

**Clinical study of ocular injuries in road traffic accidents****Prajwalli Reddy**<sup>1</sup>Assistant Professor, M R Medical college, Gulbarga, Karnataka, India**ABSTRACT**

**Aims and objectives of study:** 1. To study the incidence of ocular injuries in vehicular accidents .2.To determine the pattern of clinical presentation of ocular injuries due to vehicular accidents.3.Effective management and final visual prognosis in vehicular ocular injuries. **Materials and methods:** Patients presenting with history of ocular injuries following vehicular accidents; were selected from the Out-Patient Department of Ophthalmology, Trauma care unit and Casualty, of Basaveshwar Teaching & General Hospital, attached to M.R. Medical College Kalaburagi. Included in this study are 209 patients examined from March 2014 to February 2016. Other cases of ocular injuries other than vehicular injuries are excluded from this study. **Results:** Out of 209 cases, of vehicular accidents; 130 cases (62.20%) were of 2-wheelers; among which 183 cases (87.55%) were males; in which Right eye was affected in 117 cases (55.98%); affecting ocular and adnexal structures in 115 cases (55.02%); with sub-conjunctival haemorrhage seen in 132 cases (63.15%); followed by ecchymosis in 126 cases (60.28%); Out of 209 cases; 03 cases (1.4%) were reported to have no PL at presentation due to Globe perforation and all the 03 cases (1.4%) failed to recover even after treatment. **Conclusion:** On conclusion of this study, it was found that ocular injuries due to vehicular accidents accounted for 7.6% of all injuries of due to vehicular accidents. Most of the injuries involved the ocular adnexa, which while causing a certain degree of cosmetic disfigurement do not have any effect on the final Visual outcome. It was only those injuries which involved the globe (corneo-scleral perforation), which had bad prognosis for the final visual outcome. Effective management will include measures taken to prevent or minimize the ocular involvement in such injuries. Some of the measures that can be suggested are: 1.Using protective device such as seat belts, crash helmet, protective eye-glasses. 2. Raising public awareness of: safe driving and health education through radio, TV and Teachings in school.

**Key words:** Ocular trauma, Globe perforation, Blindness, Road traffic accident.

**Introduction**

Despite the protection afforded, the eye by nature anatomically; by its situation in the elastic fatty tissue of the orbital cavity over hung on all aspects except downwards and outwards by the sturdy bony projections of the orbital rim and the nose and physiologically by the vigilance exercised by the blink reflex and the head turning reflex on the approach of objects which can be seen and the copious lacrimation which follows the intrusion of any irritant material into the eye.

Accidents involving injury to the eyes and their adnexa incurred in travelling are common and in a world which craves for speed yet more speed, where in wheels are being supplemented by wings, where in the internal combustion engine is being replaced by the jet, there seems no reason why the number of the maimed should not increase continuously. Ocular injury usually in accidents could be trivial like subconjunctival haemorrhage or simple corneal abrasion to severe such as a contusion leading to fracture of the orbit, concussion or rupture of the globe or perforating injuries due to glass and frequently lead to ocular damage particularly laceration of the eyelids and cheek. Finally mention may be made of the controversial condition of whiplash injury, in which various disturbances of accommodation and increased pupillary diameter leading to difficulty in reading and

*\*Correspondence*

**Dr. Prajwalli Reddy**

Assistant Professor, M R Medical college, Gulbarga,  
Karnataka, India

E Mail: [prajwalli\\_reddy@yahoo.com](mailto:prajwalli_reddy@yahoo.com)

near vision may be the result of hyperextension of the spine followed immediately by acute flexion such as may occur when a standing car hit from behind, in a frontal crash or with other causes of rapid deceleration. The damage may require conservative treatment or a careful intricate surgical management. They may resolve without any complications or end with irremediable complications with loss of function partially or completely in affected eye.

### Materials and methods

Patients presenting with history of ocular injuries following vehicular accidents were selected from the Out-patient Department of the Ophthalmology, Emergency Wards, Casualty of Basaveshwar Teaching & General Hospital, and Kalaburagi. Included in this study are 209 patients examined from March 2014 to February 2016. Other cases of ocular injuries other than vehicular injuries are excluded from this study. When a patient presented with a history of ocular injury following vehicular accident, a detailed history regarding age, sex, type of vehicle the patient was travelling and signs and symptoms occurring following the injury were taken.

