International Journal of Ophthalmology & Visual Science
2023; 8(1): 10-19
http://www.sciencepublishinggroup.com/j/ijovs
doi: 10.11648/j.ijovs.20230801.13
ISSN: 2637-384X (Print); ISSN: 2637-3858 (Online)

A Profile of Ocular Trauma Cases Visiting the Ophthalmology Department in a Tertiary Care Eye Centre

Faiza Syed Jafar*, Alhaj Farhath Tasneem, Irvathur Vittal Nayak, Vasundhara Reddy

Department of Ophthalmology, Vydehi Institute of Medical Sciences and Research Centre, Bangalore, India

Email address:

faiza_jafar@yahoo.com (Faiza Syed Jafar), alhajftasneem@gmail.com (Alhaj Farhath Tasneem), ivittal78@gmail.com (Irvathur Vittal Nayak), vasundharareddy.vasu123@gmail.com (Vasundhara Reddy)

*Corresponding author

To cite this article:

Faiza Syed Jafar, Alhaj Farhath Tasneem, Irvathur Vittal Nayak, Vasundhara Reddy. A Profile of Ocular Trauma Cases Visiting the Ophthalmology Department in a Tertiary Care Eye Centre. *International Journal of Ophthalmology & Visual Science*. Vol. 8, No. 1, 2023, pp. 10-19. doi: 10.11648/j.ijovs.20230801.13

Received: December 14, 2022; **Accepted**: February 8, 2023; **Published**: March 4, 2023

Abstract: Ocular trauma is a significant preventable cause of permanent visual morbidity and has a substantial socioeconomic impact. Hence, it is essential to understand the various causes, presentations, treatment and surgical approaches with regards to the treatment of these cases as well as prevention with safety devices. This paper aims to assess pattern of presentation and risk factors of ocular injuries attending the department of ophthalmology a tertiary care center. This was a retrospective analysis of ocular trauma cases that visited our center between 2018 to 2021 and the various diagnostic techniques and appropriate surgical methods taken with respect to each case, highlighting the visual outcome. A follow-up was maintained in all cases for three years at regular 3-4 months interval. It was found that 50% of injuries were open-globe injuries, 16.7% closed globe injuries and 25% orbital wall fractures. Majority of subjects were in the age group 21-30 years (41.7%) of which 83.3% males. The most common cause of ocular injury was road traffic accidents (66.7%) of which 37.5% were associated with two-wheeler vehicles. 41.6% presented with visual acuity less than 6/60. 83.3% required surgical treatment. 58.2% of eyes regained visual acuity greater than or equal to 6/24 of which 25% regained visual acuity of 6/9. In conclusion, ocular trauma was more common in males following road-traffic accidents particularly with two-wheeler, the majority presenting immediately following the trauma and most required surgical correction.

Keywords: Ocular Trauma, Orbital Fracture, Bull Gore, Road-Traffic Accident, Ocular Surgery, Corneal Laceration

1. Introduction

Ocular trauma is a major cause for monocular visual impairment and disability throughout the world. [1] It is a significant public health problem, more common in developing countries, occurring at any age and affecting either sex, though several hospital and population-based studies indicate a large preponderance among males and children. [2] According to estimates declared by the World Health Organization (WHO), the global annual incidence of ocular trauma is about 55 million and worldwide blindness in 1.6 million people is due to ocular trauma. [3] Hence the need for a preventive strategy to know more about the visual morbidity related to ocular injuries and the socioeconomic impact which is potentially preventable. [4] Furthermore, paediatric age-group pose specific challenges in terms of visual rehabilitation as well as amblyopia treatment. [5] This study aims to assess the pattern, presentation and risk factors of ocular injuries attending the department of ophthalmology in a tertiary care eye center.

2. Materials and Methods

A retrospective analysis of ocular trauma cases attending our hospital from 2018 to 2021. All patients underwent a comprehensive ocular examination with visual acuity assessment using Snellen's chart wherever possible. After initial torchlight examination, slit-lamp biomicroscopy, fluorescein staining, direct and indirect ophthalmoscopy, B-scan, CT scan and MRI scan were done wherever needed. The Birmingham Eye Trauma Terminology System (BETTS) for classification of ocular injuries and the Ocular Trauma Scoring System developed by Kuhn et al was applied during the initial examination for prognostic information regarding the final visual outcome. [6]

2.1. Statistical Analysis

Statistical analysis was done using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions.

2.2. Cases

Case 1: open globe injury – corneal laceration with iris prolapse

A 36-year-old male was brought to the EMD following a motorcycle accident when his two-wheeler collided with a 4-wheeler and he sustained injuries to his right eye. Patient was wearing a helmet at the time of collision. Vision in the right eye was perception of light; there was a corneal laceration with hyphaema and limbal iris prolapse. The left eye was apparently normal with a visual acuity of 6/60, though it was later diagnosed as anisometropic amblyopia. Unfortunately, the injury was to his good eye. The patient was taken for emergency surgery. Iris was reposited and anterior chamber was formed, hyphaema was washed out. The laceration was sutured with 10-0 ethilon. Postoperatively, visual acuity of right eye was counting fingers at 3 meters which improved to 6/6 on follow-up. Sutures were removed six weeks later. One year later, increased intraocular pressure was noted and gonioscopy of right eye showed 270 degrees angle recession. IOP did not improve despite medical management. A diagnosis of secondary angle recession glaucoma with traumatic cataract was made and lens extraction with filtering surgery (and mitomycin C) was done. Postoperatively, vision improved to 6/24 in the right eye. IOP was 14mmHg. Patient was stable on follow- up.

