

OCULAR MORBIDITIES WITH CLOSED GLOBE INJURIES DUE TO ROAD TRAFFIC ACCIDENTS IN PATIENTS ATTENDING TERTIARY CARE HOSPITAL

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Abstract

Background: AIM of this study was to determine the ocular morbidities in road traffic accidents patients attending tertiary care hospital. **Materials and Methods:** This is an observational study which was conducted on 20 patients who presented with history of ocular trauma following road traffic accidents to the casualty of a tertiary care hospital, between June 2021-May 2022. All the cases were subjected to detailed history taking, anterior and posterior segment examination, additional investigations whenever necessary. **Results:** A total of 20 patients were analysed during the study period. Majority of them were males - 85%. The age range of the patients included in the study were from 20-60 Years. Out of the 20patients, 12patients (60%) had visual acuity $\geq 20/40$, six patients (30%) had vision between 20/50 to 20/100 and two patients(10%) had visual acuity between 19/100 to 5/200.Majority of the patients had soft tissue injuries. Subconjunctival haemorrhagebeing most common (n=18,90%) followed by ecchymosis 16 (80%) and lid laceration 5(25%). Orbital fractures were seen in five Patients (25%). Un-displaced medial wall fractures were seen in three patients. One patient had lateral wall fracture with lateral rectus entrapment with hematoma. One patient had inferior and medial wall fracture and tear drop sign with inferior rectus muscle entrapment. Traumatic mydriasis was seen in six patients (30%), Berlin's oedema was seen in three patients (15%). There were four patients (20%) who had traumatic optic neuropathy at the time of hospital admission which was managed medically. Two-wheeler vehicle accidents were seen in 17 patients (85%). **Conclusion:** Early intervention is required to prevent further ocular complications after road traffic accident. As this is a preventable cause of ocular morbidity, protective steps must be taken to decrease its incidence2Proper examination of the patient is absolutely required with various imaging techniques. Increasing public awareness of safety precautions is crucial to prevention of road traffic accidents.

INTRODUCTION

Ocular trauma is regarded as one among the common causes of ophthalmological morbidity and blindness.^[1] Road traffic accidents (RTA) are one of the major causes of ocular trauma causing mild to severe injuries to the eyes.^[1,2] Immediate clinical evaluation is important in early localization of the site of injury for better management and improved visual prognosis^[2] Annually, there are in excess of 2 million cases of ocular trauma, with more than 40,000 individuals sustaining significant visual

Impairment on a permanent basis.^[8] In Indian scenario the tremendous increase in population and heavy increase in the road traffic has led to rise in road traffic accidents. Commonly people riding two wheelers without helmets sustain more severe ocular injuries during an accident than those wearing helmets.^[11] Thus, it is clear that prevention of severe eye injuries is an accomplishable goal and one that demands attention, given its far reaching social and economic impact. Ocular trauma is a health problem which can be prevented with proper strategies.^[12]

The aim of the present study was to study ocular morbidities in road traffic accidents attending tertiary care hospital.

MATERIALS AND METHODS

This is an observational cross sectional study which was conducted in between June 2021 to May 2022 in a Tertiary care hospital on 20 patients.

Inclusion Criteria

All the road traffic accident patients presenting to casualty of our hospital were included in the study.

Exclusion Criteria

1. Patients with open globe injury
2. Ocular trauma not due to road traffic accident
3. Age < 10 years and > 60 years
4. Previous history of head injuries.

