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Original Article

Epidemiological Study of Ocular Injuries with Midface Fractures in a Government Medical College of Central India

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***ABSTRACT*:**
Background: Midfacial fractures may often be complicated with injuries to the orbit and its adnexa. These injuries may lead to notable dysfunction of the visual apparatus, if not detected early after injury**.** Thus, the aim of this study is a retrospective analysis of ocular injuries after maxillofacial trauma reporting to the department of dentistry and trauma centre at Gajra Raja Medical College, Gwalior. **Study design:** A retrospective analysis of ocular injuries was thus planned on patients following facial trauma from August 2013 till July 2016. **Results:** In the present survey, a male predominance 71.57 % was observed and the most common age group was of 31-40 years with the commonest etiology being road traffic accidents (RTA). Zygomatico maxillary complex fractures (ZMC) were the dominant injury involving ocular trauma 49.47% patients. Most common ocular injury was periorbital edema recorded in 77 patients (81.05%). And blindness due to retinal detachment was seen in 1 patient (1.05%). **Conclusion:** From our study, it became imperative that maxillofacial surgeons should have a thorough knowledge of the various ocular injuries that could occur in association with midface trauma involving ZMC fractures, Lefort II, Lefort III fractures and panfacial trauma. Understanding of the subtle injuries to the ocular apparatus which may remain undiagnosed by a maxillofacial surgeon but have significant grave outcomes is essential.
Key words: Midface fractures, Ocular injuries, Panfacial trauma, Retrospective analysis.

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INTRODUCTION

Human eye occupying only 0.3% the total body surface is responsible for one of the prime senses, 'Vision'.[1,2] The globe and adnexal structures are frequently injured during blunt facial trauma despite of the built-in protection of enclosing orbit and cushioning orbital fat.[3] Midface injuries like ZMC, Lefort II and Lefort III fractures have been reported to increase the risk of developing ocular injuries 6.7 times more when compared with major trauma in the patients with no facial fractures.[4, 5] There is a recognized association between orbitozygomatic fractures and ocular injuries. The reported incidence of ocular injuries in the patients with fractures of the middle third of the facial skeleton varies from 2.7% to 9.6%. [3, 6, 7, 8, 9, 10]

According to Lefort, the face resists the force mainly because of the elasticity of the tissues, its periosteum, and its soft tissues. [11, 12, 13] The severity of these ocular injuries can vary from a simple subconjunctival haematoma to globe perforation or even an optic nerve lesion. [14] Some ocular injuries may be apparent; however, other potentially blinding complications can easily be missed hence they are actively sought. Hence, this retrospective study was set up to determine the incidence and types of ocular injuries in patients who sustained midfacial fractures.

PATIENTS AND METHODS:

95 patients who sustained midfacial injuries were retrospectively analysed from 01st September 2013 till 31st August 2016 at the department of dentistry and emergency trauma centre at Gajra Raja Medical College, Gwalior. Patients with pre-existing congenital or acquired

ophthalmic disease or infection were excluded from our survey.

METHODOLOGY:

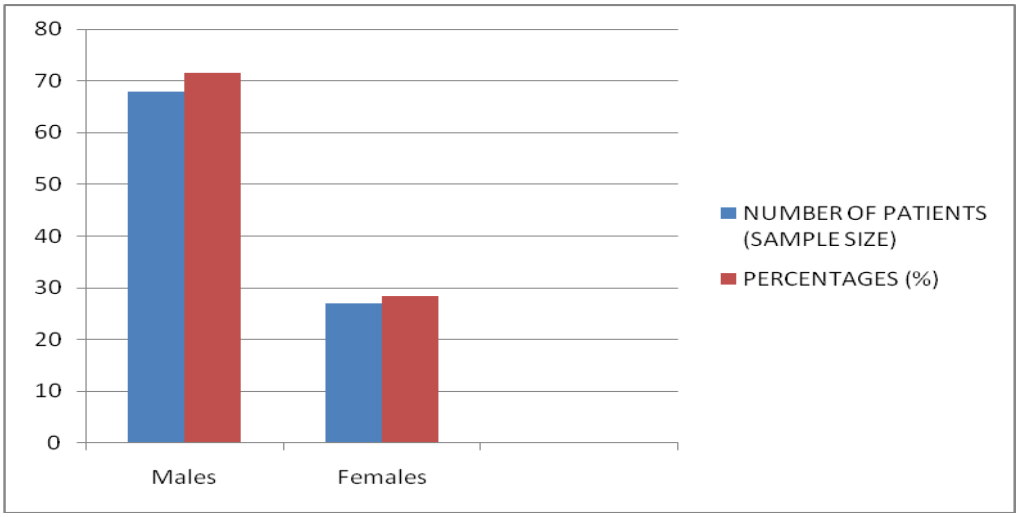
This is a retrospective survey of maxillofacial trauma patients involving compiling of demographic data on patronized forms after attainment of consent from the institutional ethical committee.

