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Ocular Trauma In Mid Face Fractures - An Interdisciplinary Approach

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Abstract

Purpose : A prospective study was done to assess ophthalmic injuries in patients who have sustained a mid-face trauma and to highlight the need for early identification of these ophthalmic injuries.

Methods: A total number of 68 patients presenting to our tertiary care centre with mid-face fractures, clinically and radiographically proven, and who underwent complete ophthalmological evaluation at the time of initial presentation were considered in the study from July 2016 to May 2017. Ophthalmology referral was done to determine the exact nature of the injury and its implications. The ophthalmic injuries were then correlated with the type of fracture.

Results: The patients were predominantly male with an average age of 33 years. Facial trauma was found more due to road traffic accidents. The most common type of mid-face fracture seen was the zygomaticomaxillary complex fracture. Most of the ophthalmic injuries in our study were mild in severity accounting for 67.5% of the cases. Around 27.3% of the injuries were moderate in severity and only 5.19% of the injuries were severe. Forty-six of the 68 patients exhibited sub-conjunctival haemorrhage (67.65 %). Thirty-nine patients presented with periorbital oedema (57.35 %), eight patients experienced diplopia(11.76%), and there was one case each of retrobulbar haemorrhage, optic nerve compression and traumatic optic neuropathy (1.45%). Twelve patients presented with infraorbital nerve paraesthesia which was predominantly associated with the zygomaticomaxillary complex fractures.

Conclusion: Ocular injuries may be trivial to vision-threatening, and may or may not affect the surgical treatment plan of mid-face fractures. Although it may have a bearing on the timing of surgery, some vision threatening injuries may need to be treated on a priority basis. Zygomaticomaxillary complex fractures and pan facial fractures were associated with an increased occurrence of ocular injuries. An interdisciplinary approach involving the maxillofacial surgeon and ophthalmologist will provide comprehensive care to patients with mid-face injuries.

Keywords:
Ocular trauma, ZMC fractures, mid-face injury

Introduction

The occurrence of an ocular injury can be consequential in facial fractures, and many patients present in situations that preclude a formal ophthalmic examination. Patient unconsciousness, head injury, intubation, cervical spine care are factors that can delay the most basic ocular and visual acuity examinations.(1)

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The natural anatomy of the bony orbit and the placement of the globe protects it from injury by having a solid exterior and the soft cushioning of the orbital fat. The mid-face region is of interest to many surgical and clinical disciplines.(2) Despite this, the incidence of ophthalmic injuries range from 2.7- 64% in association with maxillofacial injuries, causing significant cosmetic and functional defects.(3)

The incidence of these injuries again varies depending on the type of mid-facial fracture seen. These ophthalmic injuries range in severity from lacerations of the lids, abrasions of the cornea and uncomplicated subconjunctival haemorrhages to rupture of the sclera, globe perforations, intraocular haemorrhages, dislocation of the lens, detachment of the retina and optic nerve lesions.(4,5)

The initial examination may be the only time that the physician can observe the damage to such structures as the retina and optic nerve that may later become obscured by continued haemorrhage and cataract formation. Some ophthalmic injuries may be apparent. Nonetheless, vision-threatening conditions may be overlooked if they are not proactively sought after. This can result in blindness, with medico-legal implications. (6,7) Hence all traumas to the face, particularly above the level of the mouth, require a careful ocular examination, including an estimation of the visual acuity for each eye.(2,6,7) In literature, several studies have been done assessing the various ocular injuries among the multiple facial fractures that have occurred in individuals. Most of them being retrospective than prospective. The incidence of ocular injuries and grievous ocular damage in patients with mid-face fractures vary around 14% - 20%.(7,8)

In this study, all patients who presented within 24 hours of the injury to a tertiary care centre in South India, with mid-face fractures and ophthalmic injuries underwent ophthalmic evaluation, by both the ophthalmologist and the oro-maxillofacial surgeon. The various ophthalmic injuries, their presentation, the types of mid-face fractures, and a correlation between them has been discussed.

