

Changing Perspectives in the Surgical Management of Orbito-Zygomatic Fractures - Six Year Institutional Study

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ABSTRACT

Introduction: Facial trauma is one of the commonest injury in urban centres. The purpose of our study is to analyse the epidemiological characteristics of patients treated for orbito zygomatic fractures at our institution.

Materials and methods: Retrospective analysis of 120 patients with orbito-zygomatic who underwent surgery between April 2007 and April 2015.

Results: The patients treated were mostly males (87%) with a male female ratio of 7:1. There was predominance of patients with age groups 22-30 years and it was about 34%. Traffic related causes were most common with two wheeler accidents being frequent (25%). This was followed by four wheeler accidents (20%) and personal violence (13%). The most utilized procedure for treatment was internal fixation with miniplates and screws (85% of the cases). The complication rate was less which was about 23%.

Conclusion: Orbito-zygomatic fractures cause significant morbidity and disturbance in patients' quality of life with socio economic status. Despite recent trends and improvements in legislative rules and regulations, traffic still remains the main reason for these type of injuries. Therefore more advanced and intensive efforts should be made for reducing the etiology of facial trauma.

Keywords: epidemiological, facial trauma, internal fixation, morbidity, orbito-zygomatic fractures.

INTRODUCTION

Facial trauma is considered to be one of the commonest injuries in urban centres^{1,2,3}. Several researches have been done to know the epidemiology of facial trauma^{4,5}. Epidemiological data varies according to local socioeconomic and cultural factors^{6,7,8}. Facial injuries affect the young predominantly because of road traffic accidents and violence^{9,10}. Hence, the studies on epidemiology of facial fractures are very important and valuable in providing useful data for therapeutic and preventive actions.

MATERIALS AND METHODS

The present study gives details of retrospective analysis of 120 patients with orbito-zygomatic who underwent surgery between April 2007 and April 2015. The surgical treatment of these patients was conducted by Dept. of Oral & Maxillofacial Surgery, Institute of Dental sciences, Bhubaneswar. Patients who were included in this study exclusively had orbitozygomatic fractures. Patients with other type of fractures were not included in this study. Statistical analysis was performed using chi-square and ANOVA tests.

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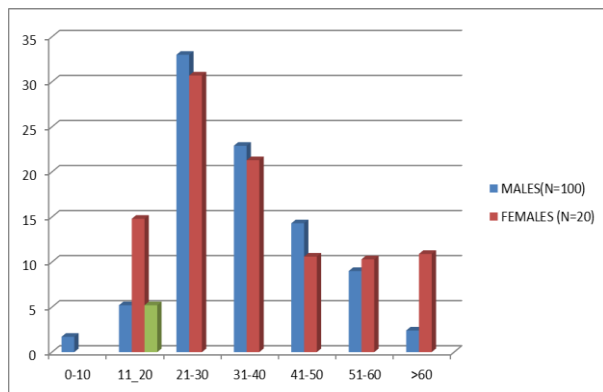


Fig 1: Distribution by age groups and gender n=120 (%).

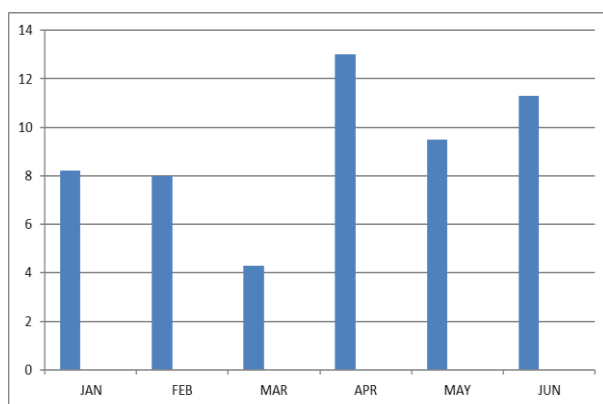


Fig 2: Monthly distribution of orbito zygomatic fractures.