ANALYSIS:

The analysis from the patronized forms was compiled in the following tables:

TABLE 1: DISTRIBUTION OF MAXILLOFACIAL FRACTURES ACCORDING TO GENDER (n= 95)

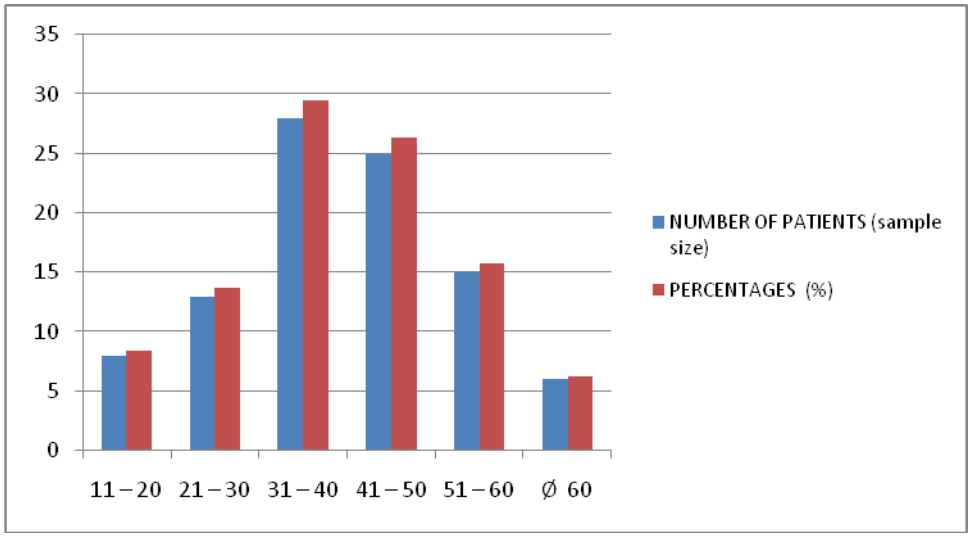
GENDER (variables)	NUMBER OF PATIENTS (SAMPLE SIZE)	PERCENTAGES (%)
Males	68	71.57
Females	27	28.42
Total	95	100



BAR GRAPH 1: REPRESENTING THE GENDER DISTRIBUTION

TABLE 2: AGE DISTRIBUTION OF STUDY SAMPLE. (n= 95)

AGE (YEARS) (variables)	NUMBER OF PATIENTS (sample size)	PERCENTAGES (%)
11 – 20	08	08.42
21 – 30	13	13.68
31 – 40	28	29.47
41 – 50	25	26.31
51 – 60	15	15.78
➢ 60	06	06.31
TOTAL	95	100



BAR GRAPH 2: REPRESENTING AGE DISTRIBUTION OF STUDY SAMPLE

Table 3: DISTRIBUTION OF MAXILLOFACIAL FRACTURES ACCORDING TO ETIOLOGY (n= 95)

Etiology (variables)	Number of patients (sample size)	Percentages (%)
RTA	55	57.89
Assault (Interpersonal violence)	21	22.10
Self fall	10	10.52
Sports injury	05	5.26
Miscllaneous	04	4.21
Total	95	100

Table 4: DISTRIBUTION OF MAXILLOFACIAL FRACTURE ASSOCIATED WITH OCULAR INJURIES (n= 95)

Fracture site (variables)	Number of patients (sample size)	Percentages (%)
ZMC	47	49.47
Lefort II	24	25.26
Lefort III	16	16.84
Panfacial	08	08.42
Total	**95**	**100**

Table 5: ASSOCIATED OCULAR INJURIES

Type of lesion	Clinical presentations	Number of patients
1. Extraocular	Periorbital edema	77
	Subconjunctival echymosis	65
	Chemosis	22
	Ptosis	20
	Restriction of extraocular movements	15
	Telecanthus	13
	Enophthalmus	07
	Exophthalmus	12
	Transient Diplopia	09
2. Intraocular	Optic nerve compression	01
	Retrobulbar haemmorhage	02
	Retinal detachment	01
	Traumatic Mydriasis	01
3. Blindness	01	