- A thorough examination using a torch light was done.
- Slit lamp examination was performed for detailed examination.
- Visual acuity was recorded on Snellen's chart.
- Intraocular pressure was recorded with the Shiotz tonometer. Vision and intraocular pressure could not be accurately recorded in few cases.
- Direct ophthalmoscopy was performed in all cases.
- Gonioscopy was performed.
- Indirect ophthalmoscopy was performed whenever required.
- Retinoscopy was performed in patients without media opacities.

- Plain X-ray: X-ray skull in antero-posterior view, water's View, Nose -chin position and Rhese parieto-orbital, oblique projection, were taken whenever necessary.
- B-scan ultrasonography was performed in patients suspected to have a posterior segment abnormality with or without media opacities.
- CT scan was done whenever required.
- Routine investigation of blood and urine.

Depending on the presentation patients were subjected to detailed examination by ENT surgeon, General Surgeon, General Physician and Dental Surgeon. Patients were managed at casualty or OPD level. Some were admitted as in-patients for further management and specialized care. Patients seen at casualty and OPD were asked to follow-up after 8 days. Patients discharged from the wards were called for follow-up after 8 days and then as and when required.

### Results

This study includes 209 cases of ocular injuries following vehicular accidents who presented at Out-patient Department of Ophthalmology, Emergency wards and Casualty, at Basaveshwar Teaching & General Hospital, Kalaburagi for a study period of two years from March 2014 to February 2016.

**Incidence of Ocular Injuries among all Vehicular Accidents:** The total number of cases of vehicular accidents in 2 years were 2734, out of which there were 209 patients with ocular injuries. In this study on an average the incidence of ocular injuries in all vehicular accidents is about 7.6% of the total vehicular accidents.

**Age and Sex Distribution:** In this study of 209 cases, the number of cases in different age groups were as follows (table 1) 21 – 30 year age group showed the maximum number of cases.

**Table 1: Age wise distribution of ocular injuries in vehicular accidents**

Age in Years	Number of cases	Percentage
0-10	1	0.48%
11-20	17	8.13%
21-30	98	46.89%
31-40	48	22.97%
41-50	32	15.31%
51-60	9	4.30%
61-70	4	1.91%
<b>Total</b>	<b>209</b>	<b>100%</b>

**Table 2: Sex distribution**

	Number of cases	Percentage
Male	183	87.55%
Female	26	12.44%
<b>Total</b>	<b>209</b>	<b>100%</b>

Of the 209 patients, 183 were males and 26 were females with a male: female ratio of 7:1 (table 2)

**Type of Vehicle Involved:** Out of the 209 patients, 130 patients who sustained ocular injuries in the vehicular accidents with 2 wheelers, 11 with 3 wheelers, 40 with 4 wheelers and 28 were pedestrians. Ocular injuries due to vehicular accidents involving two-wheelers had the maximum incidence.

**Eye Involved:** Out of the 209 patients, 116 of the patients sustained injury to the right eye, 72 patients had left eye involvement and 21 patients had involvement of both the eyes. (Table 3)

**Type of Ocular Injury:** Out of the 209 patients, 51 patients had adnexal involvement, 43 patients had ocular. 115 patients had ocular and adnexal involvement (table 4)

**Clinical Findings in Ocular Injuries**(table 5)

**Table 3: Distribution of cases according to the eye affected**

Age in years	Left eye	Right eye	Both eyes
0-10	1	-	-
11-20	4	11	2
21-30	31	56	11
31-40	21	25	2
41-50	13	17	2
51-60	2	5	2
61-70	1	3	-
<b>Total</b>	<b>73</b>	<b>117</b>	<b>19</b>

**Table 4: Type of vehicle involved in ocular injuries**

Type of vehicle	No. of cases
2 wheeler	130
3 wheeler	11
4 wheeler	40
Pedestrians	28
<b>Total</b>	<b>209</b>

**Table 5: According to part involved**

Ocular	43
Adnexal	51
Ocular and adnexal	115
<b>Total</b>	<b>209</b>

**Table 6: Clinical findings in ocular injuries**

Clinical findings	No. of cases
Ecchymosis	126
Lid tear	59
Orbital fracture	5

Subconjunctival haemorrhage	132
Retrobulbar haemorrhage	3
Retained foreign body	
Conjunctiva	9
Corneal	10
IOFB	1
Traumatic hyphema	3
Traumatic mydriasis	6
Traumatic cataract	4
Corneoscleral perforation	7
Posterior segment involvement	6

**Ecchymosis:** Ecchymosis is one of the most common presentation in vehicular accidents. This is a manifestation of trauma involving the surrounding of orbit. In the present study 126 patients had ecchymosis, out of which 21 patients had only ecchymosis, whereas 24 patients had ecchymosis with lid tear, 5 patients had ecchymosis with orbital fracture and 44 patients had ecchymosis with subconjunctival hemorrhage.

