

OCCURRENCE AND TREATMENT OF ZYGOMATIC BONE FRACTURES

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ABSTRACT

Objective: To evaluate and analyze the occurrence and treatment of zygomatic bone fractures in our population.

Material and Methods: Data of 50 patients with zygomatic bone fractures reported to the department of Oral and Maxillofacial Surgery, Bacha Khan Medical College Mardan, from May 2013 to October 2015 were reviewed. History, clinical examination and radiographic studies were carried out for diagnosis. Data regarding the age, gender, etiology, side involved, associated facial fractures and treatment modalities were evaluated and analyzed.

Results: The most common age group involved was 3rd decade. Male outnumbered female. Road traffic accidents (72%) was the leading cause and left side (56%) was more involved. Maxillary fracture (22%) occurred more than mandible as associated facial fractures. Closed and open reductions were the common modalities of treatment with no significant complications.

Conclusions: This study showed that zygomatic bone fractures occurred more in young males. Male RTA was the leading cause and left side of the patient was more affected. Maxilla was commonly fractured with zygomatic bone. Closed and open reductions were used for treatment with no significant complications.

Key words: Zygomatic bone fracture, Road traffic accident, Modality of treatment

INTRODUCTION

Face occupies the prominent position in the human body which makes it vulnerable to traumatic injuries. Zygoma or zygomatic bone is a strong bone of lateral portion of middle third of facial skeleton, playing a key role in the determination of facial morphology and protection of orbital contents^{1,2}. Because of its prominent anatomical position; it fractures most commonly among maxillofacial injuries³.

Its fracture may occur alone or in combination with other facial bones or more serious injuries, including cranial, spinal, abdominal, pelvic, upper and lower body injuries⁴. Fracture pattern depends on the mechanism of mechanism of injury, magnitude and direction of impact force and anatomy of site⁵. It is reported that zygomatic bone fractures represent the

second most frequent fractures of the middle face after the nasal bones⁶. It is involved in 42% of facial fractures and accounts for 64% of all middle third facial fractures⁷.

The common causes of zygomatic bone fractures, across the globe, are road traffic accidents (RTA), falls, assaults, sports, firearm injury and industrial accidents. These etiological factors depend on the geographic condition, socioeconomic status, and cultural characteristics and era^{5,6,8}. Road traffic accident is the leading cause of maxillofacial fractures in developing countries, while interpersonal violence is the leading cause in western world^{1,3,5,7}. The most common causative factor in adults is the road traffic accident and fall in the younger population^{8,9}. Epidemiological studies have revealed age and sex as important factors that influence the occurrence of maxillofacial trauma. The highest incidence is observed in the age group 21-30 years, while the lowest in the age group above 60 years and below 5 years. Recent data indicates 4:1 male: female ratio worldwide^{5,8,9,10}.

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Zygomatic bone has four bony attachments to the skull through its processes, when fracture of all occurs, called tetrapod fracture, or can occur as isolated process fracture¹¹. Common Signs and symptoms of zygomatic bone fracture includes swelling of face, subconjunctival haemorrhage, periorbital or maxillary vestibular ecchymosis, periorbital edema, trisms, flattening of cheek, sensory disturbance, enophthalmos, diplopia and gagging of occlusion, epistaxis etc^{11,12}. Diagnosis of zygomatic bone fracture depends upon history and clinical examination and confirmed by plain radiography, CT scan of face in axial and coronal plane for all patients¹².

The treatment of zygomatic bone fracture varies from none to open reduction and internal fixation at three or four sites depending upon type of fracture¹³. Zygomatic bone fracture carries a risk of functional and aesthetic impairment and therefore warrants timely management to prevent late or non operative squeals. The purpose of the present study was to evaluate the occurrence of zygomatic bone fracture and its treatment options, preventing later complications.