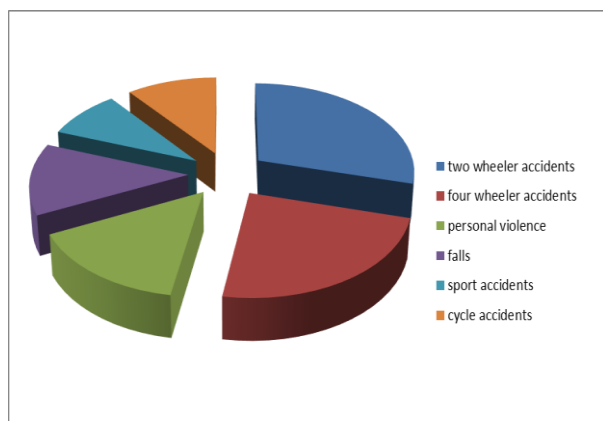


Fig 3: Aetiology of orbito zygomatic fractures n=120.

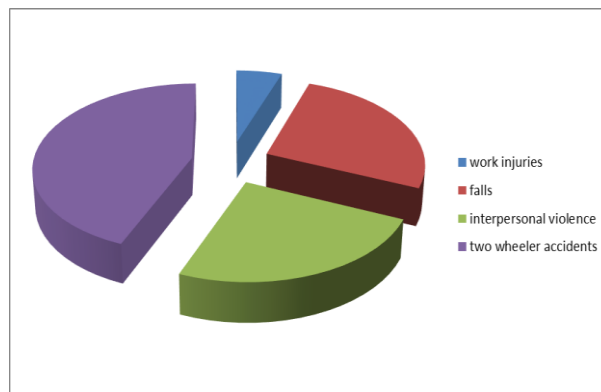


Fig 4: Aetiology of blow out fractures (n=25)

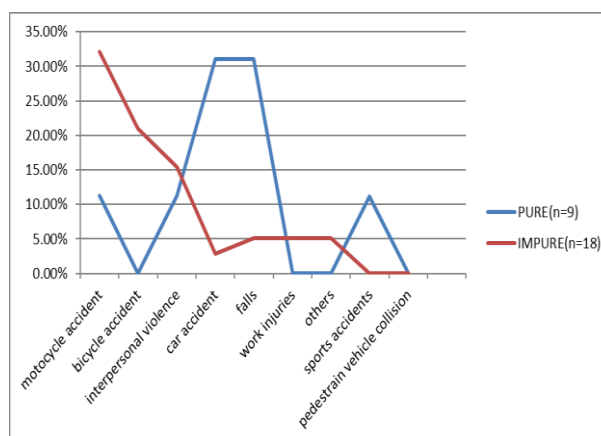


Fig 5: Aetiology of pure and impure blow out fractures.

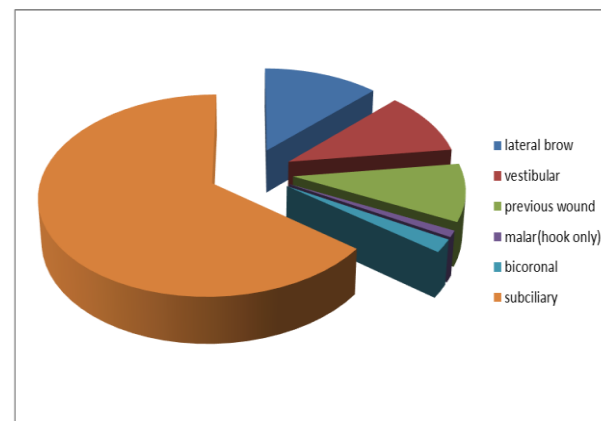


Fig 6: Surgical Approaches n=120.

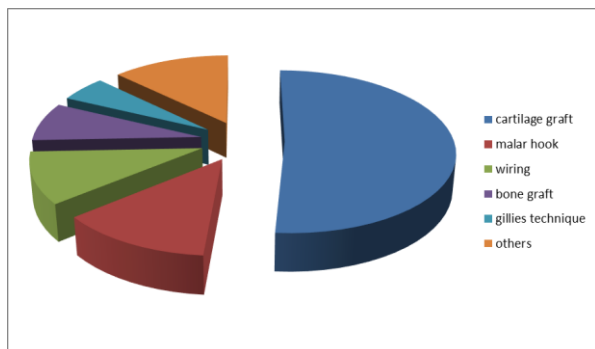


Fig 7: Treatment methods n =125.