RESULTS:

In our study, 95 patients with ocular injury following maxillofacial trauma were evaluated. It was observed in our study that there is a male predominance with 68 (71.57%) patients being males and 27 (28.42%) being female patients (Table 1 and Bar graph 1). Patients having midfacial fractures ranged in age from an 11-year-old girl to a 66-year-old male. The peak incidence occurred in the 31- to 40-year-age group for both sexes (Table 2 and Bar graph 2). The etiology of midfacial injuries in 55 patients was RTA, accounting for 57.89% while interpersonal violence in the form of assaults was the second common cause of trauma in 21 patients, accounting for 22.10% followed by self fall in 10 patients (10.52%). Fracture sites associated with ocular injuries mainly involved ZMC fractures (49.47%), Lefort II fractures (25.26%), Lefort III fractures (16.84%). Computerized tomography (CT) scans, paranasal sinus view and submentovertex view were used to confirm the clinical diagnosis. Most of the patients were treated with open reduction and internal fixation. Most common ocular injury in our study (Table 5) was periorbital edema in 77 patients, 65 patients had subconjunctival echymosis, chemosis was seen in 22 patients, 20 patients suffered from ptosis, 9 patients had transient diplopia. Retrobulbar haemmorhage was detected in 2 patients leading to optic nerve compression in 1 patient, 1 patient had traumatic mydriasis while retinal detachment leading to blindness was seen in 1 patient (1.05%). All the recorded data including both extraocular and intraocular injuries was based on preoperative and postoperative clinical examination done under the supervision of staff of oral and maxillofacial surgery and ophthalmology and mentioned in Table 5.

DISCUSSION:

Injuries to globe and adnexal structures occur frequently during blunt facial trauma.[15] Thus, ocular injuries are unavoidable consequences of maxillofacial fractures. Analysis of the data from this retrospective survey allows examination of demographic patterns, etiology of injuries and highlights the ocular morbidity associated with midfacial trauma. There are several differences among international series regarding the epidemiology and presentation of maxillofacial fractures. The most important cause of any inconsistency between

our results and other reports is the difference in the studied population; therefore, any comparison should be made with caution.

Like most previous studies, we found men to be more susceptible to ocular injuries than women. This can be attributed to the typical lifestyle and occupation of men and being more active and community-dwelling, compared to women. [6, 7, 8, 10, 18] In our survey, the male-female ratio was 2.5:1; and it was as high as 14:1 in other studies. [16, 17]

Similar to other studies addressing maxillofacial trauma, there was a peak in incidence of fractures in adult males as compared to children as shown in Table 2. A majority of previous studies have reported that people in the age range of 20-30 years have the highest prevalence of ocular injuries [18, 19 and 20] which differs from our study where 31-40 years age group contributed to the maximum number of fracture patients and is in consensus with few other studies. [13]

Classically, the main causes of facial fractures are road traffic accidents, followed by assault, self fall and sports injury. [11] However, the etiology of injury varies geographically. Our finding is consistent with the results of Mittal et al, Riaz et al and Ansari et al [7 18, 19, 20] However, more recent studies have identified assaults as the main cause. [6, 8, 10, 15, 21] This may be attributed to the cultural, social and economic differences between different countries. In a developing country like India, high speed driving, insufficient attention to traffic rules and excessive and improper use of motorcycles are the main causes of high rates of road accidents. According to our study,, the most frequent etiologic factor was RTA (57.89%) followed by interpersonal conflicts and accidental falls. The most frequent fracture involving ocular injuries were ZMC fractures in around 47 patients among 95 patients. This falls in consensus with many studies in literature. [2, 6, 7 8, 10, 13, 18]

Midfacial trauma is usually associated with ocular injuries which comprises of a vast majority of presentations, ranging from a simple periorbital edema and subconjunctival haemmorhage to the most severe complication of blindness. [22] The reported incidence of ocular injuries in patients with orbital fractures varies widely. [9, 10, 13, 18, 19 and 21] The variation in reported incidence between studies may represent differences in inclusion criteria. As it is evident from our survey that 1.05 % of trauma cases lost vision which is quite high when the importance of an organ is taken into consideration. Thus rapid assessment and examination following trauma to the eye is crucial. A thorough knowledge of potential injuries and detailed examination including record of perception to light, color, form, visual acuity, papillary reactions, eye movements, fundus examination to detect intrabulbar haemmorhage, retinal edema, detachment and optic nerve compression is imperative to ensure rapid diagnosis, to prevent further damage to the eye, and to preserve the visual acuity. [23]

