



“AN ANALYSIS OF OPHTHALMIC INJURIES IN PATIENTS WITH MAXILLOFACIAL TRAUMA”

Surgery

Dr.Sharmila.S	PG Student Dept. of Oral & Maxillofacial Surgery, Govt. Dental College, Thiruvananthapuram.
Dr.Abhilash Balakrishnan*	MDS, Assistant Professor, Dept.of Oral & Maxillofacial Surgery, Govt. Dental College, Thiruvananthapuram. *Corresponding Author
Dr.Saji Nair .A	Assoc.Prof, Regional Institute of Ophthalmology Thiruvananthapuram.
Dr.Ajith Kumar.K	Prof. & Head Department of Oral & Maxillofacial Surgery, Govt. Dental College, Thiruvananthapuram.

ABSTRACT

PURPOSE OF THE STUDY: To estimate the proportion and types of ophthalmic injuries in patients with maxillofacial fractures

PATIENTS AND METHODS: All patients with maxillofacial trauma, who came to the Department of Oral and Maxillofacial surgery Government Dental college Thiruvananthapuram from November 2020 to June 2021 were included in this study. The information and data collected included age, sex, mechanism of injury, type of maxillofacial fracture and type of ophthalmic injury.

RESULTS: Ocular injury was sustained by 209 patients out of which 180 (86.1%) were males and 29 (13.9%) were females. The largest age group of patients associated with ophthalmic injuries were 30-39 years. The etiology of facial fractures or ocular injuries showed that road traffic accidents more frequently resulted in ocular injuries 66.5% followed by assault 18.7% and self fall 14.8%. Ophthalmic injuries occurred mostly in association with orbital fractures 33.5% followed by Zygomatico maxillary complex fracture 26.8% and Maxillary sinus fractures 24.4%. Periorbital oedema was the most common ophthalmic injury accounting for 46.4% of cases followed by Periorbital ecchymosis 35.4% and Subconjunctival haemorrhage 17.2%.

CONCLUSION: Mid facial trauma commonly causes ophthalmic injuries of varying degrees. Prompt ophthalmic examination of all patients with mid facial trauma is mandatory to prevent any blinding complications

KEYWORDS

Ophthalmic injury; Maxillofacial trauma; Orbit

INTRODUCTION

Maxillofacial trauma can occur as an isolated injury or in combination with other concomitant injuries. The orbit is involved in fractures of the zygomatic bone, Lefort II, Lefort III level fractures, naso-orbitoethmoidal fractures as well as fractures of the frontal bone. The globe is protected from injury by a number of factors such as prominence of orbital rim and the natural reflexes of self protection –like blinking, averting the head, and protecting the eye with the hand or forearm. Despite these factors, the anatomic location of the orbit predisposes them to injury in instances of maxillofacial trauma, especially in patients with upper face and forehead injuries. Ophthalmic injuries associated with maxillofacial trauma vary in severity from laceration of the eyelids to permanent visual loss or blindness. The purpose of the study is to estimate the proportion and types of ophthalmic injuries in patients with maxillofacial fractures.

PATIENTS AND METHODS

All patients with maxillofacial trauma, who presented to the department of Oral and Maxillofacial surgery Government dental college Thiruvananthapuram from November 2020 to June 2021 were included in this study. Patients with pre-existing ophthalmic injuries, neurological or congenital disorders of the eye were excluded from this study. The information and data collected included age, sex, mechanism of injury, type of maxillofacial fracture and type of ophthalmic injury. All cases of ocular involvement had primary or secondary Ophthalmology consultation. Statistical analyses were performed by using a statistical software package SPSS, version 20.0. Categorical variables were expressed as frequency (percentage). Independent t test was used to compare quantitative parameters between categories. Prevalence of ophthalmic injuries among patients with maxillofacial fractures was expressed using 95% CI.