Case 2: open-globe injury – corneal laceration with conjunctival foreign body

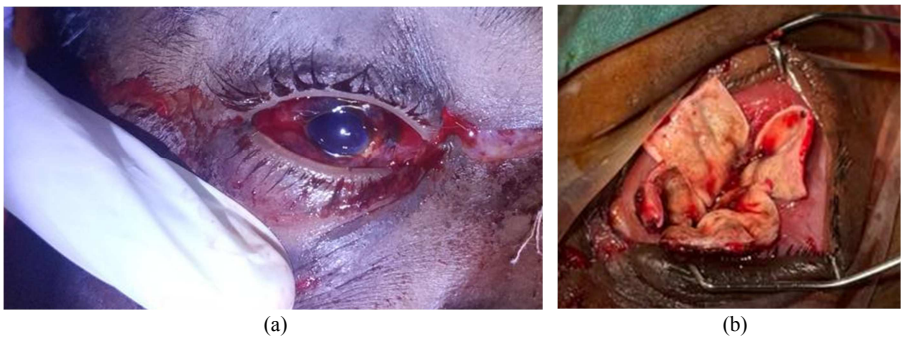
A 33-year-old male was brought to the EMD following road traffic accident. The patient was in the passenger seat of a 4-wheeler when the vehicle skid and collided into a wall. Patient was not wearing a seatbelt and sustained injuries by the broken windshield. He had a large lacerated cut across the forehead, avulsing the skin and frontalis muscle and reflecting it backwards. The right eye showed subconjunctival haemorrhage with several bits of broken glass embedded in the conjunctiva, though cornea was clear and intact and fluorescein staining was negative. The left eye showed a well-approximated, horizontal corneoscleral laceration extending from limbus-to-limbus and 1mm of sclera on both sides. AC was shallow. Visual acuity could not be assessed as the patient was taken up for emergency surgery under general anaesthesia. The forehead laceration was sutured in three layers, conjunctival foreign bodies of right eye were removed and corneoscleral laceration of left eye was repaired and sutured with ethilon 10-0. Postoperatively, visual acuity of right eye was 6/12 and left eye was counting fingers at 3 meters. Fundus of right eye was normal and left eye was not visualized due to hazy view. CT skull and orbit and Xray skull showed no intraocular foreign bodies, which was confirmed later with MRI. Four days later, vision in left eye had improved to 6/60. Patient was discharged after one week. Vision in left eye at six weeks was 6/24 and remained stable. Patient was regularly followed up for one year.

Case 3: Open globe injury – rupture globe

A 23-year-old male patient came to the ophthalmology OPD with history of sudden onset pain, bleeding and loss of vision in left eye following trauma with a stick during Jallikattu sport. He had no light perception in the left eye. Examination revealed lid oedema, ecchymosis, conjunctival chemosis, flat AC and a large sclerocorneal tear with iris prolapse extending from 12 to 6 o'clock position diagonally. Other ocular details could not be assessed. Wound exploration under general anaesthesia revealed an extensive rupture globe with posterior extension. Primary wound repair was done and the patient was started on systemic antibiotics and analgesics. He was counselled about the risk of sympathetic ophthalmitis and need for evisceration. Having taken consent, evisceration was done with cosmetic rehabilitation.

Case 4: Open globe injury – rupture globe

A 35-year-old male was brought following history of road-traffic accident. The patient was in the passenger seat of a four-wheeler when it collided head on with a truck. Patient was allegedly wearing a seatbelt at the time. He sustained injuries to the right side of his face. Visual acuity in right eye was no perception of light. Examination revealed a 3 cm laceration medial to the medial canthus and periorbital oedema, ecchymosis, conjunctival chemosis, horizontally oval cornea, total hyphaema obscuring iris and pupil details and a large scleral tear with iris prolapse located superiorly. Other ocular details could not be assessed. Left eye hypotony was noted on digital tonometry. A diagnosis of left eye rupture globe was made and patient was counselled for evisceration for which he consented. Evisceration with orbital implant and secondary repair of extraocular laceration was done under general anaesthesia. Conformer was placed. Postoperatively, patient was stable and was discharged and planned for prosthesis fixation after 6 weeks.



(a) (b)

(c) (d) (e)

Figure 1. *(a) preoperative image of rupture globe. (b), (c) and (d) Intraoperative images of evisceration procedure, conformer insertion. (e) Postoperative image of patient with conformer in situ.*

Case 5: Open globe injury – corneoscleral laceration

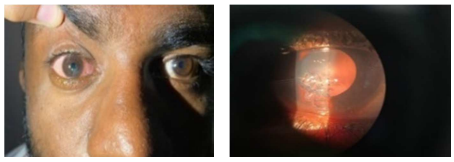
A 4-year-old female child was brought to the EMD with history of road-traffic accident. She was seated in front of her father who was driving a two-wheeler when a sudden brake was applied and her right eye struck the bike handle. The child sustained injuries primarily to the right eye and the surrounding skin. Visual acuity could not be assessed. Examination revealed complete hyphaema with subconjunctival haemorrhage, chemosis, periorbital ecchymosis and oedema. Cornea, pupil and lens were not visible. A 0.5x0.5 cm abrasion was noted superotemporal to the right eye. Left eye appeared normal. There was no evidence of fracture on CT scan. Under general anaesthesia, anterior chamber was found to be uniformly deep with hyphaema in inferior quadrant. Pupil was oval along 6-9 o'clock position. Paracentesis and anterior chamber wash were given following which a corneoscleral tear wound was detected at 9 o'clock position and was approximated using 6-0 vicryl suture. Side port was sutured with 8-0 ethilon. The child was started on systemic antibiotics and analgesics and was discharged after four days. On follow-up visits at 1, 2, 3 and 6 weeks postoperatively, vision acuity was 6/9 in both eyes.