Our findings with regard to the frequency of types of ocular injuries is roughly similar to the results of few previous studies where minor eye injuries have been far more frequent than other injuries. [6, 7, 10, 15] Periorbital edema and circumorbital echymosis are the most prominent initial features in patients presenting to the hospital following trauma to the orbit. Direct trauma may result in bruising of the eyelids leading to the classical “black eye”. Treatment included head elevation, cold compresses and reassurance. Complete resolution typically takes 2-3 weeks. However, further inspection is necessary to exclude a concomitant injury to the globe. In our survey we could find 77 cases (81.05%) of periorbital oedema and echymosis which was consistent with other authors. [13, 23, 24]

Subconjunctival haemmorhage frequently described as pathognomic of fracture involving one or more orbital walls, with a resultant echymosis which tracks forward external to muscle cone and under the conjunctiva as far as the margin of avascular cornea. This echymosis remains bright red in color due to ability of the atmospheric oxygen to diffuse through the conjunctiva and prevent reduction of haemoglobin in effuse blood. [13] The 90.6% incidence reported by Al- Qurainy et al. includes subconjunctival haemmorhage as ocular pathology. This is not counted as the most significant ocular finding in many others, including this study where subconjunctival haemmorhage was found in 65 cases (68.42%). Treatment consisted of reassurance and local cold compresses for 24 hours. It healed spontaneously in 2-4 weeks.

Non penetrating injury to the conjunctiva may lead to conjunctival edema (chemosis) which usually resolves spontaneously and was reported in 22 cases of our survey. Ptosis following trauma may be mechanical or neural in origin. Edema of the upper eyelid produces a temporary mechanical ptosis. Ptosis secondary to traumatic nerve paresis (oculomotor) usually resolves slowly. Damage to muscular and facial surface of upper eyelid should be identified and repaired promptly. [13] Ptosis was reported in 21.05% cases in our survey which was higher than other studies. [13]

Disruption to the attachment of medial canthal ligament is the most common etiology of traumatic telecanthus when there is an increase in inter-canthal distance from the normal range of 25.5-37.5 mm in women and 26.5-38.7 mm in men. Telecanthus is a sign of disruption of both the anterior and posterior limbs of medial canthal ligament which was seen in 13 patients in our study. A wide variety of ocular displacement and visual symptoms accompany zygomatic fractures. The eyes should be assessed for the presence of position of eye ball post trauma. Incidence of enophthalmous and exophthalmos is mainly attributed to the displacement of zygoma. [13, 25] Inferior and posterior displacement of zygoma produces a varying degree of disorganization of the soft tissue of orbital cavity with bony expansion causing enophthalmos. [25, 26, 27] On the other side, medial dislocation of zygoma might compress the volume of the orbit and produce exophthalmos. [26, 27]

Diplopia is a disabling problem, especially when it occurs close to primary position or downward gaze. In our clinical study 9.47 % cases suffered from transient

diplopia which is in consensus with different authors who have reported an overall frequency between 5 and 37%. [10, 13, 28] However, diplopia as a persisting symptom has been reported as far less being from 5-7% in patients. [29, 30] Diplopia in the primary and downward gaze usually resolves along with edema in 7-10 days. Slight diplopia in extreme peripheral fields of gaze persisting for a month is rarely problematic and is best evaluated and treated by an ophthalmologist. [13]

Retrobulbar haemorrhage is bleeding into potential space surrounding the globe which may occur following blunt trauma because of injury to the orbital vessels, leading to acute visual loss. [23, 31] In a small series of patients with non displaced fractures of the orbital walls, they were found to be associated with retrobulbar haematoma. [31, 32] The present study shows 2 cases (2.10%) of retrobulbar haemorrhage in association with Lefort III fractures which was diagnosed by an ophthalmologist during fundoscopy. Our results are comparable with various other surveys reported in literature. [7, 13, 24] Treatment approaches include:

1) Surgical decompression through lateral canthotomy to release the intra ocular pressure. [13, 31, 32]
2) Intraorbital edema and circulatory spasm can also be minimized by using intravenous steroid (hydrocortisone, 100mg) or dexamethasone sodium phosphate 3-4 mg/ Kg as a bolus and then gradually tapering the dose.
3) The decompression of the orbit be supplemented by retrograde injection of spasmolytic agents such as papaverine (40 mg bolus) through a canula introduced into the supraorbital artery. [28]

Traumatic mydriasis after blunt trauma may persist, often affecting young adults causing glare, blurred vision, and poor cosmesis. Treatment with a muscarinic agent such as pilocarpine drops (1%) four times daily and thymoxamine drops (0.5%) needs to be administered twice daily. Traumatic mydriasis was observed in a single patient in the present survey.