**Lid Tear:** 59 patients had lid tear. Some lid tears are full thickness involving upper or lower lid. These lid tears were sutured in layers depending upon the involvement of thickness of lid, 4-0 chronic catgut, 4-0 silk suture were used.

**Orbital Fracture:** Orbital fractures are common in vehicular accidents with associated facial trauma. 5 patients had orbital fractures. 3 patients had blow out fracture one patient had fracture roof and 1 patient had infero-orbital margin fracture. Diagnosis was made on X-ray, CT scan and palpation of infero-orbital margin.

**Subconjunctival Hemorrhage:** Out of the 209 patients 132 patients had subconjunctival hemorrhage. Most cases of the subconjunctival hemorrhage were due to minor trauma to the eye. They varied from small petechiae to large extravasations. Their anterior margin begin more dense and the hemorrhage tapering posteriorly except in severe SCH where the posterior limit could not initially be made out SCH absorbed completely by 10<sup>th</sup> to 12<sup>th</sup> day in most cases. In cases involving more than 2 quadrants absorption occurred over a period of 21 days.

**Retrobulbar Hemorrhage:** Retrobulbar hemorrhage was seen in 3 patients. They presented with unilateral proptosis and restriction of extra-ocular movements. It was treated medically with carbonic anhydrase inhibitors and pad and bandaged.

**Retained Foreign Body:** Out of the 209 patients 20 patients had retained foreign body. 10 patients had foreign body on the cornea, 9 patients in the conjunctival fornices and 1 patient on the lens. These foreign bodies were mostly sand particles or glass

pieces. These were removed with cotton swab or hypodermic needle No. 26 or forceps under local anesthesia. One patient had intraocular foreign body on the lens developed cataract and intraocular foreign body was removed when the patient was taken up for traumatic cataract surgery. 4 patients with extra-ocular foreign body on the cornea, which were deeply embedded developed nebular grade opacities.

**Conjunctival Tear:** 14 patients had conjunctival tears. None of them were more than 5-6 mm in length and they were associated with SCH. Out of the 14 patients 2 had associated corneal tear.

**Corneal Tear:** 9 patients had corneal tear, 2 patients with corneal tear were associated with conjunctival laceration. All the corneal tears were sutured with interrupted 10-0 nylon sutures. One patient had corneal tear with iris prolapse. Postoperatively patients with corneal tear had astigmatism and developed corneal opacity.

**Traumatic Cataract:** 4 patients developed cataract following vehicular accidents. Out of these, one patient had IOFB on the lens with cataract. One patient had subluxated lens (phacodonesis) and cataract. All four patients underwent cataract surgery. Three patients underwent intraocular lens implant, while one patient underwent lens extraction with anterior vitrectomy.

**Traumatic Hyphema:** Three patients (case No. 33, 175, 188) out of 209 patients had traumatic hyphema. Hyphema mostly involved 1/3 to 1/2 of the anterior chamber. All three cases had only a marginal increase in intraocular pressure. All the three patients were treated medically with acetazolamide and tablet vitamin C.

**Traumatic Mydriasis:** 6 patients had traumatic mydriasis. One patient had ecchymosis with lid tear the remaining 5 patients had subconjunctival hemorrhage or ecchymosis.

**Posterior segment:** Seven patients had posterior segment involvement of which four patients had macular edema and 2 patients had vitreous

hemorrhage. This was detected and confirmed with direct and indirect ophthalmoscopy. All these patients were treated conservatively. All six patients with posterior segment involvement had subconjunctival hemorrhage or ecchymosis. 3 patients of macular edema improved from counting fingers to 20/60 while one patient improved from counting fingers to 20/120.

**Perforated Globe:** 7 patient of the 209 patients had globe perforation. 3 patients had badly perforated globe. All the three patients did not have perception of light and were taken for enucleation in order to prevent sympathetic ophthalmia. 4 patients had cornea scleral perforation. All 4 patients had perception of light and were taken up for repair. 2 patient had iris prolapse Iris abscission was done and interrupted sutures were put with 8-0 silk or nylon 10-0.

#### Visual Activity:

Out of 209 cases of ocular injuries due to vehicular accidents:

69 cases had 20/20 visual acuity.

63 cases had 20/100 to 6/120.

30 cases had 20/60 to 6/120.