METHODS AND MATERIALS

The present descriptive study (case series) had been carried out on 50 consecutive patients of both gender and any age group presenting with the features

Table-1: Age and Gender Distribution of Patients with Zygomatic Bone Fractures

Age Group in Years	Male		Female		Total	
	n	%	n	%	n	%
11-20	10	20	1	2	11	22
21-30	15	30	5	10	20	40
31-40	7	14	2	4	9	18
41-50	7	14	1	2	8	16
51-60	1	2	0	0	1	2
Above 60 years	0	0	1	2	1	2
Total	40	80	10	20	50	100

Table-2: Distribution of Patients According to Etiology

Etiology	Male		Female		Total	
	n	%	n	%	n	%
RTA	36	72	08	16	44	88
Falls	2	4	1	2	3	6
IPV	2	4	0	0	2	4
FAI	0	0	01	2	1	2
Total	40	80	10	20	50	100

of zygomatic bone fracture at Oral and Maxillofacial Surgery Unit, Bacha Khan Medical College Mardan from May 2013 to October 2015. With the consent of the patients, a detailed history was taken and thorough clinical examination was carried out. Routine investigations, orthopentograph (OPG), Waters view and CT were performed for every patient supplemented by MRI when necessary. Cases already treated were excluded from the study. The diagnosis, established, was based on history, clinical and radiographic examination in all cases. The data concerning the study was obtained on preformed proforma and evaluated and analyzed by applying descriptive statistics.

RESULTS

The age of patients at the time of presentation ranged from 13- 81 years, with a mean age 30.65 ±5.45 years. The most common age group involved was 3rd decade (40%) followed by 2nd decade (22 %). The details of age distribution are given in Table 1.

Gender distribution showed that zygomatic bone fractures were common in male (80%) with ratio of male to female of 4:1 (Table 1). Road traffic accidents (n=36, 72%) was the leading cause followed by falls (n=3, 6%) and least by FAI (n=1, 2). (Table2).

Left side (n=28, 56%) of the zygomatic bone was commonly fractured than the right side (n=22, 44%) in all etiological factors (Table 3). Regarding the distribution of associated facial fractures, maxilla (n=11, 22%) was commonly fractured followed by mandible (n=9, 18%). (Table4). Closed reduction (n=27, 54%) was comparatively the common modality of treatment than open reduction and internal fixation (n=23, 46%). (Table5). Post operatively, no significant complications were noted in all patients.

Table-3: Distribution of Patients According to Etiology and Side of Involvement

Etiology	Side of involvement				Total	
	Left		Right			
	n	%	n	%	n	%
RTA	24	48	20	40	44	88
Falls	2	4	1	2	3	6
IPV	1	2	1	2	2	4
FAI	1	2	0	0	1	2
Total	28	56	22	44	50	100

Table-4: Distribution of Patients with Etiology and Associated Facial Fractures

Etiology	Associated Facial Injuries				Total	
	Maxilla		Mandible			
	n	%	n	%	n	%
RTA	8	16	6	12	14	28
Falls	2	4	2	4	4	8
IPV	1	2	1	2	2	4
FAI	0	0	0	0	0	0
Total	11	22	9	18	20	40

Table-5: Patients Distribution According to Treatment Modalities

Etiology	Treatment Modality				Total	
	Closed Reduction		Open Reduction			
	n	%	n	%	n	%
RTA	25	50	19	38	44	88
Falls	1	2	2	4	3	6
IPV	1	2	1	2	2	4
FAI	0	0	1	2	1	2
Total	27	54	23	46	50	100

DISCUSSION

The results of epidemiological surveys on the causes and incidence of zygomatic bone fractures tend to vary with geographic region, socioeconomic condition, cultural characteristics and era. In the present study the predominant age group having zygomatic bone fractures was 21-30 years; these findings are consistent with the results of the previous studies done across the world^{5,7,8,14,15,16}. The possible explanation for the higher frequency of fractures in age group 21-30 years is that the second and third decades of human life are the most active decades in life and thus people in these decades are vulnerable to trauma. These age groups show more activity in sports, fights, violent activities, industry and high speed transportation. In developing countries the old aged people are economically dependent on the young for their livelihood. The low frequencies of very young and old age groups are due to the low activities of these age groups.

The male to female ratio (4:1) showed that zygomatic fractures were predominantly common in the male population in this part of the world. Other studies have also reported higher percentages of male than females. Obuekwe et al¹¹ reported male to female ratio as 3.2:1 Ajagbe HA et al¹⁷ 4.7:1, Chowdhury SKR et al⁸ 5.2:1, Kovacs FA et al¹⁸ 6.42:1, Sullivan STO et al¹⁹ 8.9:1 and Bouguila J et al²⁰ 9.1:1.