In the present study we had one case of retinal detachment (1.05%) and one case of blindness. This is quite high when the importance of an organ is taken into consideration. Patients who initially have vision after an injury but subsequently lose it should be given active treatment because they have a greater chance of regaining vision. [13, 33] Patients who lose their sight immediately have some degree of permanent visual impairment regardless of treatment, but treatment should be instigated immediately. [13, 33]

CONCLUSION:

Injuries to the face, particularly those associated with Lefort II, Lefort III, ZMC fractures may lead to ophthalmic injuries and even blindness. Our study reaffirms the tenet that a fast and efficient ophthalmic examination by an alert and trained maxillofacial surgeon and a single ophthalmologist for all ocular injuries is essential to prevent permanent visual sequel to latent ocular injuries. To obtain a more conclusive and comprehensive evaluation an interdisciplinary approach is required. Henceforth, the maxillofacial surgeons must be trained to perform a basic fundoscopic examination so as to rule out any posterior segment pathology, which can easily be learnt with the inter-departmental cooperation.

LIMITATIONS OF THE STUDY:

- The inability to examine large number of patients due to time constraints.
- Other than the orbito zygomatic bone fracture patients, some nasoethmoidal and frontal bone fracture can make significant contributions to ocular complications, which were not considered in the present study.

Further future works overcoming these deficits are suggested to broaden the scope of research.

REFERENCES:

1. Negrel A-D, Thylefors B(1998). The global ompact of eye injuries. Ophthalmic Epidemiol 5: 143-169.
2. Reyes JM, Vargas MFG, Rosenvasser J, Arocena MA, Medina AJ, Funes J (2013). Classification and epidemiology of orbital fractures diagnosed by computed tomography. Rev Argent Radiol 77 (2): 136-146.
3. Karabekia HS, Gocman-Mas N, E med E, Karacayliu, Koyman R, etal.(2012). Ocular and periocular injuries associated with an isolated orbital fracture depending on a blunt cranial trauma: anatomical and surgical aspects. J Craniomaxillofac Surg 40: e 189-e 193.
4. Guly CM, Guly HR, Bouamra O, Gray RH Lecky FE. Ocular injuries in patients with major trauma. Emerg Med J. 2006; 23(12): 915-7, doi: 10, 1136/ emj. 2006, 038562.
5. Blice JP. Ocular injuries, triage, and management in maxillofacial trauma. Atlas Oral Maxillofac Surg Clin North Am. 2013; 21(1): 97-103, doi 10. 10016/ j.cxom. 2012. 12. 007.
6. Jamal BT, Pfahler SM, Lane KA, Bilyk JR, Pribithem EA, Diecidue RJ, et al, Ophthalmic injuries in patients with zygomaticomaxillary complex fractures reuiring surgical repair. J Oral Maxillofac Surg. 2009; 67(5): 986-9. Doi:10.1016/ j. joms. 2008. 12. 035.
7. Mittal G, Singh N, Suvarana S, Mittal SR. A prospective study on ophthalmic injuries related to maxillofacial trauma in Indian population. Natl J Maxillofac Surg 2012: 3(2): 152-8. doi: 10. 4103/ 0975-5950. 111370.
8. Roccia F. Boffano P, Guglielmi V, Forni P, Cassarino E, Nadalin J, et al. Role of the maxillofacial surgeon in the management of severe ocular injuries with maxillofacial fractures. J Emerg Trauma Shosk. 2011; 4(2): 188-93, doi:10. 4103/ 09741-2700. 822004.
9. Magarakis M, Mundeinger GS, Kelamis JA, Dorafshar AH, Bojovic B, etal. (2012) Ocular injury, visual impairment, and blindness associated with facial fractures. A systematic literature review. Plast Reconstr Surg 129 227-233.
10. Al- Qurainy IA, Stassen LF, Dutton GN Moos KF, El-Attar A (1991). The characteristics of midfacial fractures and the association with ocular injury: A prospective study. Br J Oral Maxillofac Surg 29: 291-301.
11. Cruse CW, Blevins PK, Luce EA (1980). Nasoethmoid-orbital fractures. J. Trauma 20: 551.
12. Le Fort R. (1901) Elude expermentalisur les fractures de la machoire superieure (suite). Rev Chir 23: 360.

