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Original Research Article

Ophthalmic implications following orbital trauma

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ABSTRACT

Background: To study the epidemiology, clinico-radiological pattern of ocular injuries following orbital trauma.
Methods: A cross-sectional study was conducted for a period of 6 months, all the patients attending casualty with the history of orbital injuries were included in the study. Proper history and ophthalmological examination were done. The data were recorded in the form of various parameters like type of injury, time, place and severity of injury, site of injury, and radiological pattern of fracture.
Results: Out of 100 patients 68 patients had injuries due to road traffic accidents. Most of the victims were males (86%). The most vulnerable age group was 21-30 year (38%). Majority of the patients had lid laceration (n=43, 43%), followed by periorbital swelling with black eye in 40 patients (40%) and iris prolapse in 1 patient. Out of 40 orbital wall fracture 11 fractures were impure and 29 were pure orbital wall fracture. Most of them were orbital floor fracture and least was roof fracture.
Conclusions: Road traffic accidents can result in severe ocular trauma. Victims are usually adult males of productive age group. Frontal impacts during the accidents poses the greatest risk of orbito-facial trauma. Factors like open globe injury and multiple orbital wall fracture usually associated with poor prognosis. Use of helmet and seatbelt may reduce the risk of frontal impact and hence vision threatening ocular trauma.

Keywords: Orbital trauma, Orbital fracture, Road traffic accident, CT scan

INTRODUCTION

Road traffic accidents (RTA) are a major public health issue, leading to high morbidity and mortality rates. Globally, RTAs are the eighth leading cause of death.[1] In India, the number of RTAs is rising due to increasing vehicle numbers, congested and poor-quality roads, untrained drivers, and non-compliance with traffic rules. RTAs also contribute significantly to ocular injuries.[2]

Quite diverse ocular injuries are sustained during the road traffic accidents and these are often associated with severe, vision-threatening complications. Severe ocular trauma related to RTAs has a significant impact on individuals, their families, and society, leading to substantial socioeconomic costs, increased morbidities, an unnecessary burden on medical care, long-term disability, and loss of productivity, all of which negatively affect the quality of life.[3,4]

Permanent visual impairment and physical disfigurement can negatively impact both the physical and mental health of the victim. Road traffic accidents are the most common cause of polytrauma, with the head, face, and limbs being the most frequently injured body parts. The orbit and maxilla are the facial bones most commonly fractured in these incidents.[5,6]

Common vision-threatening complications in ocular trauma related to road traffic accidents include corneal laceration, ruptured globe, intraocular haemorrhages, multiple complex orbital bone fractures with or without

extraocular muscle entrapment, retinal detachment, and optic nerve avulsion. Computed tomography (CT) scans of the face, orbit, and skull, with 3-dimensional reconstructed imaging, are particularly useful for diagnosis and decision-making in such cases.[7]

About 90% of ocular trauma cases are preventable with the proper use of protective helmets, seatbelts, and protective glasses.[8] However, a lack of awareness about preventive measures, improper use of protective helmets, and delays in receiving immediate medical care increase the risk of complications, leading to visual morbidity and blindness. Therefore, prevention should be the cornerstone of managing ocular trauma.

This was a hospital-based study conducted to evaluate the epidemiology, clinico-radiological pattern in patients having various ocular injuries.

Objectives of this study was to determine the pattern of ocular injury following RTA. To determine the radiological pattern of orbital trauma.

METHODS

Subjects and study design

A prospective cross-sectional study was conducted from April 2023 to September 2023, for a period of 6 months at Gadag institute of Medical Sciences, Gadag. All the patients attending casualty with the history of orbital injuries were included in the study. Total of 100 cases were included in the study. Diagnosis was done based on clinical examination and computed tomography (CT) scan evaluation.

Inclusion criteria

Patients of all age groups, both sexes having a history of ocular trauma and giving consent were included in the study.

Exclusion criteria

Patients refused to give consent for the study.

Methodology

Based on the inclusion and exclusion criteria subjects are selected. Proper history and thorough examination of all patients attending the casualty was done and the data were recorded in the form of various parameters like time, place and severity of injury, site of injury, and radiological findings.

Total 100 patients attending the casualty following the history of ocular trauma were included in the study.

Prior to the examination an informed consent was obtained from all the participants. Proper history and ophthalmological examination of all patients was done, and the data were recorded in a pretested proforma including demographic variables (age, sex), specific history of trauma (type of insult).

All the patients attending the casualty were asked about their complaints and thorough ocular examination was done and initial specific ophthalmic treatment were given. The patients were examined thoroughly to note the severity of injury, extent of ocular injury (type of globe injury/adnexal injury) and anterior or posterior segment involvement. As per requirement radiological investigations like USG B-scan and CT scan were done and the pattern of orbital wall involvement is recorded.

The data was entered into an excel sheet and statistical analysis was performed using IBM SPSS software. Categorical numerical variables were analysed as frequency and percentage. P value of <0.05 was considered as significant.