Methods

This was a prospective study from 2016 to 2017 conducted on all patients with maxillofacial fractures with ophthalmic injury, presenting to a tertiary care centre in South India. The study group consisted of 68 patients who sustained an injury to the face and had mid-face fractures. Ramaiah University of Allied And Health Sciences Institutional ethics review board approval was obtained and the study adhered to the Declaration of Helsinki. Informed consent was sought from all the patients. Patients who presented at the department of oral and maxillofacial surgery within 12 hours of injury at the hospital, with clinically and radiographically confirmed mid-face fractures and associated ocular injuries were included in the study. Patients who had already undergone treatment for trauma previously and patients with any congenital or other ophthalmic pathologies were excluded from the study.

The information collected included demographic data such as age and sex, cause of trauma, date of injury, date of presentation, history of any previous treatment, and type of trauma/ fracture documented. The type of ophthalmic injuries was recorded based on the site, and severity of the injury. All patients underwent a thorough ophthalmic assessment comprising of a detailed anterior and posterior segment evaluation, and any defect in pupillary reaction, and extraocular motility was also recorded.

The patients were examined at the time of presentation for the presence or absence of ophthalmic injuries and the associated mid-face fracture. The clinical findings on the type of fracture were then confirmed using CT scans, and the type of mid-face fractures were noted.

The ocular injuries associated with various types of mid-face fractures and their distribution were recorded. The type of fracture was later correlated with the type of ophthalmic injury found in each case. The patients were evaluated by the maxillo-facial surgeons and the ophthalmologists. After undergoing surgery for the facial fractures all patients also underwent an ophthalmic follow-up examination.

Statistical analysis was performed with Statistical Package for the Social Sciences software (version 16.0; IBM SPSS, Chicago, IL). The data on the demographics, type of mid-face fracture, the type of ophthalmic injuries associated with the fracture, the type of fracture associated with the ophthalmic injuries etc. has been described using frequency and percentages. Chi-square test has been used to compare the incidence of ocular injuries in relation to the mid-face fractures.

Results

In this study out of 68 patients, a male predominance was seen, with 76.47% of patients being male, and 23.52% were female. About 55.9% were in the economically productive age of 21-35years. Among the various etiology all causes, road traffic accidents accounted for 51.47%, followed by self-fall in 32.35% and assault was seen in 16.17% of total patients. (Table 1)

The distribution of various mid-face fractures is shown in Table 2, with malar fracture being the most common in our study. Among the various types of mid-face fractures, zygomaticomaxillary complex fractures are found to be the most predominant with road traffic accident as the primary etiology. There was no evident correlation seen between the type of fracture and the type of etiology. Most of the patients were treated with open reduction and internal fixation for their facial fractures.

Table 1: Cause of injuries among our patients

Etiology of injury	n	%
Road traffic accident	35	51.5%
Assault	11	16.2%
Self-Fall	22	32.4%

The most common ocular injury in our study was subconjunctival haemorrhage seen in 46 patients (67.64 %), periorbital oedema (figure 1) in 39 cases (57.35%), followed by infraorbital nerve paraesthesia in 12 patients (17.64%), lid lacerations in 13 patients (19.12%), diplopia in eight(11.76 %), chemosis in eight (11.76 %), restriction of extraocular movements in three cases (4.4%), ptosis, telecanthus (figure 2), enophthalmos, exophthalmos, were each two cases (5 %), retrobulbar haemorrhage, optic nerve compression and traumatic optic neuropathy each one case (1.45%). Intraocular injuries seen were corneal abrasions in eleven cases (16.17%) and traumatic hyphema in 3 cases (4.4%) (Table 3). Most of the ophthalmic injuries in our study were mild in severity accounting for 67.5% of the cases. Around 27.3% of the injuries were moderate in severity and only 5.19% of the injuries were severe.

While correlating the different ocular injuries with various mid-face fractures, it was seen that the incidence of enophthalmos and diplopia occurring in orbital blow-out fractures was statistically significant with a p-value of 0.001. The association of infra-orbital paraesthesia occurring in zygomaticomaxillary complex fractures was statistically significant with a p-value of 0.001 in this study as shown in Table 4. The ocular injuries were seen more in patients who had pan-facial fractures and zygomaticomaxillary complex fractures. Periorbital oedema and sub-conjunctival haemorrhage occurred in almost all types of fractures. Le-fort 3 fracture, and an orbital rim fracture one of each had significant optic nerve injury leading to loss of vision. The various fractures and the associated ocular injuries seen are listed in Table 5.