RESULTS

There were 510 patients with maxillofacial trauma, out of which 209 (40.98%) had ophthalmic injuries over the period of study as shown in Table 1. Fig 1 Prevalence of ophthalmic injuries among patients with maxillofacial fractures expressed using 95% CI. is 36.7 – 45.2. The largest age group of the patients associated with ophthalmic injuries was 30-39 years (65 patients, 31.1%) followed by the age group of 19-29 years (54 patients, 25.8%) Table 2 Fig 2. There were more males (180, 86.1%) than females (29, 13.9%) who sustained Ophthalmic injury Table 3 Fig.3. The etiology for distribution of facial fractures or

ocular injuries showed that road traffic accidents had more frequently resulted in ocular injuries (139, 66.5%) followed by assault (39, 18.7%), self fall (31, 14.8%) Table 4 Fig 4. The risk for sustaining ocular trauma in association with different fracture patterns are summarized in Table 5, Fig 5. Ophthalmic injuries occurred mostly in association with orbital fractures (33.5%) followed by Zygomatico maxillary complex fracture (26.8%) and Maxillary sinus fractures (24.4%). The distribution of Ophthalmic injuries associated with maxillofacial trauma is summarized in Table 6 Fig 6. Periorbital oedema was the most common ophthalmic injury accounting for 46.4% of cases followed by Periorbital ecchymosis 35.4% and Subconjunctival haemorrhage 17.2%.

Table 1: Percentage ophthalmic injuries among patients with maxillofacial fractures

	Count	Percent	95 % CI
Ophthalmic injuries	209	40.98	36.7 – 45.2
Without ophthalmic injuries	301	59.02	
Total	510	100.00	

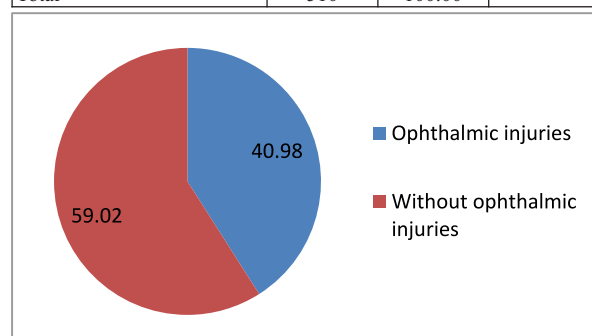


Fig.1: Percentage ophthalmic injuries in patients with maxillofacial fractures

Table 2 Percentage distribution of ophthalmic injuries in different age groups

Age	Count	Percent
Child (0-12)	0	0.0
<3	0	0.0

4-6	0	0.0
7-12	2	1.0
Adolescent (13-18)	8	3.8
Adult (19yr or older)		
19-29	54	25.8
30-39	65	31.1
40-49	38	18.2
50yrs or older	42	20.1

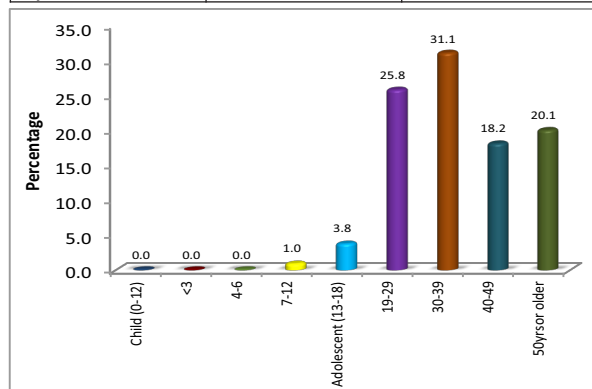


Fig.2 Percentage distribution of ophthalmic injuries in different age groups

Table 3: Percentage distribution of ophthalmic injuries in patients by sex

Sex	Count	Percent
Male	180	86.1
Female	29	13.9

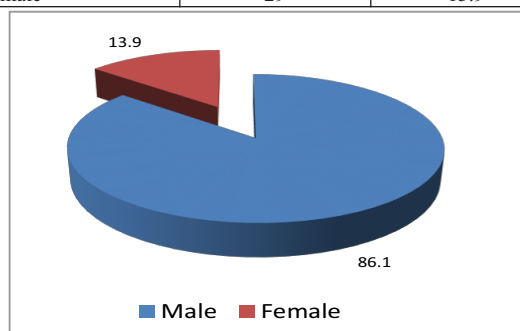


Fig.3: Percentage distribution of ophthalmic injuries in patients by sex

Table 4: Percentage distribution of ophthalmic injuries in patients by etiology

Etiology	Count	Percent
RTA	139	66.5
Self fall	31	14.8
Assault	39	18.7
Sports related	2	1.0
Work related	8	3.8