RESULTS

Total of 100 patients were studied. Patients were aged between 6 to 75 years. Most vulnerable age group was 21-30 years followed by 31-40 years. There were only two patients aged more than 60 years; 12 were in the paediatric (1-20 years) age group (Figure 1).

Table 1: Distribution of victims according to their age.

Age group (years)	Number of victims	Percentage (%)
1-10	1	1
11-20	11	11
21-30	38	38*
31-40	28	28
41-50	12	12
51-60	8	8
>60	2	2
Total	100	100

Most vulnerable age group was between 21-30 years*

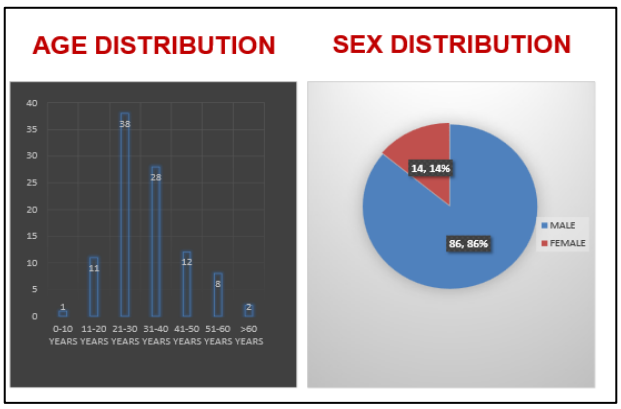

Figure 1: Age and sex distribution.

Table 2: Distribution of victims according to their gender.

Gender	Number of victims	Percentage (%)
Male	86	86*
Female	14	14
Total	100	100

Incidence of orbital injury were more common in males*

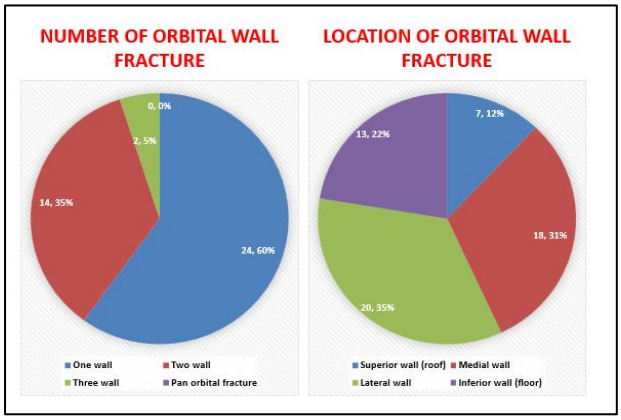

Figure 2: Distribution of mode of injury and injury subtype.

Table 3: Distribution of victims according to the mode of injury.

Mode of injury	Number of victims	Percentage (%)
Road traffic accident	68	68*
Assault	12	12
Self-fall	09	09
Sports injury	07	07
Agriculture related trauma	04	04
Total	100	100

Road traffic accident was the commonest cause for orbital injuries*

The ocular trauma incidence was highest in males (86%) than in females (14%) (Figure 1).

A total 68 patients had ocular injuries following RTA, while 32 patients due to other than road traffic accidents (Figure 2).

A total 99% of the patients presented with closed globe injury, and 1% presented with open globe injury. Majority of the patients had lid laceration (n=43, 43%), followed by Periorbital swelling with black eye in 40 patients (40%), subconjunctival haemorrhage in 35 patients (35%), lid abrasion in 25 patients (25%) and corneal perforation with iris prolapse in 1 patient (1%) (Figure 2).

In CT scan 36 patients out of 100 were had orbital wall fractures. In those 4 patients had fracture of both orbits. Out of 40 orbital wall fracture 11 fractures were impure, rest all were pure orbital wall fracture. 24 fractures involved only single wall, 14 fractures involved two walls, 2 fractures involved three walls and none of the fracture involved all walls (Figure 3).

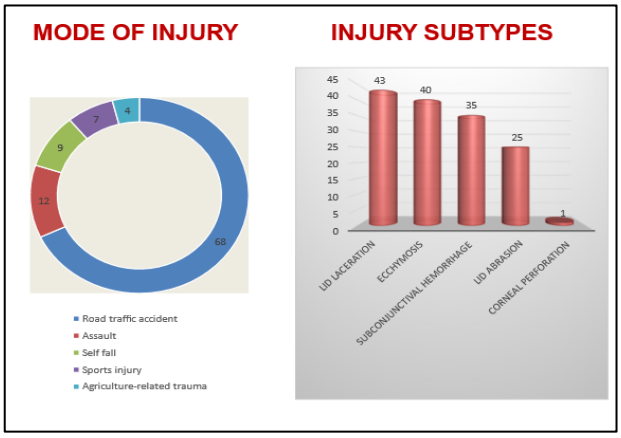

Figure 3: Distribution of orbital wall fracture.

Table 4: Distribution of victims according to the injury subtypes.