8 cases had 20/200.

28 cases had counting fingers.

8 cases had perception of light and

3 cases with globe perforation had no PL at the time of presentation.

Visual outcome of the 209 patients at the time of discharge or follow up was:

20/20 in 83 cases

20/30 – 20/40 in 74 cases.

20/60 – 20/120 in 21 cases. 20/200 in 12 cases

Counting fingers in 12 cases

Perception of light in 4 cases

No perception of light in 3 cases.

#### Discussion

In this study of 209 cases of ocular injuries following vehicular accidents involving all age groups of patients and with involvement of both the sex and different patterns of clinical presentation. Most reports regarding ocular trauma in the current literature are generalized and few literature is available on ocular injury following vehicular accidents for comparative study. In a study done by Rekhi GSet al[1], ocular trauma accounted for 11.82% of blindness. 119 patients of which 11 were due to road traffic accidents, which accounts for 9.2%. In our study comprising 209 patients of ocular injuries due to vehicular accidents accounted for 7.6% as compared to the above study. Out of 11 patients in the above study, 8 were males and 3 were females, showing a male predominance with a ratio of 2.66:1. In our study, the

male to female ratio is 7:1, which shows a higher incidence of ocular trauma following vehicular accidents in males than females.[2] In our study, the maximum number of cases with ocular injuries in vehicular accidents was seen in the age group of 21 to 30 years accounting 46.8% of the total number of cases. Goswamy Subhash et al[3] in a resume of clinical presentation of their management has depicted that out of 12 cases of orbital fracture in 2 years, 5 were due to road traffic accidents. All except for 1 were males and except for 3 all were adults (15-45 years). In our study of 2 years we had 5 cases of orbital fractures. All of them were males. 3 patients had blow out fracture and 1 patient had fracture roof and one patient had infraorbital margins. According to a study by Dabral SM, Mukherjee AK and Saini JS et al[4], who analyzed 82 patients for penetrating eye injuries, concomitant injuries in the eye were laceration of lid (26), lacrimal canalicular injuries (98), conjunctival tears (38), iris tear (30), ciliary body tear (20), lens (95), posterior segment damage (28) and hyphema (32). In 12.10% of cases, glass caused injury following road traffic accidents. In our study, of 209 cases 59 patients had lid tears, 14 patients had conjunctival tear, 9 patients had corneal tear in which one patient had iris prolapse associated with corneal tear. 6 patients had post segment involvement and 3 patients had hyphema. Amoni SS et al[5], in a two year prospective study from January 1996 to December 1997 had 76 patients with traumatic hyphema out of which 4 were due to road traffic accidents. In our study of 209 cases, we had 3 cases of traumatic hyphema. All the cases were treated conservatively and hyphema resolved. In a three year study conducted by Yanko et al[6] in Israel between October 1981 and September 1984 for the incidence of hospitalized civilian, ocular injuries of the 2276 hospitalized cases, 457 resulted in unilateral and 6 in bilateral legal blindness. Injuries sustained in road accidents were the most highly morbid resulting in blindness in 345 of the road accident victims. Rekhi GS et al[6] in a study for the cause of blindness in 1006 consecutive legally blind patients, were analyzed in large urban multidisciplinary medical centre. In this ocular trauma accounted for 11.82% of blindness, 119 patients of which 11 were due to road traffic accidents. The sex distribution shows a male predominance, of 11 patients 8 were males and 3 females with a ratio of 2.66:1. In our study, 03 patients were blind accounting for 1.43% cases

Amoni SS et al[6] in a two year prospective study from January 1976 to December 1977 had 76 patients with traumatic hyphema out of which 4 were due to road traffic accidents. In our study 03 patients had hyphema. Nanda SK, Mieler WF, Murphy ML et al[7] in 1993



conducted a study in which the files of 293 patients treated for penetrating ocular injury over a 5 years period (1986 to 1991), were reviewed and 10 (3.4%) were associated with motor vehicle accidents. 6 patients had corneoscleral lacerations, 2 patients each had corneal and sclera lacerations, vitreous surgery was performed in 2 patients, one had intraocular foreign body and one had retinal detachment. In our study 4 patients had corneo-scleral tears who were taken for repair.

Visual outcome of the 209 patients at the time of discharge or follow up was:

20/20 in 80 cases

20/30 – 20/40 in 75 cases.

20/60 – 20/120 in 23 cases.

20/200 in 12 cases

Counting fingers in 12 cases

Perception of light in 4 cases

No perception of light in 3 cases.