Values of $p < 0.05$ were considered to be statistically significant.

RESULTS

During the 6 year study, 120 patients with orbitozygomatic fractures were surgically treated at our institution. The patients treated were mostly males (87%) with a male female ratio of 7:1 ($p < 0.0001$). No statistical difference was seen between males and females in their mean ages ($p = 0.77$). There was predominance of patients with age groups 22-30 years and it was about 34% (**Fig 1**).

The incidence of these orbito-zygomatico fractures was stable during the year, and no significant differences in monthly values were observed ($p = 0.40$) (**Fig 2**). In the population verified and studied the most common etiology was found to be two wheeler accidents which was about 25%. This was followed by four wheeler accidents (20%) and personal violence (13%). The other causes were falls (11%), sport accidents (7.5%), cycle injuries (9%), vehicle-pedestrian collisions being 5% and other causes (5%) (**Fig 3**).

Males suffered from injuries more than the females. The male female ratio was found to be 15:1 which revealed maximum differences in traffic related and interpersonal violence for two wheeler accidents (**Table 1**). Analysis of age mean figures among the groups mentioned that two wheeler and four wheeler victims were much younger (23 and 27 years respectively) whereas falls and vehicle-pedestrians collisions affected older people (averages 40 and 45 years). Comparison between the two groups show statistically significance for mentioned differences ($p < 0.05$).

Initial evaluation along with clinical signs of orbito zygomatic fractures of patients were recorded ($n = 91$) and mentioned in details (**Table 2**). Fractures were classified according to the portion of the orbito-zygomatic portions affected and the described fracture sites were mentioned in **Table 3**. The most common fracture site being the inferior orbital rim, lateral and medial orbital wall, orbital roof and floor with zygomatic arch. There was no statistically significant differences in the number of sites affected according to the etiology of orbito-zygomatic injuries.

Blow out fractures accounted for about 25 cases. The etiology of these type of fractures along with the pattern is mentioned in **Fig 4,5**. A total of 87 associated lesions were recorded in 60 patients (**Table 4**). Greater incidence of trauma was observed in two wheeler accident groups with a total of 38 lesions in 25 patients (**Table 5**). This incidence was statistically significant which was higher in comparison to other etiological groups ($p < 0.001$). Incidence of traffic related victims were more in comparison to non traffic related victims ($p = 0.002$). The average period of hospitalization was about 4.5 days and there was no significant variation in the period of hospitalization seen between patients grouped according to the etiology of trauma ($p = 0.35$). The most utilized procedure for treatment was internal fixation with miniplates and screws (85% of the cases). Isolated zygomatic arch fractures occurred in 3 patients and the treatment consisted only reduction using Gillies Technique. Six patients were managed by grafting for treatment of floor blow out fractures. (**Fig 6,7**)

The complication rate was less which was about 23% either by trauma which was present earlier and persisting after surgical intervention. (**Table 6**). Data related to occurrence of complications are shown in **Table 7**.

DISCUSSION

Several studies related to facial fractures have been conducted with different local variations^{4,11,12}. Our study shows greater incidence of orbitozygomatic fractures in males, with male female ratio being 7:1 especially in age groups between 22-30 years. These data relate to most of the previous studies on facial trauma^{3,4,13}. Similarly certain studies on these type of orbito zygomatic

Table 1: Gender distribution in etiologic groups.

	Males	Females	Ratio
Two wheeler accidents	30	2	15:1
Interpersonal violence	15	2	7.5:1
Sports accident	8	2	8:2
Pedestrian vehicle collisions	5	1	5:1
Four wheeler accidents	18	6	3:1
Falls	8	4	2:1
Bicycle accidents	10	0	-
Work injuries	4	0	-
Others	4	1	4:1

Table 2: Clinical signs and symptoms (n=91).