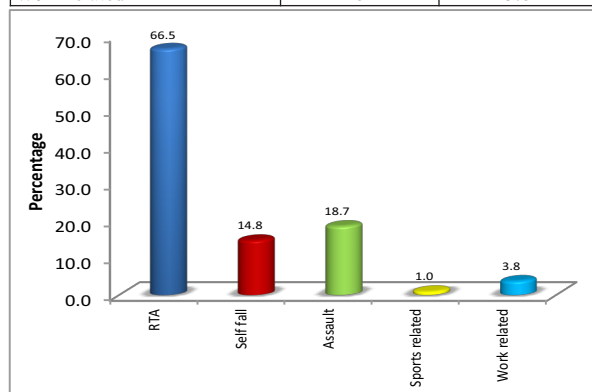


Fig. 4 Percentage distribution of ophthalmic injuries in patients by etiology

Table 5 Percentage distribution of patterns of maxillofacial fractures

Maxillofacial fractures	Count	Percent
Lefort I fracture	2	1.0
Lefort II fracture	16	7.7
Lefort III fracture	8	3.8
Maxillary sinus fracture	51	24.4
Zygomatico maxillary complex fracture	56	26.8
Isolated zygomatic arch fracture	23	11.0
Nasal bone fracture	14	6.7
Naso orbito ethmoid fracture	6	2.9
Frontal bone fracture	18	8.6
Dentoalveolar fracture	8	3.8
Mandibular fracture	10	4.8
Orbital fracture	70	33.5
Medial wall	16	7.7
Lateral wall	20	9.6
Roof	14	6.7
Floor	20	9.6

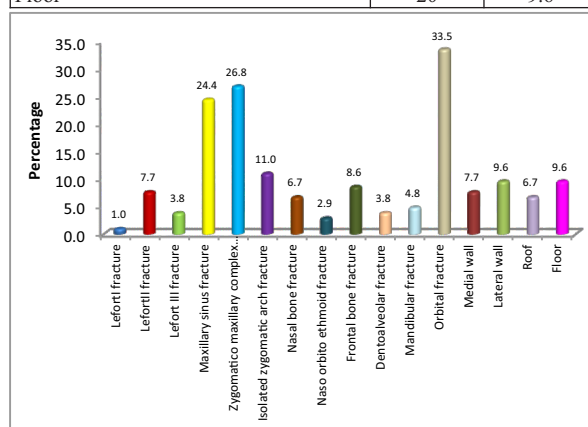


Fig 5. Percentage distribution of patterns of maxillofacial fractures

Table 6: Percentage distribution of types of ophthalmic injuries

Ophthalmic Injuries	Count	Percent
Eyelid ecchymosis	8	3.8
Eyelid oedema	21	10.0
Eyelid laceration	8	3.8
Eyebrow laceration	18	8.6
Periorbital ecchymosis	74	35.4
Periorbital oedema	97	46.4
Supra orbital laceration	8	3.8
Infra orbital laceration	6	2.9
Subconjunctival haemorrhage	36	17.2
Infra orbital paraesthesia	6	2.9
Enophthalmos	0	0.0
Diplopia	8	3.8
Blindness	0	0.0
Retrobulbar haemorrhage	0	0.0
Emphysema	2	1.0
Chemosis	3	1.4
Telecanthus	1	0.5

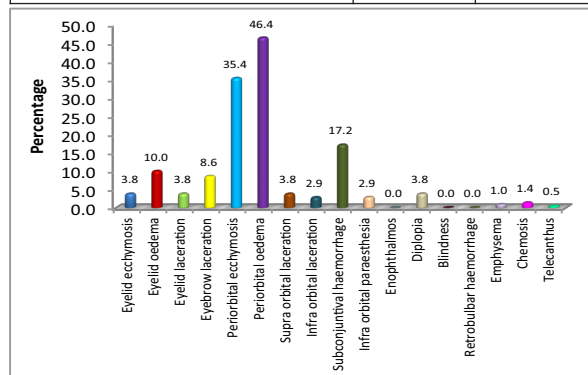


Fig 6. Percentage distribution of types of ophthalmic injuries

DISCUSSION

Injuries to the middle third of the face commonly destroys the integrity of the orbital skeleton and are frequently complicated by injury to the eye, ranging between 2.7% and 90.6% in series of reports¹⁴. Guly et al⁵ had found that the risk for an eye injury for a patient with a facial fracture is 6.7 times greater compared with a patient without facial fractures. In our study, the overall prevalence of ophthalmic injuries in association with maxillofacial fracture was 40.98% which is consistent with previous studies were between 38.7% and 95.7% of patients with mid facial fractures have ocular injuries.⁶⁷⁸

With respect to demographics, there were more males (86.1%) than females (13.9%) which is similar to other studies⁶⁸. The children showed a low risk for ocular injuries, whereas the patients aged between 30-39 years of age (31.1%) showed the highest risk for ocular trauma. Politis et al⁸ has found 41-50 years age bracket as most affected and Benjamin Formete et al⁷ in their study has found patients aged between 21-30 years of age (38.7%) seems to be most affected.