(a) (b)

Figure 2. *(a) pre-operative and (b) postoperative image of corneoscleral laceration.*

Case 6: open globe injury – corneal laceration

A 21-year-old male came with history of injury to right eye with spectacles due to rebound. On examination, a Y-shaped corneal laceration was noted at the 5 o' clock position, extending from the paracentral area up to limbus. Fluorescein staining and Siedel's test were positive. Left eye appeared normal. Vision was 6/36p at the time of presentation. The patient was started on empirical antibiotics and analgesics. Under general anaesthesia, repair of the corneal laceration was done with 9 simple interrupted sutures using 10-0 ethilon. Post procedure, Siedel's test was negative. A bandage contact lens was applied. The patient was discharged after 5 days with vision at the time of discharge of 6/18p.



(a) (b)

Figure 3. *(a)Preoperative image of corneal laceration of right eye extending from 5 o'clock position peripherally towards the center of the cornea (b) Postoperative image of repaired corneal laceration.*

Case 7: closed globe injury – extraocular laceration

A five-year-old male came with a laceration above the left eye following road traffic accident where the child was seated behind his parent on a 2-wheeler but fell off the vehicle when it skidded. Patient was not wearing a helmet at the time. He was not cooperative for visual acuity measurement. The laceration had uneven margins and extended horizontally along entire left brow and vertically 3 cm above and 1 cm below the left brow. Extraocular movements, anterior and posterior segments were normal. Intraoperative wound exploration was done with suturing of wound in layers with placement of collagen sheet over area of epithelial loss. Cosmetic recovery post- procedure was excellent.

(a) (b) (c)

Figure 4. *(a) preoperative, (b) intraoperative and (c) postoperative images of extraocular laceration.*

Case 8: closed globe injury – extraocular foreign body

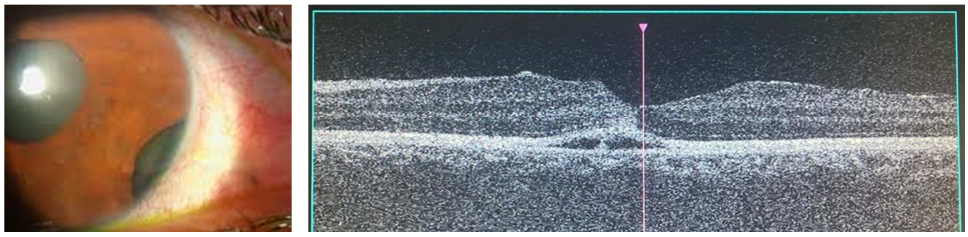
(a) (b)

Figure 5. *(a) and (b) intraoperative image and picture of broomstick pieces retrieved from the swelling.*

A 48-year-old female patient presented with swelling in supraorbital region of left eye just above the lateral canthus associated with pain for 2 years. She gave history of trauma 4 years back. Unaided visual acuity in left eye was 6/12p improving with pinhole to 6/6. Anterior and posterior segment examination of eye were normal. On inspection, there was a diffuse swelling of about 2cm x 1.5 cm size in the supraorbital region of left eye. Palpation revealed subcutaneous swelling with tenderness. Ultrasonography revealed linear hyperechoic tubular structure in subcutaneous plane measuring 15mm with surrounding anechoic fluid collection and skin thickening. Surgery revealed several impacted foreign bodies (pieces of broomstick) within the swelling.

Case 9: closed globe injury – contusion with commotio retinae

A 27-year-old male came with history of injury to the right eye with a rubber band two days back followed by diminution of vision. On examination of the right eye, vision was counting fingers at 4 meters. There was iridodialysis at the four o-clock position causing D-shaped pupil. Cornea and lens of the right eye appeared to be normal. Fundus of right eye showed normal disc, absent foveal reflex and glistening gray-white opacification suggestive of commotio retinae. Right eye optical coherence tomography scan of macula showed loss of foveal contour and neurosensory layer separation and increased foveal thickness. Patient was started on conservative treatment with prophylactic antibiotics, topical analgesics and cycloplegics. He was followed up regularly. At the end of one month, visual acuity of right eye improved to 6/9 with no residual pathology in the retina, though iridodialysis still persisted.

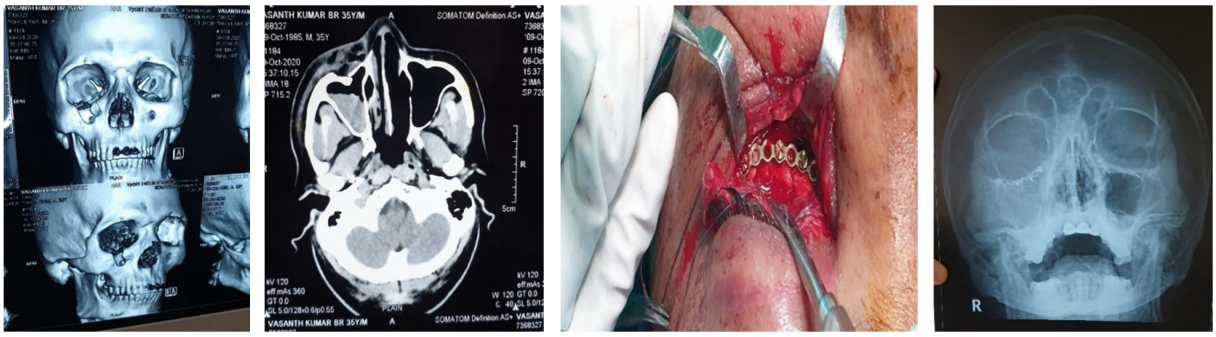


(a) (b)