Injury subtype	Number of eyes
Lid abrasion	25
Lid laceration	43
Ecchymosis	40
Subconjunctival haemorrhage	35
Corneal perforation	1

Most of the victims had closed globe injuries.

Table 5: Distribution of orbital wall fracture.

Number of orbital wall fracture	Number of eyes involved (n=40)	Percentage (%)
One wall	24	60*
Two walls	14	35
Three walls	2	5
Pan orbital fracture	-	-
Total	40	100

One wall fracture was most observed*

Table 6: Distribution according to the location of the orbital wall fracture.

Location of fracture	Number of eyes (n=40)	Percentage (%)
Superior wall (Roof)	7	17.5
Medial wall	18	45
Lateral wall	20	50*
Inferior wall (Floor)	13	32.5
Total	40	100

lateral wall of the orbit was most vulnerable for fracture*

Out of 40 orbital wall fractures 20 were floor fracture followed by lateral wall 18, medial wall 13, and roof involvement in 7 cases (Figure 3).

Table 7: Distribution of patients according to the intervention performed.

Management	Cases	Percentage (%)
Conservative management	56	56*
Patients required intervention	44	44

Most of the cases treated conservatively*

DISCUSSION

Ocular trauma is one of the major causes of avoidable blindness. In this current study (male: female - 6.1:1), Higher preponderance of ocular trauma is noted in males which can be attributed to their increased outdoor work or activities and taking more part in outdoor sports. Rash driving, violence and factory workers are other risk factors.

In this study, out of 100 ocular trauma patients, 68 patients (68%) were injured due to RTA. The variable incidence of RTA related ocular injuries have been reported in other studies, like Maurya et al (25%), Georgouli et al (56%), Mackay et al (70%), Laila et al (60.7%).[9-12] RTA still ranks high in the etiology among young adult males as compared to other age groups.

In this current study, male patients (86%) had more ocular injuries as compared to females (14%) with M: F ratio being 6.1:1. Kumar J et al from India reported incidence as 77.6% in males and 22.4% in females.[13] Arora et al from India also reported M: F ratio to be 2.5:1.[14]

Apart from gender difference, age is also other risk factor. Our study showed that about 12% of ocular traumas occurred in paediatric age group. People with low-socioeconomic status generally suffer consequences following ocular trauma due to delay in seeking treatment.

In the current study, the most vulnerable age group was between 21-30 years (38%) followed by 31-40 years age group (28%) and 41-50 years (12%). A similar peak age of 21- 30 years was also reported by Maurya et al i.e., 21-30 years (25.3%) followed by 31-40 years age group (24.2%).[9]

Majority of the RTA victims had unilateral eye involvement i.e. 96% and 4% had bilateral eye involvement. The incidence of bilateral ocular involvement reported among RTA related ocular injuries varies from 4% to 93.68%; Briner et al (4%), Kriedl et al (4.9%), Kumarasamy et al (9.7%), Taylor et al (50%) and Maurya et al (93.68%).[9,15-18]

In the current study there was a slight predominance of left eye (55%) involved. A study done by Maurya et al also had a slight predominance of left eye (51.58%).[9] However, higher proportion of right eye injury was reported in previous studies.[14,17,19]

Ocular tissue involvement determines the prognosis of an eye injury. Posterior segment injury has a relative worse prognosis than that of anterior segment involvement. In our study, 99 patients had closed globe injury while 1 patient had open globe injury. Commonest ocular injury was lid laceration (n=43, 43%), followed by periorbital swelling with black eye in 40 patients (40%), subconjunctival hemorrhage (35%), lid abrasion in 25 patients (25%), corneal perforation with iris prolapses in 1 patient (1%).

The study done by Maurya et al reported that ecchymoses (77.23% eyes) were seen in 77.23% eyes followed by eyelid laceration and subconjunctival hemorrhage and globe injury.[9] Kumar J et al reported periorbital oedema with ecchymoses (82.2%) followed by eyelid laceration (68.8%) as a commonest type of injury.[13] Similar findings were also reported by Alam J et al and Kumarsamy et al.[14,19] Muralidhar et al reported subconjunctival hemorrhage was the commonest ocular injury followed by ecchymoses.[20] Orbit and periocular structures usually take the brunt of the injury in accident at first.

CONCLUSION

RTA can cause severe ocular trauma and may lead to severe ocular disability. Victims are usually young males of the productive age group. multiple orbital fractures, posterior segment trauma, initial poor visual acuity and open globe injuries are associated with poor prognosis.

Public health education regarding use of helmet and seat belt while driving, early reporting to the hospital following road traffic accidents and appropriate intervention may reduce the vision threatening complications and blindness in RTA related ocular trauma. As road traffic accidents cause a lot of morbidity and mortality, safety measures must be undertaken properly, and traffic rules have to be abided strictly as prevention is always better than cure.

Major cause of orbital trauma in our study was due to RTA. Specific clinical examinations and imaging studies help in determining mode and extent of injury. By rendering appropriate treatment early possible long-term complications can be avoided.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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