In the present study RTA was the leading cause of zygomatic fractures followed by falls.

Previous epidemiological studies reported similar findings about the causes of zygomatic fractures in developing countries^{3,4,8,21,22}. However, in western countries assault and interpersonal violence is the major cause of fractures. This changing trend in the etiology of fractures in western world may be attributed to the implementation of compulsory seat belts legislation²³

and to the abuse of alcohol and use of illicit drugs in those societies^{18,24}.

Interestingly Sullivan STO et al¹⁹ reported sports 27.5% and Gomes PP et al²⁵ reported fall 21.83% as most common cause of zygomatic complex fractures. The high number of maxillofacial fractures attributed to RTA in our country is due to lack of seat belt/helmet law obligation, over speeding, overloading, underage driving and poor conditions of roads and vehicles.

In this study, fracture of the zygomatic bone was common on the left (56%) than right side (44%). Similar results about the zygomatic bone fracture on left side have also been reported by Chowdhury and coworkers⁸ (59.77%), Kovacs AF¹⁸ (61.5%) and Ugoboki V (30 63%)²⁶.

Any trauma to facial region can cause fracture of other facial bones, which may occur in isolation or in association with zygomatic bone fractures. In this study 60% of patients presented with isolated fractures, while the rest (40%) in association with other facial bone fractures. During this study it was observed that maxillary bone fracture (22%) dominated other bones. The results of the present study coincides well with the study of Ahmad H.E.A and associates (2004)²⁷ where maxillary fractures dominated other facial bones. Adi M and colleagues (1990)²⁸ have reported that the most common bone of the facial skeleton fractured in association with zygomatic bone is mandible. The reason for the higher percentage of these fractures may be due to the fact that most of the injuries are caused by RTA (motor cycle accident) and falls in this country, where the maxillary bone is more prone to fracture than mandible.

The treatment modalities of zygomatic bone fracture vary from surgeon to surgeon and depends on multiple factors like the timing of presentation, degree of displacement, age of the patient, mouth opening,

aesthetics concern, finances and associated systemic diseases. There are different techniques either non surgical or surgical which ranges from simpler close reduction without fixation to open reduction and internal fixation^{7,14}. These techniques included temporal, lateral orbital, intraoral approaches and percutaneous for elevation with bone hook and external fixation, antral packing with gauze or balloon, intraosseous wiring, bone plating and recently endoscopic assisted reduction and fixation^{8,13,14}. In this study 54% of patients were treated by elevation either through intraoral or extraoral approaches and 46% were treated by open reduction and internal fixation with microplates. Upper eyebrow, infraorbital rim and intraoral vestibular incision were used to expose the fracture sites. No significant complications were noted in these patients.

CONCLUSIONS

This study shows that zygomatic bone fractures occurs more in young people. Male are more affected than female. RTA is the leading cause and left side of the patient is more affected. Maxilla is commonly fractured with zygomatic bone. Closed and open reductions can be used for treatment with no significant post operative complications.