Figure 6. *(a) iridodialysis at 4 o'clock position (b) OCT macula image of left eye showing loss of foveal contour and neurosensory layer separation with small pigment epithelial detachment and increased foveal thickness*

Case 10: orbital floor fracture – impure floor fracture

A 35-year-old male patient came with injury to the right eye with pain, swelling, redness and discharge following road traffic accident 4 days back. He was driving a 4- wheeler when it collided with another vehicle and hid forehead and eyes struck the steering wheel. Patient was allegedly wearing his seat belt. Primary suturing of right lower eyelid and right brow laceration had been done elsewhere. Vision in right eye was counting fingers at 1 meter. There was restriction of extraocular movements (depression) and binocular diplopia on upgaze. Examination of right eye revealed lid oedema and conjunctival chemosis with good fundal glow. CT scan revealed depressed comminuted fracture (impure blow-out fracture) of right infraorbital wall with hyperdense focus in right periorbital region – likely foreign body. Open reduction of right orbital floor fracture was done with release of entrapped muscle and internal fixation of titanium plate for orbital floor repair with removal of foreign body (small wood piece).

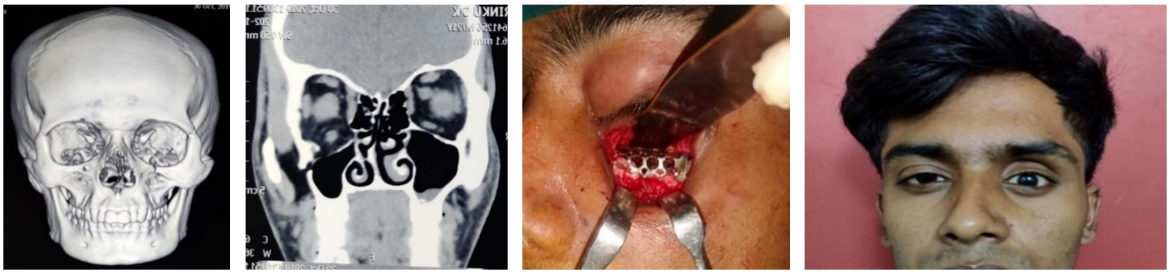


(a) (b) (c) (d)

Figure 7. *(a) and (b) CT skull and orbit images showing impure orbital floor fracture, (c) intraoperative picture of titanium mesh insertion (d) postoperative radiological image with titanium mesh in situ.*

Case 11: orbital floor fracture – impure floor fracture

A 23-year-old male was brought to the EMD following road-traffic accident when his two-wheeler skid and he sustained injuries over the face. Patient was not wearing helmet at the time. Visual acuity was 6/9 in both eyes. Left eye appeared sunken and hypotropic with decreased palpebral fissure height and globe enophthalmos. CT skull and obit was done. Patient was diagnosed with left eye enophthalmos secondary to orbital floor fracture. Left eye reconstruction of orbital floor using titanium mesh was done under general anaesthesia. Postoperatively, extraocular movements were full. Visual acuity was maintained at 6/9 in both eyes.



(a) (b) (c) (d)

Figure 8. *(a) and (b) CT skull and orbit images showing orbital floor fracture, (c) intra-operative image showing titanium mesh insertion, (d) postoperative image.*

Case 12: orbital floor fracture – impure blowout fracture

A 25-year-old male was brought to the EMD with history of RTA, when his two-wheeler skid and he sustained injuries over the face. Patient was not wearing helmet at the time of injury. Patient complained of binocular diplopia in extreme right gaze. On examination, visual acuity was 6/6p in both eyes. The left eye showed periorbital oedema with conjunctival chemosis. CT skull and orbit showed orbital floor fracture of left eye. On surgical exploration, few fibres of inferior oblique and inferior rectus muscles were found to be entrapped within the fractured orbital floor of left eye. Left eye orbital floor reconstruction with titanium mesh along with recession of left inferior oblique and inferior rectus muscles was done under general anaesthesia. Postoperative period was uneventful. On subsequent follow-up visits, patient reported improvement of his symptoms as well and resolution of diplopia. Visual acuity was maintained at 6/6p in both eyes.

(a) (b) (c)

Figure 9. *Preoperative image of patient with image of CT brain and orbit showing left orbital floor fracture. Intraoperative images showing titanium mesh fixation. Postoperative images of patient on day following procedure.*

3. Results

Table 1. *Profile of subjects with ocular trauma.*

		Count	%
Age Group	0-10	2	16.7%
	11-20	0	0%
	21-30	5	41.7%
	31-40	4	33.3%
	41-50	1	8.3%
Gender	Female	2	16.7%
	Male	10	83.3%
Cause	RTA	8	66.7%
	Domestic injury	3	25.0%
	Sport-related injury	1	8.3%

This study is a retrospective analysis of the various presentations of ocular trauma cases attending our hospital from 2018 to 2021. Majority of subjects in this study were in the age group 21-30 years (41.7%), 33.3% were in the age group 31 to 40 years. 83.3% were males and 16.7% were females. Road-traffic accidents were the most common cause of ocular trauma (66.7%), followed by domestic injuries (25%) and sport-related injuries (8.3%). This has been illustrated in Table 1.

Seven patients sustained injury by road traffic accident — four due to two-wheeler and three due to four-wheeler vehicles. Of the patients on two-wheeler vehicles, the most common cause of injury was direct impact on the ground following skidding of the vehicle (37.5%) followed by collision with another vehicle (12.5%). Only one had worn a helmet at the time of injury. Of the patients in four-wheeler vehicles, two were in passenger seat (66.7%) and only one of them was wearing their seatbelt. One patient was driving the four-wheeler at the time of injury (33.3%) and was wearing

his seatbelt [Table 2].