METHODOLOGY

The present study was carried out at department of ophthalmology of a tertiary care hospital for a period of one year. All the road traffic accident patients presenting to casualty of our hospital during the period June 2021 to May 2022 were included in the study. General condition of the patients was assessed. Vitals were checked. Glass glow coma scale of the patients were assessed. Location, type and mechanism of injuries were noted. Detailed history and ocular examination were done and the results were tabulated and analysed. The trauma cases were classified based on standardized Birmingham eye trauma terminology (BETT) and ocular trauma score was calculated for all the patients. Ophthalmological examination was done at two stages. Bedside examination in casualty and evaluation in outpatient department after the patient was ambulatory. Bedside examination included orbital injury assessment, bedside visual acuity assessment, torch light examination of anterior segment and pupillary response to light. Extra-ocular movements examination, dilated fundus examination, and visual field examination by finger confrontation test was done. Evaluation in outpatient department included assessment of distant and near visual acuity using Snellen's chart, colour vision assessment using Ishihara chart and contrast sensitivity using Pelli Robson chart. Anterior segment examination was done using slit lamp biomicroscopy. Posterior segment evaluation was done by slit lamp bio microscopy with 78D lens and Indirect ophthalmoscopy with 20D lens after dilatation of pupil with tropicamide 0.5% eye drops. Intra-ocular pressure was measured with Goldman Applanation tonometer. Gonioscopy was done wherever necessary. B - scan was done in patients with media opacities to rule out vitreous haemorrhage, retinal detachment or intra-ocular foreign bodies. X-rays, ultrasonography, CT-scan/MRI of brain and orbit was done depending on the extent of injury. Routine blood investigations

were done for all patients. Any other diagnostic tests, medical and surgical treatment done was recorded. all the cases were managed on the basis of the guidelines given by eye trauma society, while some cases were referred to higher centres for further management.

RESULTS

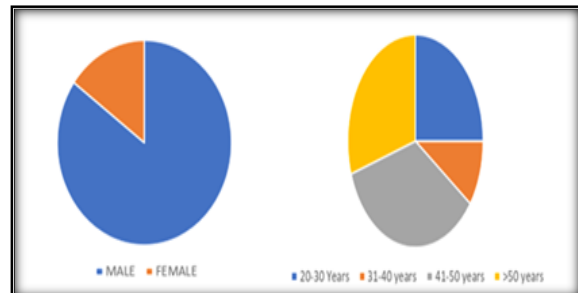


Figure 1



Figure 1 Upper Eyelid laceration in RTA patients

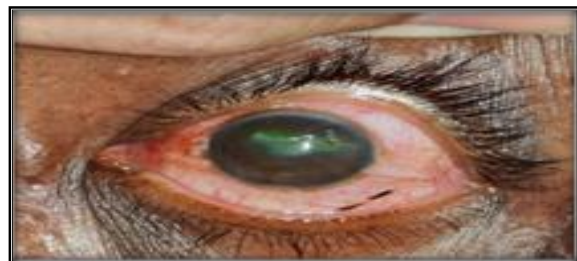


Figure 2 Lamellar corneal tear in RTA patient



Figure 3 Shows lid edema, periocular ecchymosis and subconjunctival haemorrhage in RTA patients studied

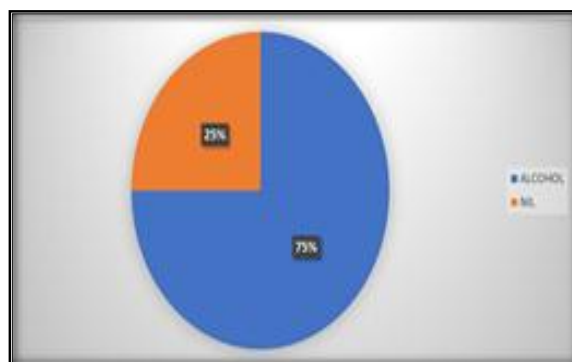
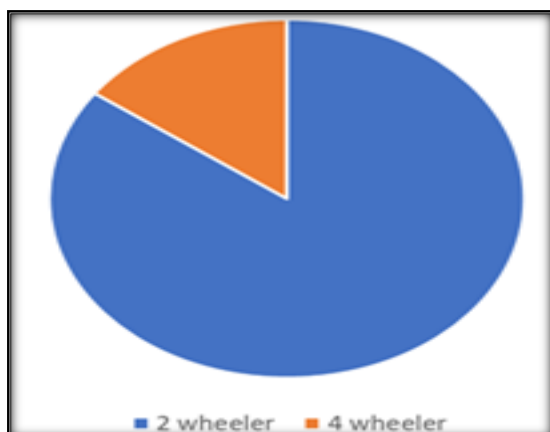