On post-operative follow up at the ophthalmic clinic, none of the other patients had a decrease in visual acuity.

Figure 1:Panfacial trauma with evident periorbital edema; CT scan showing the fracture sites

Figure 2: Combined left NOE and ZMC fracture with evident telecanthus. Along with 3D CT showing left NOE and ZMC fracture

Table 2 - Distribution of various mid-face fractures among study patients

Type of Mid-face Fractures	**n**	**%**
Malar fracture	14	20.6%
Zygomatic Arch Fracture	8	11.8%
ZMC tripod fracture with undistracted FZ suture	10	14.7%
ZMC tripod fracture with distracted FZ suture	5	7.4%
Pure blow out fracture	2	2.9%
Orbital Rim fracture	5	7.4%
Lefort I fracture	5	7.4%
Lefort II fracture	3	4.4%
Lefort III fracture	2	2.9%
NOE fracture	3	4.4%
Panfacial fracture	11	16.2%

ZMC: Zygomatico -maxillary Complex; FZ – Fronto-zygomatic; Na-so-orbito-ethmoid

Table 3 - Incidence of Extra & Intra Ocular Injuries among study Patients

Extra-Ocular Injuries	**n**	**%**
Subconjunctival hemorrhage	46	67.6%
Periorbital edema	39	57.4%
Chemosis	8	11.8%
Ptosis	2	2.9%
Restricted Extraocular movements	3	4.4%
Telecanthus	2	2.9%
Enophthalmos	2	2.9%
Exophthalmos	2	2.9%
Infraorbital nerve paraesthesia	12	17.6%
Transient diplopia	8	11.8%
Optic nerve compression	1	1.5%
Retrobulbar hemorrhage	1	1.5%
Lid lacerations	13	19.1%
Traumatic Optic Neuropathy	1	1.5%
Intra-Ocular Injuries	**n**	**%**
Traumatic Hyphema	3	4.4%
Corneal abrasions	11	16.2%

Table 4 - Association of different extraocular and Intraocular Injuries with mid facial fractures using Chi Square test

Extra Ocular Injuries	Malar fracture	Zygomatic Arch fracture	ZMC fracture	ZMC fracture with distraction	Pure Blow out	Orbital Rim fracture	Lefort I	Lefort II	Lefort III	Naso-orbital ethmoid fracture	Panfacial fracture	c2 Value	P-Value
	n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**		
Subconjunctival hemorrhage	5 (10.9)	0 (0)	10 (21.7)	5 (10.9)	2 (4.3)	5 (10.9)	0 (0)	3 (6.5)	2 (4.3)	3 (6.5)	11 (23.9)	53.133	<0.001*
Periorbital edema	5 (12.8)	0 (0)	6 (15.4)	5 (12.8)	2 (5.1)	2 (5.1)	0 (0)	3 (7.7)	2 (5.1)	3 (7.7)	11 (28.2)	40.140	<0.001*
Chemosis	0 (0)	0 (0)	0 (0)	2 (25)	2 (25)	0 (0)	0 (0)	1 (12.5)	0 (0)	0 (0)	3 (37.5)	29.000	0.001*
Ptosis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	25.964	<0.001*
Restricted extraocular movements	0 (0)	0 (0)	0 (0)	0 (0)	2 (66.7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (33.3)	46.443	<0.001*
Telecanthus	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	44.646	<0.001*
Enophthalmos	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	44.646	<0.001*
Exophthalmos	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	8.130	0.62
Infraorbital nerve paraesthesia	0 (0)	0 (0)	4 (33.3)	5 (41.7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (25)	36.473	<0.001*
Transient diplopia	0 (0)	0 (0)	0 (0)	3 (37.5)	2 (25)	0 (0)	0 (0)	1 (12.5)	0 (0)	0 (0)	2 (25)	34.254	<0.001*
Optic nerve compression	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	5.259	0.87
Retrobulbar hemorrhage	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	5.259	0.87
Lid lacerations	0 (0)	1 (7.7)	0 (0)	0 (0)	1 (7.7)	3 (23.1)	2 (15.4)	2 (15.4)	0 (0)	0 (0)	4 (30.8)	22.813	0.01*
Traumatic optic Neuropathy	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12.788	0.24
Intra Ocular Injuries	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	c2 Value	P-Value
Traumatic Hyphema	0 (0)	0 (0)	0 (0)	2 (66.7)	1 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	27.688	0.002*
Corneal abrasions	6 (54.5)	3 (27.3)	0 (0)	0 (0)	0 (0)	1 (9.1)	1 (9.1)	0 (0)	0 (0)	0 (0)	0 (0)	17.088	0.07