Table 2. *Mechanism of injury amongst patients with ocular trauma due to road traffic accidents.*

Mechanism of injury	Count	Percentage
Total number of cases = 8		
2-wheeler	5	62.5%
Collision with vehicle (Number of patients wearing helmet)	1 (1)	12.5% (100%)
Skid (Number of patients wearing helmet)	3 (0)	37.5% (0%)
Sudden brake (injury to handle)	1 (0)	12.5% (0%)
4-wheeler	3	37.5%
Passenger seat (Number of patients wearing seatbelt)	2 (1)	25% (50%)
Driver seat (Number of patients wearing seatbelt)	1 (1)	12.5% (100%)
Total number of patients wearing seat belt	2	66.7%

Regarding laterality of eyes involved, 91.7% presented with uniocular involvement of which right eye was more common (58.3%). Bilateral involvement was seen only in 8.3%, as shown in Table 3.

Table 3. *Laterality of eye involvement among study subjects.*

	Bilateral	Unilateral	
		Right	Left
Count	1	7	4
Percentage	8.3%	58.3%	33.3%
Total (with percentage)	1 (8.3%)	11 (91.7%)	

Regarding mechanism of injury, 50% had open globe injury, 16.7% had closed globe injury, 25% had orbital floor fracture and 8.3% had extraocular injury [Table 4].

Table 4. *Distribution of mechanism of injury in study subjects.*

		Count	%
Category	Open Globe	6	50.0%
	Closed Globe	2	16.7%
	Extra ocular injury	1	8.3%
	Orbital Floor Fracture	3	25.0%

In this study, visual acuity at presentation could not be recorded in a majority of patients (25%). 16.7% had no perception of light on presentation. 8.3% had visual acuity at presentation of 6/6p, 6/9p, 6/12p, 6/18p, counting fingers at 1 meter, 8.3% counting fingers at 4 meters and perception of light as shown in Table 5 and Figure 10.

Table 5. *Distribution of visual acuity at presentation of various study subjects.*

Visual Acuity at Presentation	Count	Percentage
6/6p	1	8.3%
6/9p	1	8.3%
6/12p	1	8.3%
6/18p	1	8.3%
Could Not Be Assessed	3	25.0%
Counting fingers at 1 Meter	1	8.3%
Counting Fingers at 4meters	1	8.3%
Perception of Light +	1	8.3%
No Perception of Light	2	16.7%
Total no. with VA > 6/60	4	33.3%
Total no. with VA < 6/60	5	41.6%

It was observed that 50% of patients had periorbital oedema and ecchymosis. 41.6% had corneal involvement. 33.3% had scleral tear. 25% had hyphaema, subconjunctival haemorrhage, iris prolapse and orbital floor fracture. 41.7% had chemosis, 8.3% had conjunctival foreign body, iridodialysis, extraocular movement restriction and enophthalmos respectively. 16.7% had diplopia. (Figure 11).

