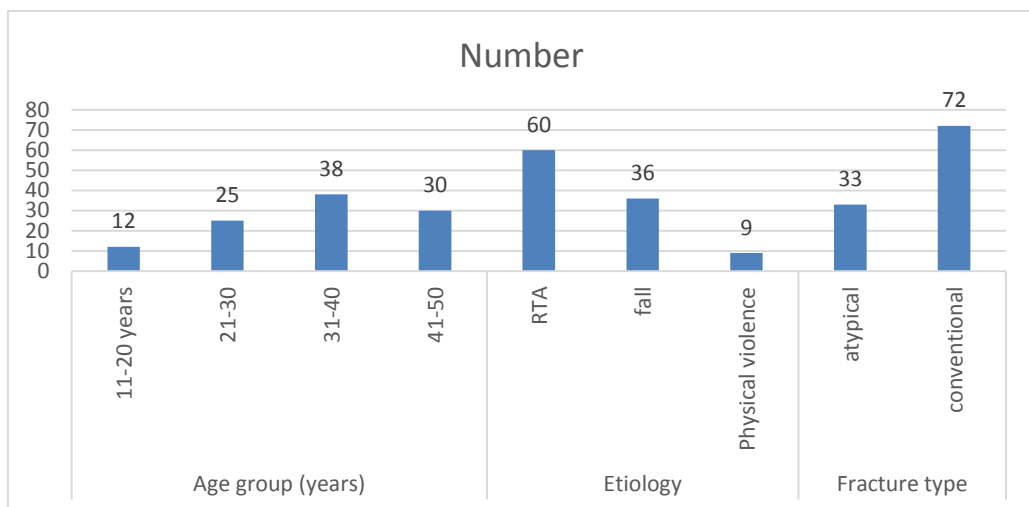
Total- 105		
Gender	Males	Females
Number	65	40

Table I, shows that out of 105 patients, males were 65 and females were 40.

Table II Assessment of parameters

Parameters	variables	Number	P value
Age group (years)	11-20	12	0.17
	21-30	25	
	31-40	38	
	41-50	30	
Etiology	RTA	60	0.05
	fall	36	
	Physical violence	9	
Fracture type	atypical	33	0.01
	conventional	72	

Table II, graph I shows that age group (years) 11-20 had 12, 21-30 had 25, 31-40 had 38 and 41-50 had 30 patients. Etiology was RTA in 60, fall in 36 and physical violence in 9 cases. Fracture type was atypical in 33 and conventional in 72 cases. The difference was significant ($P < 0.05$).



Discussion

The maxillofacial region is one of the most vulnerable parts of the body exposed to injury, and among the face ZMC is the subunit that is an integral part of facial esthetics and functions.⁷ Zygomaticomaxillary complex (ZMC) is one of the most critical and complex facial structures providing both vertical and horizontal strut to facial framework. Zygoma is a strong buttress of lateral portion of middle third of facial skeleton, forms the malar prominence and is an integral part of the lateral and inferior orbital rim and the orbital floor.⁸ Because of its prominent position, it is more prone to fractures either alone or in combination with other structures of midface such as maxilla, naso-ethmoidal and orbital area. Fracture patterns commonly involve four processes of the complex resulting in distinct facial deformity.⁹ Functional impairment like paresthesia, trismus, diplopia, antimongoloid slant is also very much troublesome for the patient which requires

surgical correction. It is difficult to use existing classifications for ZMC fractures in few cases because of changing fracture patterns due to complex injuries.¹⁰ These factors in turn make the fractures difficult to manage and often require patient specific treatment plan.^{11,12} The present study was conducted to assess etiology of zygomaticomaxillary complex fractures.

We found that out of 105 patients, males were 65 and females were 40. Sakamoto et al¹³ determined relationships between the trauma etiology, the zygomatic fracture patterns. In total, 113 patients, aged 16-82-years-old (mean age (SD), 39.8 (17.0)-years-old), including 74 men were analyzed. Patients in their teens and 20s had injuries that were predominantly sports-related (48.8%). With increasing age, the ratio of sports injuries decreased and the number of falls causing injury increased. The frequency of injuries caused by motor vehicle collisions remained reasonably constant across the age groups. Comparing the ratio of shear type fractures with patient ages revealed that 4/ 13 injuries among patients in their 20s and 30s were of this type, whereas the proportion of shear fractures increased in patients over 40 (17/28, $p < 0.05$). We observed that age group (years) 11-20 had 12, 21-30 had 25, 31-40 had 38 and 41-50 had 30 patients. Etiology was RTA in 60, fall in 36 and physical violence in 9 cases. Fracture type was atypical in 33 and conventional in 72 cases. Dikhit PS et al¹⁴ analyzed retrospectively the changing patterns of mid-face fractures in a sample of patients. A performa was prepared which included age, sex, etiology of injury, alcohol influence, and treatment given during hospital stay. Road traffic accidents contributed 68.11% of zygomaticomaxillary complex (ZMC) fractures, followed by assault (18.11%) and fall from height (13.76%). RTA was the major cause of atypical ZMC fractures as compared to conventional ZMC fractures ($P < 0.001$).

Ungari et al investigated epidemiological data (age, gender), sites, etiology and surgical approach of zygomatic fracture. A 9 years retrospective clinical and epidemiologic study evaluated 642 patients treated for zygomatic fracture. There were 569 men and 77 women. The age range was 2 to 86 years with 205 (31.9%) in the 21 to 30 years age group. A number of parameters, including age, gender, cause of injury, site of injury, treatment modalities were evaluated. There were 552 (86%) zygoma fractures and 90 (14%) zygomatic arch fractures. The left zygoma was involved in 309 cases (56%); the right zygoma was involved in 243 cases (44%). Concerning the zygomatic arch, the left side was involved in 43 cases (48%) and the right side in 47 cases (52%). 7% of the patients were younger than 9 years old, about 70% between 10 and 39 years, and 18% between 40 and 59 years, while 4% were older than 60 years. Causes of zygoma fracture were traffic accidents in 151 (26%), assault in 117 (20%), accidental falls in 105 (19%), sports injuries in 56 (10%), home injuries in 45 (8%), work accidents in 34 (6%). Causes of zygomatic arch fractures 28 (29.1%) were assaults in 28 (29.1%), traffic accidents in 20 (21.5%), sports injuries in 14 (15.8%), accidental falls in 11 (14%), domestic accidents in 8 (8.8%) and work accidents in 4 (5%). The access to the fronto-zygomatic suture (74.6%) and the maxillary vestibular approaches (66.8%) were the commonest method of reduction of zygomatic fracture. About arch fractures, the Gillies temporal approach was the most used method of reduction (94.4%).

Conclusion

Authors found that Zygomaticomaxillary complex fractures were commonly seen among males in age group of 31-40 years and road traffic accident was the leading cause of fracture.

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