ZMC: Zygomatico -maxillary Complex, c2 value – from the Chi square test compares the incidence of ocular injuries in relation to the mid-face fractures.

Table 5– Distribution of ocular injuries among each type of mid-face fractures

Fracture	**Associated ocular injuries (Percentage of occurrence in each fracture)**
Malar fracture - undisplaced fracture - any site (14) - 20.6%	Periorbital edema – 5 (35.7%) Subconjunctival ecchymosis – 5 (35.7%)
Zygomatic arch fracture (8) – 11.8%	Lid laceration – 1 (12.5%) Corneal abrasion – 3 (37.5%)
Zygomatico -maxillary Complex fracture - tripod with undistracted fronto-zygomatic suture (10) – 14.7%	Periorbital edema -6 (60%) Subconjunctival ecchymosis – 10 (100%) Infra orbital nerve paresthesia – 4 (40%)
Zygomatico -maxillary Complex fracture - tripod with distracted fronto-zygomatic suture (5) – 7.4%	Periorbital edema – 5 (100%) Subconjunctival ecchymosis – 5 (100%) Chemosis – 2 (40%) Infra orbital nerve paresthesia – 5 (100%) Diplopia – 3 (60%) Traumatic hyphema – 2 (40%)
Pure blow-out (2) – 2.9%	Periorbital edema – 2 (100%) Subconjunctival ecchymosis – 2 (100%) Chemosis – 2 (100%) Restriction of extraocular movements - 2 (100%) Enophthalmos – 2 (100%) Diplopia – 2 (100%) Lid laceration – 1 (50%) Traumatic hyphema – 1 (50%)
Orbital rim fracture (5) – 7.4% Superior orbital rim fracture (3) Lateral orbital rim fracture (2)	Periorbital edema – 2 (40%) Subconjunctival ecchymosis – 5 (100%) Ptosis – 2 (40%) Traumatic optic neuropathy (1) Lid laceration – 3 (60%) Corneal abrasion – 1 (20%)
Lefort I (5) – 7.4%	Lid laceration – 2 (40%) Corneal abrasion – 1 (20%)
Lefort II (3) – 4.4%	Periorbital edema – 3 (100%) Subconjunctival ecchymosis – 3(100%) Chemosis – 1 (33.3%) Diplopia – 1 (33.3%) Lid laceration – 2 (66.6%)
Lefort III (2) – 2.9%	Periorbital edema – 2 (100%) Subconjunctival ecchymosis – 2 (100%) Exophthalmos – 1 (50%) Retrobulbar hemorrhage – 1 (50%) Optic nerve injury – 1 (50%)
Naso-orbital ethmoid fracture (3) – 4.4%	Periorbital edema -3 (100%) Subconjunctival ecchymosis – 3 (100%) Telecanthus – 2 (66.6%)
Panfacial fracture (11) – 16.2%	Periorbital edema – 11 (100%) Subconjunctival ecchymosis – 11 (100%) Chemosis – 3 (27.3%) Restriction of extraocular movements - 1 (9.1%) Exophthalmos – 1 (9.1%) Infra orbital nerve paresthesia – 3 (27.3%) Diplopia – 2 (18.2%) Retrobulbar hemorrhage – 1 (9.1%) Lid laceration – 1 (9.1%)