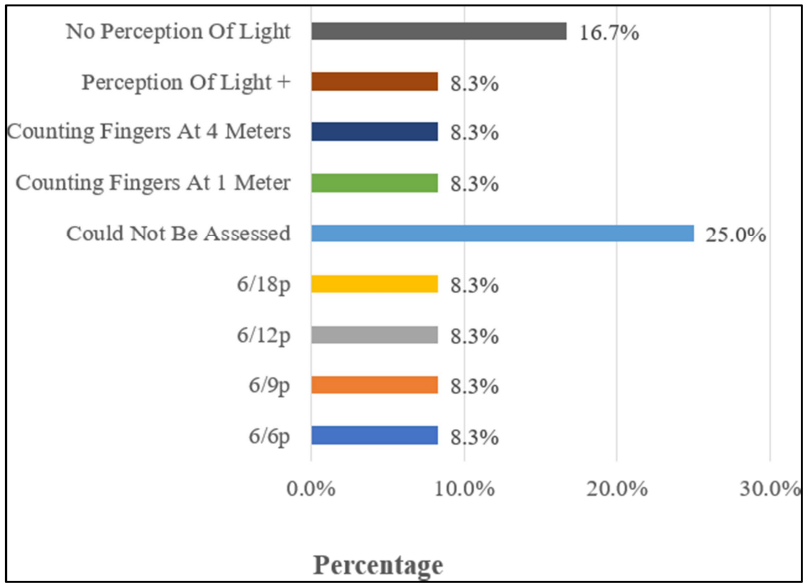


Figure 10. *Bar diagram showing distribution of visual acuity at presentation.*

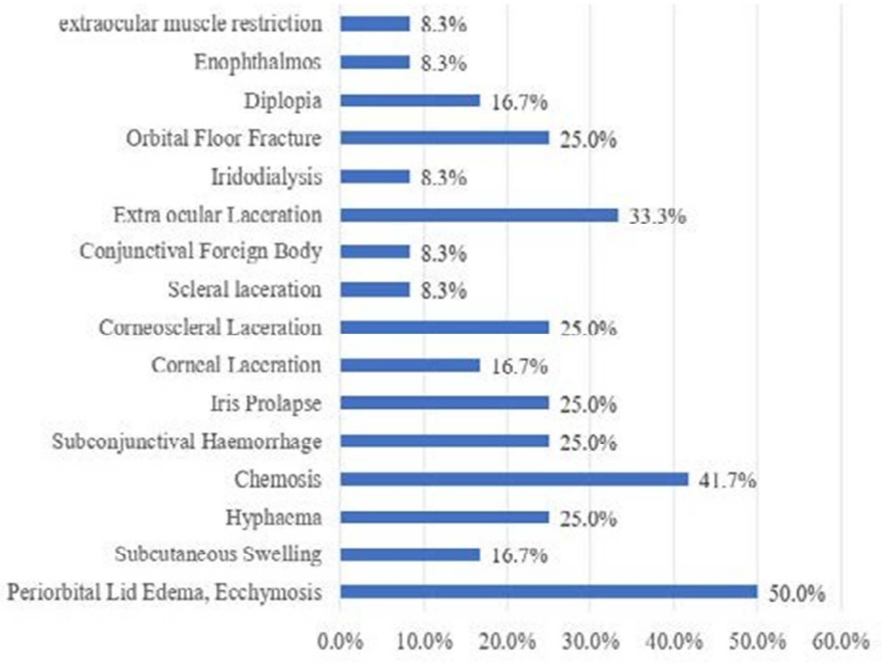


Figure 11. *Bar diagram showing distribution of ocular findings among study subjects.*

Most of the patients in this study underwent surgical management (83.3%) while the rest (16.7%) underwent conservative management as shown in Tables 6 and 7.

Table 6. *Distribution of mode of management among study subjects.*

Management	Count	Percentage (%)
Conservative	2	16.7%
Surgical	10	83.3%

Table 7. *Distribution of various treatment modalities done.*

Treatment modality	Count	%
Topical NSAIDs, cycloplegics, antibiotics	1	8.3%
Repair of extraocular laceration	4	33.3%
Removal of extraocular impacted foreign body	1	8.3%
Removal of conjunctival foreign bodies	1	8.3%
Repair of corneal laceration	5	41.6%
Repair of scleral laceration	4	33.3%
Anterior chamber paracentesis	2	16.7%
Iris repositioning	1	8.3%
Primary wound repair with exploration of wound	1	8.3%
Evisceration with orbital implant	2	16.7%
Open reduction of orbital floor fracture and internal fixation with titanium mesh	3	25%
Collagen sheet application	1	8.3%

Majority of patients following treatment had visual acuity of 6/9 (25%). 8.3% had visual acuity of 6/6p, 6/9p, 6/12p, 6/18p and counting fingers at 3 meters. 16.6% of subjects underwent evisceration and had no perception of light following treatment. This has been shown in Table 8.

Table 8. *Distribution of visual acuity following treatment among study subjects.*

Visual Acuity following treatment	Count	Percentage
6/6p	1	8.3%
6/9	3	25.0%
6/9p	1	8.3%
6/12p	1	8.3%
6/18p	1	8.3%
Counting Fingers At 3 Meters	1	8.3%
Initially Counting Fingers At 3 Meters, Improved To 6/36 then 6/24	1	8.3%
No Perception of Light (Underwent Evisceration)	1	16.6%
Not Available	1	8.3%

Preoperative visual acuity in open globe injuries was more than 6/24 in 8.3% and less than 6/60 in 33.3%, and in closed globe injuries was more than 6/24 in 25% and less than 6/60 in 25%. Postoperative visual acuity in open globe injuries was more than 6/24 in 33.3% and less than 6/60 in 16.7%, and in closed globe injuries was more than 6/24 in 41.6% and less than 6/60 in 8.3%. This has been illustrated in Table 9.

Table 9. *Preoperative and postoperative visual acuity according to type of injury.*

Type of injury	Preoperative visual acuity [Count (with percentage)]		Postoperative visual acuity [Count (with percentage)]	
	>6/24	<6/60	>6/24	<6/60
Open globe	1 (8.3%)	4 (33.3%)	4 (33/3%)	2 (16.7%)
Closed globe	3 (25%)	3 (25%)	5 (41.6%)	1 (8.3%)

4. Discussion

Ocular trauma, an ophthalmic emergency, has been attributed by the National Society for Prevention of Blindness as preventable in 90% of cases. According to the Birmingham Eye Trauma Terminology System (BETTS), mechanical injuries are classified into open and closed globe injuries, of which open globe injuries are more challenging for visual rehabilitation. In our study, open globe injuries (50%) were more frequently seen than closed globe injuries (16.7%) (Table 4). This was consistent with a study conducted by Khokhar et al. who reported that incidence of open globe injury is three-fold higher than closed globe injury [7]. Socioeconomic factors and industrialization play a major role in the epidemiology of eye trauma, making males more susceptible than females. It was reported by Serrano that 64.9% of patients reporting with ocular injury were male [8]. Similarly, Sharifzadeh reported a male to female ratio of 2.3:1. This is consistent with our study in which 83.3% of the subjects were male and 16.7% female [9]. (Table 1).

Majority of cases fell in the 21-30 years age group (44.7%) followed by the 31-40 years age group (33.3%) and the 0-10 years age group (16.7%) (Table 1). This was consistent with a study by Wallace HB, Ferguson RA, Sung J and McKelvie J where the majority of ocular trauma was seen in the 20-29 years age group (21.1%) [10]. The incidence of ocular trauma in paediatric age group was 16.7%, slightly less as compared to a study conducted in the United States in which 25.4% of ocular injuries occurred in paediatric age group [11].