	Abs (%)
Ecchymosis/haematomas	42 (4.3)
Palpable bone deformity	30 (29.5)
Malar depression	27(28.9)
Mouth opening limitation	13(15.6)
Diplopia	12(12.6)
Paraesthesia	11(12.3)
Enopthalmos	11(12.3)
Bone crepitation	10(11.3)
Malocclusion	4(4.5)
Proptosis	3(3.2)
Upper lid ptosis	2(2.5)
Nose deformity	1(1.0)

Table 3: Fractures sites

	Abs (%)
Inferior rim	90 (70.5)
Lateral wall	65(50.2)
Floor	51(36.2)
Zygomatic wall	26(19.3)
Roof	23(15.3)

Table 4: Associated lesions.

	Abs (%)
Intracranial	23 (16.4)
Nasal fracture	18(12.3)
Ocular	15(10.2)
Mandible fracture	11(8.1)
Limbs	10(6.4)
Thorax	2(1.1)

Abdomen	1(0.6)
Spinal cord	1(0.6)
Pelvis	1(0.6)
Total	82

Table 5: Associated lesions in etiology groups.

	Lesions count	Patients-Abs(%)
Work injuries	4	3(100)
Motor cycle accidents	40	25(82.2)
Bicycle accidents	7	5(52.5)
Interpersonal violence	11	9(47.3)
Car accidents	11	9(36.2)
Falls	4	3(25.4)
Pedestrian vehicle collisions	1	1(16.3)
Sport accidents	1	1(10.5)
Others	1	1(32.6)
Not available	2	3(18.2)
Others	82	60

Table 6: Complications incidence (n=129).

	Abs (%)
Infection	10(7.6)
Diplopia	8(6.9)
Persistent malar depression	6(5.8)
Enophthalmos	5(4.1)
Cutaneous fistula	4(3.0)
Persistent lid retraction	4(2.4)
Strabismus	4(2.4)
Altered visual activity	2(1.2)
Persistent paraesthesia	2(1.2)
Upper lid ptosis	1(0.4)
Proptosis	1(0.4)
Hardware	1(0.4)

Table 7: Complication incidence in etiological groups.

	Affected patients in group- Abs(%)	Complications per patient ratio
Pedestrian vehicle collision	4(65.4)	1.6
Work injuries	2(49.4)	1.4
others	2(32.1)	1
Interpersonal violence	5(30.9)	1.6
Falls	6(25.0)	1.4

Car accidents	7(21.2)	2
Motorcycle accidents	8(23.9)	1.0
Sport accidents	1(10.9)	1
Bicycle accidents	1(8.8)	2

fractures show same characteristics^{14,15}. The gender distribution also reflects a more frequent exposure of males towards such type of fractures^{7,15,16}.

Monthly incidence of fractures uneven in majority of reports mainly because of climatic factors^{17,18}. These local features are responsible for the risk factors especially outdoor activities. The lowest incidences in our study was seen in March, November and December. Other reasons are the important holidays also falls in the days of these months. Hence less trauma was seen during these periods which is quite similar to the previous reports^{5,6,9}.

Road traffic accidents are the main cause of orbitozygomatic fractures. Two wheeler accidents are more than Four wheeler accidents^{16,19}. There were other factors like violence. A possible reasons for traffic accidents could be speedy driving or alcohol consumption. The same etiological reasons were also found in the previous articles by various authors^{17,18,20}. But there were many studies which revealed that interpersonal violence was the main etiological factor of such type of fractures rather than road traffic accidents . A possible explanation for this could be more disseminated use of safety devices like air bags, seat belts and helmets in most of the countries as well as more legal restrictions.

The decrease in the incidence of fractures caused by gunshots is remarkable. In 2012, Guidi pointed out that 11.2% of orbital fractures were because of gunshot injuries^{7,9,10,13}. The decrease in the fractures due to gunshot injuries were mainly because of impressive reduction of firearms in the hands of civilians due to Disarmament Act in 2003. Males outnumbered females irrespective of the trauma etiology in our study. The literature though presents a divergent data. These data are compatible with what is eventually observed in studies like greater number of males driving two wheelers^{11,12,15}. Other reasons being the greater visual disturbances due aging processes and

balance disorders which might be same for both the genders.