The most common mechanism of injury in our study was Road traffic accidents (66.5%) which agrees with other reports in the literature where between 43.3% to 77.0% of midfacial injuries were due to RTA¹⁰¹¹¹². The kinetic energy released during the collision is the biggest risk factor for trauma and thus for ophthalmic injuries as well. Few studies have identified assault as the main cause¹³¹⁴. While the second most common etiology in our study was assaults (18.7%) followed by self falls (14.8%).

Ophthalmic injuries are frequently present in patients who sustained mid facial fractures. In our study Orbital fractures (33.5%), Zygomaticomaxillary complex fractures (26.8%) Maxillary sinus fractures (24.4%), were associated more frequently with ophthalmic injury. Magarakis M et al¹⁵ in a systematic literature review stated that the periorbital and orbital blow out fractures were more often complicated by ocular injuries compared with other facial fractures. Andrews BT et al¹⁶ had stated that ocular injury has been associated with fractures of the orbit in roughly one quarter of all maxillofacial trauma patients. Read and Sires¹⁷ in their study had found that ocular injury is statistically associated with orbital apex fractures, lateral wall fractures, and Lefort III fractures. Shere et al¹⁸ compared zygomatic complex fractures and orbital blowout fractures and found that blow out fractures (29.8%) were significantly more likely to sustain concomitant eye injury than zygomatic complex fractures (7.6%) which is in agreement with our study were 33.5% of orbital fractures are associated with ophthalmic injuries. Other studies have also reported that ocular trauma are more often present in the periorbital and orbital blowout fractures¹⁸¹⁹²⁰. Politis et al⁸ had found that maxillary sinus (44.3%), followed by orbital walls (23.6%) and zygoma (23.6%) were the common cause of ocular injuries. Al Quariny et al¹ reported that ZMC fractures are associated with higher ocular complications of about 41% compared to other fractures. Guly et al⁵ thought that there was no difference in the incidence of concomitant ocular injuries among different types of facial fractures. In our study the occurrence of ophthalmic injuries was found to be less in patients with mandibular fracture owing to the fact that the fracture of mandible results in absorption and reduction of the force significantly thus leading to less occurrence of ocular injuries.

Various ocular injuries with different degrees of severity are associated with mid facial fractures. Periorbital oedema (46.4%) was the most common ophthalmic injury noted in our study followed by Periorbital ecchymosis (35.4%) and Subconjunctival haemorrhage (17.2%). Diplopia is another ocular injury in mid facial fractures and the incidence range from 1% to 74%⁸¹². In the present study the incidence of diplopia was found to be 3.8% which is much lower when compared to the study conducted by Politis et al⁸ where diplopia (48.8%) was the most common ocular injury. Injuries to the eyelid like ecchymosis (3.8%), oedema (10%), laceration (3.8%) was also noted in our study. Traumatic telecanthus due to the disruption of the attachment of medial canthal ligament following naso orbital ethmoid fractures was observed in only one case (0.5%) which was lower than the previous studies¹¹²¹ 5% and 8.45% respectively. The incidence of visual loss and blindness from facial fractures varies from 0.7 to 10.8%¹⁵ and is caused by traumatic optic neuropathy, retrobulbar hemorrhage or perforation of the globe. An incidence of 0.5% to 5% of traumatic optic neuropathy following mid facial trauma is noted in the literature¹. Retrobulbar haematoma has been quoted as a cause of blindness in patients with mid facial trauma, ranging from 10% to 50%.²²²³ In our study we didn't come across any case of blindness.

CONCLUSION

Ophthalmic injuries in association with maxillofacial trauma are important as these injuries have high risk of threatening vision. The ophthalmic involvement is inevitable in mid-facial fractures as the soft tissues absorb more energy at the time of impact than the underlying bones²⁴. The severity and permanency will depend on the type of injury, extent of fractures and availability of expertise to manage the complex problems that arise. All patients who have sustained mid facial trauma should have a thorough ophthalmic examination to prevent blinding complications.

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