The most common cause of ocular injuries was due to road traffic accidents (66.7%) followed by domestic injuries (25%) then sport-related injury (8.3%) (Table 1). Regarding road-traffic accident, most of the cases occurred following skidding of two- wheeler (37.5%), none of whom were wearing helmets, followed by patients seated in passenger seat of a four-wheeler (25%) of whom half were not wearing seatbelts (Table 2). In developing countries like India, motorized two-wheelers are very popular. According to the 2016 ICE 360 survey, one in three Indian households owns a two- wheeler [12]. Additionally, many drivers and pillion-riders still do not wear helmets despite stringent traffic laws and two-wheeler riders form a vulnerable population on Indian roads hence it is understandable that many injuries associated with road traffic accidents are among two-wheeler users. This study also elaborates on the fact that those who did not wear helmet suffered greater injury than those that did. A similar pattern has been observed among four-wheeler users in which those who wore seatbelts sustained less injuries in general or injuries only to one eye as compared to those that did not wear a seatbelt — driver and passenger included. This was also observed by Negrel and Thylefors who reported that over 85% of eye injuries following road-traffic accidents were a consequence of passengers not wearing seat belts [13]. Another interesting point is that, in our study, all patients who had road traffic accident-related injuries were male. Though this need not always be the case, it has been observed by Jha N, Srinivasa DK, Roy G and Jagdish S that there is a distinct male preponderance in RTA-related injuries that should not be ignored [14].

In this study, the ratio of males to females with domestic cause for eye injury was 2:1. Although in the case of the male subjects, their respective injuries were accidental and self-inflicted, while the female patient had extraocular trauma secondary to domestic abuse with a broomstick. Both male patients reported within 24 hours of injury whereas the female patient, though the injury was extraocular, did not visit a doctor for four years despite her persistent symptoms of pain and swelling. This could be attributed to the stigma around domestic abuse and the fear of those who experience it, especially females, that prevents them from seeking medical attention in spite of their need for it [15].

Besides these, sport activities also have a tremendous contribution to the incidence of ocular injuries. Our paper discusses one case of ocular trauma secondary to bull gore injury — a common occurrence in several South Indian states particularly seen during Jallikattu sport. Injuries may range from a simple lid tear to a ruptured globe, though generally vision prognosis is poor [16].

The majority of cases presented with uniocular involvement (91.7%) of which right eye was more common (58.3%) (Table 3). This is consistent with a study conducted by Omolase CO et al where uniocular involvement following ocular injury was seen in 90.1% of cases and 45.5% presented with right eye involvement [17].

In this study, visual acuity at presentation was greater than 6/24 in 33.3% and could not be recorded in 25%. 41.6% of patients presented with visual acuity less than 6/60, i.e., ‘legally blind’ in the affected eye. (Table 5). A study done by Alem KD, Arega DD, Weldegiorgis ST, Agaje BG and Tigneh EG found that 65.9% of ocular trauma cases presented with visual acuity less than 3/60 [2].

It was observed that 50% of patients presented with periorbital oedema and ecchymosis (Figure 11). Periocular swelling poses a diagnostic dilemma in cases of rupture globe since most ruptures occur under the recti muscles and the wound may be occult. Hence, a good exploration of all penetrating injuries under general anaesthesia is a must to decrease ocular morbidity.

It was observed that corneal tear was the second most frequent form of ocular injury and was seen in 41.6% of patients. (Figure 11). This is comparable to the study done by Alem KD, Arega DD, Weldegiorgis ST, Agaje BG and Tigneh EG where corneal tear was the most frequently observed case and was seen in 39.33% of patients. 18.25% of patients in this study presented with hyphaema and 25% presented with subconjunctival haemorrhage. These findings are similar to those observed by Lee KJ and Oh JH who found that 24.2% of ocular injuries presented with hyphaema and 20.6% with subconjunctival haemorrhage. We also observed that 8.3% presented with conjunctival foreign body, a lesser value than what was found by Lee KJ and Oh JH where 23.7% of ocular injuries presented with conjunctival foreign body (Figure 11) [18].

In our study, corneoscleral laceration was seen in 25% of patients and iris prolapse in 25%, and all cases required surgical correction. Iridodialysis was seen in 8.3% of patients but was asymptomatic (Figure 11).

It was observed that 25% of patients presented with orbital wall fracture, specifically fracture of the orbital floor. Of these, 16.7% had diplopia. 8.3% had extraocular muscle restriction and enophthalmos respectively. (Figure 11). All patients were male. 66.7% were between 21- 30 years. All cases were due to road-traffic accidents and blunt injury. The most common ocular finding was periorbital oedema and ecchymosis. None of the patients had posterior segment abnormality. All were surgically managed and recovered well. Although in our case the orbital floor alone sustained injury while other cases have found that the lateral and medial orbital walls are the most frequently involved in orbital wall fracture, the former owing to its susceptibility to direct impact and latter due to its anatomical thinness [19]. A study conducted by Philamazan A, Sahasranamam V and Babu S found that 40% of orbital fractures following ocular injury were floor fractures. They found that, of the 48.3% that had extraocular muscle restriction, restricted elevation was the most common (35.83%) and diplopia was seen in only 10%. It was also found that 88.33% were male and 50.83% were due to road-traffic accidents [20]. Terrill SB, You H, Eiseman H and Rauser ME found that the incidence of sight-threatening posterior segment involvement was relatively rare (1.3%) [21].

83.3% of the participants in this study underwent surgical management (Table 6). This is comparable to a study done by Marta A et al where 91.5% of ocular trauma cases required surgical intervention [22]. The most common procedure done in this study was corneal tear repair (41.6%) followed by scleral tear repair (33.3%) and repair of extraocular laceration (3.3%). (Table 7) A study conducted by Alem KD, Arega DD, Weldegiorgis ST, Agaje BG and Tigneh EG found that corneal repair was the most frequently performed procedure among ocular surgeries secondary to trauma (51.8%) [2].