Figure 4: Distribution of Patients Under the Influence of

Table 1: Gender and age distribution of patients

| Sex | Number Of Cases | Percentage |
|--------|-----------------|------------|
| Male | 17 | 85% |
| Female | 3 | 15% |

| Age | Number of cases | Percentage |
|------------|-----------------|------------|
| 20-30 year | 5 | 25% |
| 31-40 year | 2 | 10% |
| 41-50 year | 7 | 35% |
| >50 year | 6 | 30% |

Table 2: Distribution of Patients according to Type of Injury as per bett classification (Closed Globe Injury)²⁴

| Type Of Injury | No. Of Patients | Percentage |
|--------------------------|-----------------|------------|
| CONTUSION | 17 | 85% |
| LAMELLAR LACERATION | 3 | 15% |
| SUPERFICIAL FOREIGN BODY | 0 | |
| MIXED | 0 | |

Table 3: Visual Assesment In Rta Patients:

| Vision | No. Of Patients | Percentage |
|---|-----------------|------------|
| ≥ 20/40 | 12 | 60% |
| 20/50 to 20/100 | 6 | 30% |
| 19/100 to 5/200 (less than 6/60 to CF 5 meters) | 2 | 10% |
| 4/200 to light perception | 0 | |
| No light perception | 0 | |

Table 4 : Pupillary Reaction Assesment:

| Pupil Reaction | No. Of Patients | Percentage |
|-------------------------------|-----------------|------------|
| Positive RAPD in affected eye | 6 | 30% |
| Negative RAPD in affected eye | 14 | 70% |

Table 5: Zones Of Eyeball Injuries According To Bett Classification²⁶

| Zones | No. Of Patients | Percentage |
|-------|-----------------|------------|
| 1 | 12 | 60% |
| 2 | 3 | 15% |
| 3 | 0 | |

Table 6: Ocular Trauma Score²⁵

| No. Of Patients | Raw Ots Points | Ots Score |
|-----------------|----------------|-----------|
| 12 | 92-100 | 5 |
| 2 | 81-91 | 4 |
| 6 | 66-80 | 3 |

We included total of 20 patients in our study during study period of one year. There was a male preponderance among the injured patients-17 males and 3 females. We also found that majority of patients (35%) were in the age group of 41-50 years, followed by 30% in the age group of more than 50 years [Table 1]. Distribution of closed globe injury patients according to BETT classification, we found that 85% of our patients had contusion and 15% had lamellar laceration [Table 2]. 60% of our patients had vision more than or equal to 20/40, 30% of patients had vision in between 20/50 to 20/100 and 10% of our patients had vision in between 19/100 to 5/200

[Table 3]. In our study we also found that 30% of the patients had positive relative afferent pupillary defect (RAPD) and 70% with negative RAPD in affected eye [Table 4]. Grading the injuries in zones, we found that 60% of our patients were in Zone 1 (limited to bulbar conjunctiva, sclera and cornea) and 15% of patients were in Zone 2 (structures in anterior segment internal to cornea, including posterior lens capsule). None of our patients were in zone 3 [Table 5]. Ocular trauma score (OTS) was calculated for all the patients taking into consideration their visual acuity at presentation, presence / absence of RAPD and other ocular findings. In our study group 12 patients had OTS score of 5, two patients had score of 4 and 6 patients had OTS score of 3. [Table 6].

Table 7: Anterior Segment Manifestations

| Ocular Manifestation | No Of Patients | Percentage |
|-----------------------------------|----------------|------------|
| Periorbital oedema and lid oedema | 16 | 80% |
| Periorbital ecchymosis | 16 | 80% |
| Orbital Fractures | 5 | 25% |
| Eyelid laceration | 5 | 25% |
| Conjunctival chemosis | 1 | 5% |
| Subconjunctival Haemorrhage | 10 | 50% |
| Corneal oedema | 1 | 5% |
| Corneal lamellar tears | 2 | 10% |
| Iris prolapse | 1 | 5% |
| Traumatic Mydriasis | 2 | 10% |
| Hyphaema | 1 | 5% |
| Traumatic Cataract | 1 | 5% |

Among our patients we found that maximum no. of the patients (n=16), 80% had periorbital oedema, lid oedema and ecchymosis [Figure 3]. 50% had sub conjunctival haemorrhage, 25% had Orbital fractures and eyelid laceration [Figure 1]. Two patients (10%) had lamellar Corneal tear [Figure 2] and traumatic mydriasis. 5% of patients had conjunctival chemosis, corneal oedema, iris prolapse, hyphema and traumatic cataract [Table 7].