When considering blow out fractures , the same type of pattern is seen in regard to etiology **(Fig 4)**. Traffic related causes being the most while motorcycle causes also being frequent. Traffic remains the main cause of impure blow out fractures rather than pure blow out fractures as shown in **Fig 5**. Observed tendency of pure blow out fractures mainly is because of falls and sports activities. The patterns of associated lesions are comparable to what was reported in literature with an increased rate of injuries in cephalic segment^{19,20,21} . The motorcycle accidents were significantly higher than when compared to other etiologic groups. **(Table 5)**.

All patients underwent surgery after an average period of 15 days post trauma. The time between the trauma and surgery is comparable to the previous reports. The observed interval may be because of the nature and severity of lesions. But still adequate timing of surgical intervention is a matter of debate. The preferred method for treatment of facial fractures in our institution is internal rigid fixation using miniplates and screws. Open reduction and internal rigid fixation is accepted in some studies. Orbital floor reconstruction was performed using autologous material. Certain authors advocate the use of alloplastic or autologous materials according to their experiences. Certain complications like fistula, infection and extrusion are commonly associated with alloplastic materials^{22,23}.

A total of 30 patients had complications. The victims of pedestrians vehicle collision showed highest complication incidence than others. Most studies do not show a complete view of spectrum of complications^{24,25} . Nevertheless, if considered separately, the isolated incidences of each type of complication are not incompatible to the mentioned in the above mentioned studies^{26,27,28}.

CONCLUSION

Orbito-zygomatic fractures cause significant morbidity and disturbance in patients' quality of life with socio economic status. Despite recent trends and improvements in legislative rules and regulations, traffic still remains the main reason for these type of injuries. Therefore more advanced and intensive efforts should be made for reducing the etiology of facial trauma.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Montovani, J.C., Campos, L.M.P., Gomes, M.A., Moraes, V.R.S., Ferreira, F.D., Nogueira, E.A. Etiologia e incidência das fraturas faciais em adultos e crianças: experiência em 513 casos. *Rev Bras Otorrinolaringol.* 2006;72:235-241.
2. Chrcanovic, B.R., Freire-Maia, B., Souza, L.N., Araújo, V.O., Abreu, M.H.N.G. Facial fractures: a 1-year retrospective study in a hospital in Belo Horizonte. *Braz Oral Res.* 2004;18:322-328.
3. Gomes, P.P., Passeri, L.A., Barbosa, L.R.A. A 5-year retrospective study of zygomatico-orbital complex and zygomatic arch fractures in São Paulo State, Brazil. *J Oral Maxillofac Surg.* 2006;64:63-67.
4. Fasola, A.O., Nyako, E.A., Obiechina, A.E., Arotiba, J.T. Trends in the characteristics of maxillofacial fractures in Nigeria. *J Oral Maxillofac Surg.* 2003;61:1140-1143.
5. Hogg, N.J.V., Stewart, T.C., Armstrong, J.E.A., Girotti, M.J. Epidemiology of maxillofacial injuries at trauma hospitals in Ontario, Canada, between 1992 and 1997. *J Trauma.* 2000;49:425-432.
6. Lee, K.H., Antoun, J. Zygomatic fractures presenting to a tertiary trauma centre, 1996-2006. *N Z Dent J.* 2009;105:4-7.
7. Subhashraj, K., Nandakumar, N., Ravindran, C. Review of maxillofacial injuries in Chennai, India: a study of 2748 cases. *Br J Oral Maxillofac Surg.* 2007;45:637-639.
8. Hwang, K., You, S.H., Sohn, I.A. Analysis of orbital bone fractures: a 12-year study of 391 patients. *J Craniofac Surg.* 2009;20:1218-1223.
9. Van Beek, G.J., Merckx, C.A. Changes in the pattern of fractures of the maxillofacial skeleton. *Int J Oral Maxillofac Surg.* 1999;28:424-428.
10. Gomes, P.P., Passeri, L.A., Barbosa, L.R.A. A 5-year retrospective study of zygomatico-orbital complex and zygomatic arch fractures in São Paulo State, Brazil. *J Oral Maxillofac Surg.* 2006;64:63-67.
11. Ahmed, H.E., Jaber, M.A., Fanas, S.H.A., 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;98:166-170.
12. Kontio, R., Suuronen, R., Ponkkonen, H., Lindqvist, C., Laine, P. Have the causes of maxillofacial fractures changed over the last 16 years in Finland? An epidemiological study of 725 fractures. *Dent Traumatol.* 2005;21:14-19.
13. Guidi MC: Estudo retrospectivo das fraturas faciais atendidas pela disciplina de cirurgia plástica da FCM-Unicamp no período de maio de 1994 a maio de 2001. Thesis. Medical School, State University of Campinas, Campinas, 2002.
14. Gassner, R., Tuli, T., Hachl, O., Rudisch, A., Ulmer, H. Cranio-maxillofacial trauma: a 10 year review of 9543 cases with 21067 injuries. *J Craniomaxillofac Surg.* 2003;31:51-61.
15. Bakardjiev, A., Pechalova, P. Maxillofacial fractures in Southern Bulgaria - a retrospective study of 1706 cases. *J Craniomaxillofac Surg.* 2007;35:147-150.
16. Motta, M.M. Análise epidemiológica das fraturas faciais em um hospital secundário. *Rev Bras Cir Plást.* 2009;24:162-169.
17. Tong, L., Bauer, R.J., Buchman, S.R. A current 10-year retrospective survey of 199 surgically treated orbital floor fractures in a non-urban tertiary care center. *Plast Reconstr Surg.* 2001;108:612-621.