Visual Outcome: Majority of the 209 had good visual outcome. The remaining cases had poor visual acuity because these cases had pre-existing lenticular opacities, globe perforation and vitreous hemorrhage.

### Summary

Ocular injuries due to vehicular accidents are special cases of injuries to the eye. They resulted in a spectrum of damage to the intraocular structure and adnexa. In the present study of 209 cases of ocular injuries due to vehicular accidents who presented at the Ophthalmology Out-patient Department, Emergency wards, Casualty at Basaveshwar Teaching and General Hospital, Gulbarga during a 2 years period from March 2014 to February 2016.

- The commonest age group was found to be 21 to 30 years.
- Preponderance of male patients were noted with male/ female ratio of 7:1.
- Involvement of the right eye was more. The total number of right eye involvement was 116 and left eye was 72. 21 patients had both eyes involved.
- The number of accidents were more due to two wheelers, 130, 40 due to four-wheeler, 11 due to three-wheeler and 28 were pedestrians.
- 43 patients had ocular involvement, 51 had adnexal involvement and 115 had ocular and adnexal involvement.
- The most common manifestation in ocular injury were eyelid tear 59, Ecchymosis 126 and subconjunctival hemorrhage 132.

- There were 14 patients of conjunctival laceration and 9 patients with corneal tear, 1 patient had iris prolapse.
- Orbital fracture were seen in 5 patients.
- Lenticular involvement was seen in 4 patients. 3 developed traumatic cataract while one had subluxation of lens with cataract.
- Retained foreign body was either glass piece or sand particle or metal piece. 20 patients had foreign body of which 9 were conjunctival, 14 were corneal and 1 was on the lens.
- Traumatic hyphema was present in 3 patients.
- Traumatic mydriasis was seen in 6 patients.
- 3 patients had retrobulbar hemorrhage associated with proptosis, subconjunctival hemorrhage and ecchymosis.
- In 6 patients posterior segment was involved, 4 patients had macular edema and 2 patients had vitreous hemorrhage.
- Perforating injuries of the eyeball in vehicular accidents are less frequent. We came across 7 patients of perforated globe. 3 patients had badly perforated globe, which needed immediate enucleation and 4 patients had corneoscleral perforation. Intraocular pressure in all 7 cases of globe perforation was low.

### Conclusion

On conclusion of this study, it was found that ocular injuries due to vehicular accidents accounted for 7.6% of all injuries of all injuries due to vehicular accidents. Most of the injuries involved the ocular adnexa, which while causing a certain degree of cosmetic disfigurement do not have any effect on the final outcome. It was only those injuries which involved the globe (corneo-scleral perforation), which had bad prognosis for the final visual outcome. Effective management will include measures taken to prevent or minimize the ocular involvement in such injuries. Some of the measures that can be suggested are:

1. Using protective device such as seat belts, crash helmet, and protective glass.
2. Raising public awareness of safe driving and health education using radio, TV and teaching in school.

Though these measures may curtail accidents/ ocular injuries it may not be possible to entirely avoid ocular trauma. Ocular injuries as and when they occur have to be tackled urgently and methodically if the final visual outcome is to be improved. The measures that can be suggested are:

1. Better first aid facilities and ambulance services for speedy transport to a well-equipped ophthalmological center
2. Trained ophthalmologists who can assess and manage ocular injuries on an emergency basis.
3. Equipped facility for ocular microsurgical repair.
4. Referral services whenever required.
5. Visual rehabilitation for cases in which significant visual function cannot be restored.
6. Follow up services.
2. Goswamy Subhash et al, Arch Trauma Res. 2016; 5(1): e3
3. Dabral SM, Mukherjee AK, Saini JS et al. A profile of penetrating eye injuries. Indian J Ophthalmol 1984; 32:269-71.
4. S S Amoni: Br J Ophthalmol 1981 65: 439-444
5. Yanko L, Neumark Y, Hemo Y et al: The Israeli ocular injuries study: Incidence of legal blindness from ocular trauma. Isr J Med Sci 31:423, 1995
6. Rekhi GS et al Indian J Ophthalmol 1991; 39 (3):12
7. Nanda SK, Mieler WF, Murphy ML. Penetrating ocular injuries secondary to motor vehicle accidents. Ophthalmology. 1993; 100:201

#### References

1. Rekhi GS et al, a study for the cause of blindness in 1006 consecutive legally blind patients, Indian J Ophthalmol 1991;39(2):12

**Source of Support: Nil**

**Conflict of Interest: None**