Table 8: Posterior segment manifestations

| Ocular Manifestation | No. of Patients | Percentage |
|----------------------------|-----------------|------------|
| Retinal Oedema | 3 | 15% |
| Traumatic Optic Neuropathy | 4 | 20% |

In Our Study we also found 3 patients (15%) had Retinal edema and 4 patients (20%) had Traumatic Optic Neuropathy [Table 8].

Table 9: Type of vehicle

| Type of Vehicle | No. of Patients | Percentage |
|-----------------|-----------------|------------|
| Two Wheeler | 17 | 85% |
| Four Wheeler | 3 | 15% |

In our study, we found majority of the patients 17 (85%) had two-wheeler accidents followed by 3 patients (15%) who had four-wheeler accidents [Table 9]. We also found there were 15 patients (75%) who were under the influence of Alcohol while driving, and 5 patients (25%) were not under the influence of Alcohol [Figure 4].

DISCUSSION

A Total of 20 Patients were analysed during the study period. Majority of them were Males (n=17, 85% and 3 patients (15%) were females. The age range of the patients included in the study were from 20-60 Years. Mean age of the population was 45.5±4.76 years. The studies by Sujatha et al and D Chandrakanth Reddy et al also showed male preponderance in ocular trauma cases.^[3,4] Similar male predominance was found in a study from Western Maharashtra by Patil et al.^[5] This may be because in India males are more outgoing than females due to work related activities. According to BETT's classification of ocular injuries, we found that 85% of our patients had contusion and 15% had lamellar laceration.^[24] In our study we also found that 30% of the patients had positive RAPD and

70% with negative RAPD in affected eye. Grading the injuries in zones, we found that 60% of our patients were in Zone 1 (limited to bulbar conjunctiva, sclera and cornea) and 15% of patients were in Zone 2 (structures in anterior segment internal to cornea, including posterior lens capsule). None of our patients were in zone 3.^[26] Out of the 20 patients, 60% of our patients had vision more than or equal to 20/40, 30% of patients had vision in between 20/50 to 20/100 and 10% of our patients had vision in between 19/100 to 5/200. In a study conducted by Kavita et al, most of the patients with RTA had vision in the range of 6/6-6/12 at presentation (67.39%), and 27 (28.43%) patients had vision in range of 6/18 to counting fingers 1 metre.^[7] Most of our patients (60%) had Ocular trauma score^[25] of 5 which predicts a good visual prognosis. Majority of the patients had soft

tissue injury, subconjunctival haemorrhage 18 (90%) being most common followed by ecchymosis 16(80%) and lid laceration 5(25%). The Study conducted by Chandrakanth Reddy et al showed most common anterior Segment manifestation is periorbital Ecchymosis (80.5%) followed by sub conjunctival haemorrhage (42%).^[4] The study conducted by Kavita et al reported that subconjunctival haemorrhage was most common clinical finding, found in 51(53.65%) cases and conjunctival tear was seen in 6 (6.31%) patients.^[7]

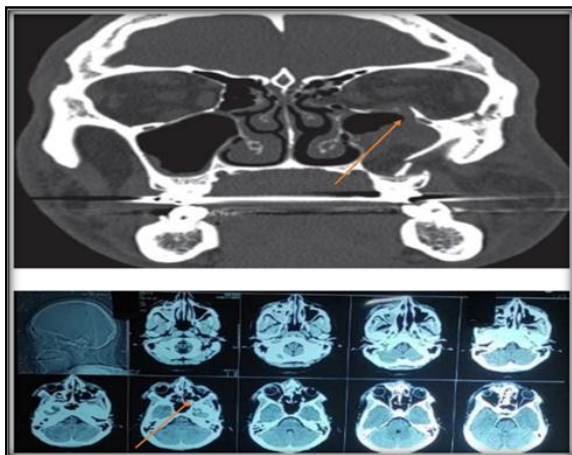


Figure 5: CT Brain and Orbit shows tear drop sign with inferior rectus muscle entrapment with maxillary haemosinus, as a result of blow out fracture in RTA patients studied.