Discussion

The face is commonly susceptible to injuries in trauma due to various causes. The severity of the injury to the face may determine the facial fractures that occur, may depend on the direction of the incoming force. Though the eye is well protected by the bony orbit, ophthalmic injuries also occur with varying incidence and diversity. These peri-ocular and ocular injuries can vary from minor injuries such as subconjunctival hemorrhage, chemosis, peri-orbital edema to severe injuries such as globe rupture, retinal detachment, traumatic optic neuropathy which can lead to irreversible visual loss.(9,10) Sometimes a trivial looking injury can mask severe ocular dysfunction, and these subtilities may be missed by a non-ophthalmologist. Identifying the ocular lesion is important since its management may take priority over the treatment of facial fractures.(6,11,12)

The causes of facial fractures are commonly road traffic accidents, assaults, self-fall or sports injury.(9-14) In the present study, road traffic accidents account for about 51.5 %, self-fall for about 32.4% and assault for about 16.2% of the etiological factors. These results support the findings as seen in earlier studies by Septa et al. who reported an incidence of 64 % road traffic accidents and Patil et al. reported road traffic accidents in 91.6% of their patients.(5,12) The higher frequency of maxillofacial injuries among males compared to females is a universal finding in almost all previous studies. The male: female ratio in the present study is around 3.25:1 which is similar to the results as found by Septa et al. where the ratio was seen as 3.16:1.(5)

This study revealed that the peak incidence of maxillofacial fractures occurred in 55.90% of patients in the 18–35 year age group, and 76.5% between18-50years of age, with a mean age of 33.09 years, which is similar to most studies in the literature which report the mean age between the second to the fourth decade, this being the most economically productive age group.(5-14) The male predominance and the age group can be explained by more number of males who maybe driving, more male aggression in the younger age group, and tendency to disobey traffic rules, not follow the road and vehicle safety rules.(5,9,12,13) The second leading aetiology in our study was assault as was also seen in studies by Al-Qurainy., Jamal et al. and Barry et al.(6,7,15)

Among the various mid-face fractures, the malar fracture (20.6%) was most common in our study, similar to a study by Politus et al. where 23.6% had malar fractures though in their study orbital floor fractures were the most common.(14) Zygomaticomaxillary fractures were found to be mostly due to road traffic accident, similar to Al Qurainy et al.(3) Ocular injuries were seen more in patients who had panfacial fractures and zygomaticomaxillary complex fractures similar to a study done by Zhou et al.(16) Orbital wall & rim fractures were associated with severe ocular injury leading to loss of vision, similar to other studies.(1,16-20) Patients with more fractures had a higher chance of ocular injuries.(21)

In our study, most of the ophthalmic injuries were mild accounting for 67.5% of cases, and severe injuries were noted in 5.19% of cases, similar to Al Qurainy et al., where 63.4% suffered mild injuries, 15.7% moderate injuries and 11.6% suffered severe injuries.(3)

Ocular injuries in mid-face fractures may have a varying presentation from mild insignificant to vision threatening injuries. The most common ocular injury was a sub-conjunctival haemorrhage seen in 67.6% of our patients, similar to other studies with a varying occurrence of 70-80%.(5,12,19) Periorbital edema and ecchymosis are the most common presenting signs in patients presenting with facial trauma, it was seen in 57.4% of our patients, as compared to 77% in a study by Mittal et al., and 89.9% in a study by Rajkumar et al.(2,19) It may also be that in our patients they presented earlier within 24 hours and hence the edema was yet to develop. According to Al Qurainy et al, the incidence of infraorbital nerve paraesthesia varied from 35 to 94 % among zygomatic complex fractures.(3) Infra-orbital paraesthesia is common in midface fractures especially those involving the orbital floor and inferior orbital rim, seen in 17.63% of our patients as compared to Sharma et al., where it was seen in 60% of their patients. It occurs either due to direct injury to the infraorbital nerve or nerve entrapment in the fracture site. It mostly reverts over a year due to nerve regeneration.(22)

Corneal abrasions were seen in 16% of our cases similar to study done by Patil et al.(5) Lid lacerations were seen in 19% of our cases, similar to the study by Foroughi et al., as compared to 2.8% in the study by Al Quirainy et al., 6.6% by Patil et al., and conjunctival chemosis was seen in 11.7% of our patients as compared to 8% in a study by Patil et al.(5,7,9)