REFERENCES

- Covington DS, Wainwright DJ, Teichgraber JF. Changing pattern in epidemiology and treatment of zygomatic fractures, 10 year review. *J Trauma* 1994; 27: 243-7.
- Jansma J, Bos RR, Vissink A. Zygomatic fractures. *Ned Tijdschr Tandheelkd.* 1997; 104: 436-9.
- Fasola AO, Obiechina AE, Arotiba JT. An audit of mid-face fractures in Ibadin, Nigeria. *Afr J Med Sci.* 2001; 30:183-6.
- Ungari C, Filiaci F, Riccardi E, Rinna C, Iannetti G. Etiology and incidence of zygomatic fracture: a retrospective study related to a series of 642 patients. *Eu Rev Med Pharmacol Sci* 2012; 16: 1559-62.
- Khitab U, Ansari SR, Khan A, Khan MT, Salam A. Occurrence and characteristics of maxillofacial injuries – a study. *Pak Oral Dent J* 2010; 30; 57-61.
- Hollier Lh, Thornton J, Pazmino P, Stal S. The management of orbitozygomatic fracture. *Plast Reconstr Surg* 2003; 111: 2386-92.
- Rehman A, Ansari SR, Shah SMA, Rehman B. Pattern of zygomatic bone fractures and treatment modalities: a study. *Pak Oral Dent J* 2010; 3: 36-40.
- Chowdhury SKR, Menon PS: Etiology and management of zygomatico maxillary complex fractures in the armed forces. *MJAFI* 2005, 61:238-40.
- Nayyar MS, Ekanayake MBK. Assessment of maxillofacial injuries. *Pak Oral Dent J* 2001; 21: 12-8.
- Adebayo ET, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. *Br J Oral Maxillofac Surg* 2003; 41: 396-400.
- Obuekwe O, Owotade F, Osaiyiwu O. Etiology and pattern of zygomatic complex fracture; a retrospective study. *J Natio Med Assoc* 2005; 97: 992-6.
- Tanrikaly R, Erol B. Comparison of computed tomography with conventional radiograph for midfacial fractures. *Dentomaxillofac Radiol* 2001; 32: 41-5.
- Geijerstan B, Bergstrom J, Stjarne P. Zygomatic fractures managed by closed reduction; an analysis with postoperative computed tomography follow up evaluating the degree of reduction and remaining dislocation. *J Oral Maxillofac Surg* 2008; 66:2302-7.
- Alamgir, Hameed H, Shah SMH. Frequency, etiology and characteristics of zygomatic complex fractures. *Pak Oral Dent J* 2013; 33: 240-4.
- Hussain S, Ahmad M, Khan I, Anwar M, Amin M, Ajmal S, et al. Maxillofacial trauma: current practice in management at Pakistan Institute of Medical Sciences. *J Ayub Med Coll Abbottabad* 2003; 15: 8-11.
- Olasoji MO, Tahir A, Ariobita GT. Changing pictures of facial fractures in Northern Nigeria. *Br J Oral Maxillofac Surg* 2002; 40:140-3.
- Ajagbe HA, Daramola JO. Pattern of facial bones fractures seen at University College Hospital Ibaden Nigeria East Africa. *Med J* 1980; 57:267-72.
- Kovacs AF, Ghahremani M. Minimization of zygomatic complex fracture treatment. *Int J Oral Maxillofac Surg* 2001; 30: 380-4.
- Sullivan STO, Panchal J, O Donghue JM, Beureng ES, Shaughnessy O, O Conoor TPF. Is there still a role of traditional methods in the management of fracture of zygomatic complex? *Injury* 1998; 29:413-35.
- Bouguila J, Zairi I, Khonsari RH, Hellali M, Mehri I, Landolsi A et al. Fracture zygoma; a review of 356 cases. *Ann Chir Plast Esthet.* 2008; 53:495-503.
- Cheema SA. Zygomatic bone fracture. *J Coll Physician Surg Pak* 2004; 14: 337-9.
- Fasola AO, Obiechina AE, Arotiba JT. An audit of mid-face fractures in Ibadin, Nigeria. *Afr J Med Sci.* 2001; 30:183-6.
- Perkin CS, Layton SA. The etiology of maxillofacial injuries & the seat belt law. *Br J Oral Maxillofac Surg* 1998; 26: 353-63.
- Israr N, Shah AA. Retrospective study of zygomatic complex fractures in Sheffield England. *Pak Oral Dent J* 2001; 21:50-9.
- Gomes PP, Passeri LA, Barbosa JRDA. A 5 year retrospective study of zygomatic-orbital complex and zygomatic arch fractures in Sao Paulo state Brazil. *J Oral Maxillofac Surg* 2006; 64:63-7.
- Ugoboko V, Udoye C, Ndukwe K, Amole A, Aregbesola S. Zygomatic complex fracture in suburban Nigeria population. *Dent Traumatol* 2005; 21:70-5.
- AL-Ahmad HE, Jaber MA, Abu Fanas SH, Karas M. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: a review of 230 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004; 98:166-70.
- Adi M, Ogden GR, Chisholm DM. An analysis of mandibular fractures in Dundee, Scotland (1977-1985). *Br J Oral Maxillofac Surg* 1990; 28:194-9.