Orbital fractures were seen in 5 Patients (25%). Un-displaced medial wall fractures were seen in 3 patients. One patient had Lateral wall Fracture with lateral rectus entrapment with hematoma. one patient had inferior and medial wall fracture and tear drop sign with inferior rectus muscle entrapment. [Figure 5] In the study conducted by Kavita et al., A total number of 11 (11.57%) orbital fractures were seen. Of these 4 cases had medial wall fracture, 2 cases had fracture of orbital rim, 3 cases had floor fractures, one case had lateral wall fracture and 1 patient had a pure blow out fracture.^[7] The study by kamath et al. also found similar results.^[6] Traumatic mydriasis was seen in 6 patients (30%) and Berlin's oedema was seen in 3 patients (15%). There were 4 patients (20%) who had traumatic optic neuropathy at the time of hospital admission which was managed medically with Injection IV Methylprednisolone 1000mg /day for 3 days, followed by oral prednisolone 1mg/kg/day for 11days^[7] In the study by Kavita et al, two patients (2.11%) had traumatic optic neuropathy.^[7] In a study by Chandrakant Reddy et al, most common posterior segment manifestation was vitreous haemorrhage (4%) and traumatic optic neuropathy (4%) In a Study by Marudhamuthu E., et al.^[9] showed traumatic Optic neuropathy in 4.7% patients similar to our study. In our study, one patient (5%) had hyphaema. Similar study done by Sujatha et al.^[1] found hyphaema in 10.31% of their patients.

The Study by Kavita et al found Hyphaema in 3(3.16%) patients.^[7] In the study by Chandrakant Reddy et al, relative afferent papillary defect (RAPD) was seen in 26.98 %, macular Oedema in 5.55% and extraocular movement restriction (EOM) in 23.01% of their patients^[3] In our study we found, two-wheeler vehicle accidents were seen in 17 patients (85%) and 3 patients (15%) had accidents due to four wheeler vehicle. In a study by Kavita et al out of 95 patients with ocular injuries, most were due to motorized 2 wheelers 53 (55.76%) followed by 4 wheelers 20 (21.04%), pedestrians 15 (15.78%) and 3 wheelers 7 (7.36%).^[7] In the study done by Patil et al., majority (35%) were due to motorized 2 wheelers Followed by 4 wheelers (25.9%)^[5] Most of the RTA cases in a study by Namala et al study causing ocular trauma were two Wheeler riders (67%). People riding two wheelers are more prone to ocular injuries as compared to persons travelling in auto or four Wheeler and pedestrians.^[10] A higher frequency of RTA- related fatalities are associated with blood alcohol concentration (BAC > 110mg/dl) as Alcohol is euphoriant and acts as central nervous system depressant, resulting in cognitive, judgement and memory impairment, relaxation, sensory dysfunction and motor impairment. Driving under the influence of alcohol and/or psychoactive substances is associated with careless driving, which could lead to fatal results.^[19,20] In Our study, there were 15 patients (75%) were under alcohol influence while driving. The Study conducted by Chandrakant Reddy et al also found that drunk people were more prone to road traffic accidents.^[4]

CONCLUSION

Soft tissue injuries were the most common ocular manifestations found in our study. Males, night driving, alcohol abuse and not following safety precautions are certain risk factors that are associated with RTA and ocular injury.

Early intervention is required to prevent further ocular complications. As this is a preventable cause of ocular morbidity, protective steps must be taken to decrease its incidence.^[2] Proper examination of the patient is absolutely required with various imaging techniques. Increasing public awareness of safety precautions is crucial to prevention of Road traffic accidents.^[11] Many Road traffic accidents can occur while driving under the influence of alcohol. Proper checks and awareness should be done to avoid drinking and driving. Proper safety rules should be followed by the public. Safety equipment like wearing helmets which is made mandatory should be followed. Meticulous observation of traffic rules is absolutely necessary. Maintaining the speed limits especially on the highways is very important.^[12-16] Driving recklessly not only endangers the life of the person driving but also the passengers in the vehicle and also others outside the

vehicle which may be other drivers or even pedestrians.^[20-23]

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