18. Obuekwe, O., Owotade, F., Osaiyuwu, O. Aetiology and pattern of zygomatic complex fractures: a retrospective study. *J Natl Med Assoc.* 2005;97:992–996.
19. Fasola, A.O., Nyako, E.A., Obiechina, A.E., Arotiba, J.T. Trends in the characteristics of maxillofacial fractures in Nigeria. *J Oral Maxillofac Surg.* 2003;61:1140–1143.
20. Ansari, M.H. Maxillofacial fractures in Hamedan province, Iran: a retrospective study (1987–2001). *J Craniomaxillofac Surg.* 2004;32:28–34.
21. Brasileiro, B.F., Passeri, L.A. Epidemiological analysis of maxillofacial fractures in Brazil: a 5-year prospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2006;102:28–34.
22. Kelley, P., Crawford, M., Higuera, S., Hollier, L.H. Two hundred ninety-four consecutive facial fractures in an urban trauma center: lessons learned. *Plast Reconstr Surg.* 2005;116:42e–49e.
23. Carr, R.M., Mathog, R.H. Early and delayed repair of orbito-zygomatic complex fractures. *J Oral Maxillofac Surg.* 1997;55:253–258.
24. Ozyazgan, I., Eskitaşçioğlu, T., Baykan, H., Coruh, A. Repair of traumatic orbital wall defects using conchal cartilage. *Plast Reconstr Surg.* 2006;117:1269–1276.
25. Constantian, M.B. Use of auricular cartilage in orbital floor reconstruction. *Plast Reconstr Surg.* 1982;69:951–955.
26. Folkestad, L., Westin, T. Long-term sequelae after surgery for orbital floor fractures. *Otolaryngol Head Neck Surg.* 1999;120:914–921.
27. Gassner, R., Tuli, T., Hachl, O., Rudisch, A., Ulmer, H. Cranio-maxillofacial trauma: a 10 year review of 9543 cases with 21067 injuries. *J Craniomaxillofac Surg.* 2003;31:51–61.
28. Zachariades, N., Mezitis, M., Anagnostopoulos, D. Changing trends in the treatment of zygomaticomaxillary complex fractures: a 12-year evaluation of methods used. *J Oral Maxillofac Surg.* 1998;56:1152–1156.