Extra-ocular movements have to be evaluated to rule out any mechanical entrapment, and this has to be differentiated from paresis of the muscle, either of which will cause restriction of eye movements and result in diplopia. To help differentiate between the two, ideally, a forced duction test should be carried out which may not be always possible on the initial examination in the emergency room. Computed tomography scans should be done and clinically correlated for any muscle entrapment.(19) Diplopia can be a very disabling problem causing significant discomfort to the patient. In trauma, it is

usually binocular, and if due to paresis it settles over time. Persistent diplopia may indicate muscle entrapment and it has to be ruled out. Entrapment is commonly found in orbital floor fractures and medial wall fractures.(5) 11.76% of our patients had diplopia, and 4.4 % of patients had restriction of extraocular movements, similar to a study by Foroughi et al.(9)
Ptosis can be mechanical or neurological due to traumatic third nerve paresis or palsy. Edema of the lids can cause mechanical ptosis which resolves faster as compared to neurological ptosis which usually resolves over a few weeks.(19) In our study ptosis was seen in 5% of patients, similar to Foroughi et al.(9)

In fractures involving the mid-face and or the orbital walls, the globe can be commonly displaced either laterally or inward or outward, resulting in telecanthus, enophthalmos or exophthalmos. The main mechanism of enophthalmos is due to a change in the soft tissue shape and position, which can be due to intra-orbital haemorrhage, or sudden increase in intraorbital volume, following orbital wall fractures, or displacement of the zygoma. Traumatic telecanthus is an increase in the intercanthal distance due to displacement of the medial canthal ligament. It is mostly seen in naso-orbital-ethmoid fractures. It usually occurs when both the anterior and posterior limbs of the ligament are detached. Our findings were similar to other studies reported in the literature.(9,19,24,25)

Intraocular injuries such as traumatic hyphema were seen in 4.4% of our cases, slightly lower than other studies.(23,24) It is mainly caused due to tearing of blood vessels at the root of the iris. Other major globe injuries like corneal laceration, dislocated lens, subluxated lens, retinal or vitreous haemorrhage, globe rupture, or scleral tear were not seen in our study.

Retrobulbar haemorrhage can occur as a consequence of midface trauma. It is characterized by haemorrhage within the muscle cone due to rupture of one or more of the posterior ciliary arteries. An increase in the orbital pressure causes a compartment syndrome, because of its rigid bony skeleton and firm anterior soft tissue border. This can result in visual loss, as the increased orbital pressure compromises the vascular supply of the optic nerve, choroids, and retina.(26) In our study retrobulbar haemorrhage was seen in 1.45% of patients, similar to the previous studies done.(3,5,19,25)

Blindness in maxillofacial trauma has been reported with a varying incidence in literature. The etiology can vary from direct globe injury, or retrobulbar haemorrhage causing optic nerve compression or traumatic optic neuropathy.(25) In our study we had visual loss leading to blindness in two patients (2.9%) one with inferior orbital rim fracture, who had traumatic optic neuropathy and another with panfacial fracture, who had optic nerve compression due to a retrobulbar haemorrhage. In the study by Foroughi et al., they found similar results where 2.7% had optic nerve injury and 3 out of 168 cases had resulted in blindness, of which two were in patients with Le Fort 2 fractures.(9) Peacock et al., in their study found visual loss more commonly due to Le Fort type 3, whereas in Magarakis et al., they found zygomatic fractures to be the main cause.(21, 27)

In conclusion, we noted that most of the ocular injuries were minor and could be managed conservatively. The zygomaticomaxillary complex fractures and the pan facial fractures were associated with more ocular morbidity. Even though the occurrence of major ophthalmic injuries has a relatively low incidence, they must be ruled out in all patients with mid-facial fractures. The resilience of the eye and its ability to withstand trauma protects the treating doctor. But some situations may arise where immediate treatment of the injured eye is indicated such as globe rupture or optic nerve compression, which when treated first may save the vision of the patient. An interdisciplinary approach, involving the expertise of the ophthalmologist might be more beneficial in managing the case before any kind of surgical intervention. The development of an ocular examination protocol in all cases of facial trauma can be incorporated at the emergency where the patient is first encountered. It can include symptoms & signs of visual disability, the type of facial fracture and the nature of the injury. This might pave the way for a more standardised approach to the diagnosis and management of mid-face fractures and their associated ocular injuries.

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