13. Rajkumar. G. C, Ashwin D. P., Singh R. et al. Ocular injuries associated with midface fractures: A 5 year survey. J. Maxillofac Oral Surg. (Oct- Dec 2015) 14(4); 925- 929.
14. Dutton GN, Al- Quarainy I (1991) Ophthalmic consequences of maxillofacial injuries. In Fonseca R, Walker P (eds) Oral and Maxillofacial trauma. Saunders, Philadelphia, P543.
15. Holt GR, Holt JE. Incidence of eye injuries in facial fractures: An analysis of 727 cases. Otolaryngeal Head Neck Surg 1983; 91: 276-9.
16. Lee RH, Robertson B, Gamble WB, Manson PN, Blunt trauma craniofacial injuries: A comprehensive analysis. J Craniomaxillofac Trauma. 2000;6(2): 7-16.
17. Abiose BO. The incidence and management of middle third facial fractures at the university college hospital, Ibadan, East Afr Med. J. 1991; 68(3): 164-73.
18. Mac Kinnon CA, David DJ, Cooter RD (2002) Blindness and severe visual impairment in facial fractures: An 11- year review. Br J Plast Surg 55: 1- 7.
19. Riaz N, Chatha AA, Warraich RA, Hanif S, Chinar KA, Khan SR. Ophthalmic injuries in orbito- zygomatic fractures. J Coll Physicians Surg Pak.2014; 24(9): 649-52.
20. Ansari MH. Blindness after facial fractures: a 19- year retrospective study. J Oral Maxillofac Surg. 2005; 63(2): 229-37. Doi: 10.1016/ j- joms 2004. 05. 221.
21. Poon A. Mc Cluskey PJ Hill DA (1999) Eye injuries in patients with major trauma. J Trauma 46: 494-498.
22. Nabeela R, Asad AC, Riaz AW, Saba H, Kashif AC, Shammas RK (2014). Ophthalmic injuries in orbito-zygomatic fractures. J Coll Phy Surg Pak 24 (9): 649-652.
23. Board SP. Linden J (2008) Trauma to the globe and orbit. Emerg Med Clin N Am 26: 97-123.
24. Patil SG, Kotwal IA, Joshi U, Allurkar S, Thakur N, Aftab A. Ophthalmological evaluation by a maxillofacial surgeon and an ophthalmologist in assessing the damage to the orbital contents in midfacial fractures: A prospective study. J Maxillofac. Oral Surg. (July-Sept 2016) 15(3): 328-335.
25. Zingg M, Laedrach K, Chen J, Chaudhary K, Vuilleimen T, Sutter F et al (1992) Classification and treatment of zygomatic fractures: a review of 1025 cases. J Oral and Maxillofac Surg 50: 778-790.
26. Bite U, Jakson IT, Forbes GS et al (1985) Orbital volumes measures by a low dose CT imaging. Plast. Reconstr. Surg. 75:502-506.
27. Whitehouse RW, Batterbury M, Jackson A, Noble J L (1994) Prediction of enophthalmos by computed tomography after blow out orbital fracture. Br. J. Ophthalmol 78: 618-620.
28. Folkestad L, Lindgren G, Moller C, Granstrom G (2007) Diplopia in orbital fractures: a simple method to evaluate eye morbidity. Acta Otolaryngol 127: 156-166
29. Hawes MJ, Dortzbach RK (1983) Surgery on orbital floor fractures. Influence of time of repair and fracture size. Ophthalmology 90: 1066-1070.
30. Tadj A, Kimble FW (2003) Fractured zygoma. ANZ J Surg 73: 49-54.
31. Gerbino G, Ramieri GA, Nasi A. Diagnosis and treatment of retrobulbar haematomas following blunt orbital trauma: a description of eight cases. Int J Oral Maxillofac Surg 2005; 34(2): 127-131.
32. Popat H, Doyle PT, Davies J. Blindness following retrobulbar haemorrhage that can be prevented. Br J Oral Maxillofac Surg. 2007: 45(2) 163-164.
33. Babajiws A, Williams JLI (1980). Blindness after trauma insufficient to cause bony injury: case report and review. Br J Oral Surg 9: 259-266.