It was observed that 58.2% of eyes regained visual acuity greater than or equal to 6/24 of which 25% regained visual acuity of 6/9, whereas 33.2% did not regain beyond counting fingers at 3 meters, of which 16.6% underwent evisceration and hence had no perception of light. (Table 8). Table 9 illustrates that visual loss was less severe in closed globe injuries (41.6%), which was also reported by Serrano [8].

5. Conclusion

Ocular injuries are more common in males and in children. Those related to road traffic accidents and household trauma injuries reported immediately within 6 hours. As a result of early intervention and availability of good microsurgical modalities, morbidity has reduced and excellent visual rehabilitation is now possible. This in turn has reduced the economic impact on the family and ultimately the nation at large. Further studies in the matter will need to be done to address the limitations faced by the current study, namely the relatively small sample size and failure of long-term follow up. The subject of ocular trauma is of grave importance to every community and hence a dedicated effort should be made to understand it. Reformulating industrial protocols, traffic regulations and general societal safety measures will undoubtedly help in decreasing ocular morbidity following trauma.

References

[1] Ryan SJ, Allen AW. Pars plana vitrectomy in ocular trauma. American journal of ophthalmology. 1979 Sep 1; 88 (3 Pt 1): 483-91.

[2] Alem KD, Arega DD, Weldegiorgis ST, Agaje BG, Tigneh EG. Profile of ocular trauma in patients presenting to the department of ophthalmology at Hawassa University: Retrospective study. Plos one. 2019 Mar 28; 14 (3): e0213893.

[3] Jahangir T, Butt NH, Hamza U, Tayyab H, Jahangir S. Pattern of presentation and factors leading to ocular trauma. Pakistan Journal of Ophthalmology. 2011 Jun 30; 27 (2).

[4] Whitcher JP, Srinivasan M, Upadhyay MP. Corneal blindness: a global perspective. Bulletin of the world health organization. 2001; 79 (3): 214-21.

[5] Brinton GS, Aaberg TM, Reeser FH, Topping TM, Abrams GW. Surgical results in ocular trauma involving the posterior segment. American journal of ophthalmology. 1982 Mar 1; 93 (3): 271-8.

[6] Kuhn F, Morris R, Witherspoon CD, Heimann K, Jeffers JB, Treister G. A standardized classification of ocular trauma. Graefe's archive for clinical and experimental ophthalmology. 1996 Jun; 234 (6): 399-403.

[7] Khokhar S, Gupta S, Yogi R, Gogia V, Agarwal T. Epidemiology and intermediate-term outcomes of open-and closed-globe injuries in traumatic childhood cataract. European journal of ophthalmology. 2014 Jan; 24 (1): 124-30.

[8] Serrano JC, Chalela P, Arias JD. Epidemiology of childhood ocular trauma in a northeastern Colombian region. Archives of Ophthalmology. 2003 Oct 1; 121 (10): 1439-45.

[9] Sharifzadeh M, Rahmanikhah E, Nakhaee N. Pattern of pediatric eye injuries in Tehran, Iran. International ophthalmology. 2013 Jun 1; 33 (3): 255-9.

[10] Wallace HB, Ferguson RA, Sung J, McKelvie J. New Zealand adult ocular trauma study: A 10 ‐ year national review of 332 418 cases of ocular injury in adults aged 18 to 99 years. Clinical & Experimental Ophthalmology. 2020 Mar; 48 (2): 158-68.

[11] McGwin G, Xie A, Owsley C. Rate of eye injury in the United States. Archives of ophthalmology. 2005 Jul 1; 123 (7): 970-6.

[12] ICE 360° survey (2016) https://www.livemint.com/Politics/Yd2EAFI upVHDX0EbUdecsO/One-in-three-households-in-India-owns - atwowheeler.html.

[13] Négrel AD, Thylefors B. The global impact of eye injuries. Ophthalmic epidemiology. 1998 Jan 1; 5 (3): 143-69.

[14] Jha N, Srinivasa DK, Roy G, Jagdish S. Injury pattern among road traffic accident cases: A study from South India. Indian J Community Med. 2003 Apr 1; 28 (2): 84-90.

[15] Paul S. Intimate partner violence and Women's help-seeking behaviour: evidence from India. Journal of interdisciplinary economics. 2016 Jan; 28 (1): 53-82.

[16] Helbig H, Iseli HP. Traumatic rupture of the globe caused by cow horns. European journal of ophthalmology. 2002 Jul; 12 (4): 304-8.

[17] Omolase CO, Omolade EO, Ogunleye OT, Omolase BO, Ihemedu CO, Adeosun OA. Pattern of ocular injuries in owo, Nigeria. Journal of ophthalmic & vision research. 2011 Apr; 6 (2): 114.

[18] Lee KJ, Oh JH. A statistical observation of the ocular injuries. Journal of the Korean Ophthalmological Society. 1990 Feb 1; 31 (2): 229-36.

[19] Rosen P, Barkin RM, Danzl DF, editors. Emergency medicine: concepts and clinical practice. Mosby; 1998. 1093-103.

[20] Philamazan A, Sahasranamam V, Babu S. Epidemiological Profile of Orbital Fracture in Orbital Trauma in a Tertiary Eye Care Centre in Kerala.

[21] Terrill SB, You H, Eiseman H, Rauser ME. Review of ocular injuries in patients with orbital wall fractures: a 5-year retrospective analysis. Clinical Ophthalmology (Auckland, NZ). 2020; 14: 2837.

[22] Marta A, Silva N, Correia N, Pessoa B, Ferreira N, Beirão M, Meireles A. A 15-year retrospective epidemiologic study of ocular trauma in the north of Portugal. European journal of ophthalmology. 2021 May; 31 (3): 1079-84.