A Clinical Study of the Pattern of Ocular Trauma and Its Visual Outcome among Road Traffic Accident Cases in a Tertiary Care Teaching Institute

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ABSTRACT

BACKGROUND

Ocular injuries due to road traffic accidents (RTA) is one of the important causes of ophthalmological morbidity and cause of unilateral blindness. Some of the injuries also result in cosmetic disfigurement. Increased usage of vehicles for transport in recent times has increased the incidence of cases. The primary objective of this study was to understand the epidemiology and pattern of ocular trauma in RTA cases and their visual outcome.

METHODS

A total of 75 cases was included in the study following the inclusion and exclusion criteria. A detailed history was taken which included information regarding time, location, type and mechanism of injury, use of spectacles, car safety belts, and helmets. The time interval between injury and reporting was recorded. Test of visual acuity was done, ophthalmic examination included the examination of all patients with the slit lamp, 90 D examination, and indirect ophthalmoscopy were done. Ultrasound B scan was done in cases where unclear media prevented fundus examination.

RESULTS

Ecchymosis of the lids was the commonest type of ocular injury. Out of 15 eyelid laceration cases, 10 cases were with mild partial-thickness tears present and 5 had severe lid tears which required suturing. Most of the patients recovered with good vision in 6 months post-treatment and a few fair results. Analysis of variance (ANOVA) comparison between conservative management and surgical management at the end of 4 months post treatment was done. The P-values were > 0.05 hence, not significant. It indicated that the outcomes were independent of the method of management adopted.

CONCLUSIONS

The incidence of RTAs is increasing due to an increase in the number of vehicles used by the public. Ocular injuries are more often seen in young men especially those driving two-wheelers without safety devices like helmets. Open globe injuries and cases with previous ocular problems have poor outcomes.

KEYWORDS

Ocular Trauma, Road Traffic Accidents [RTA], Visual Outcome

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BACKGROUND

Road traffic accidents are increasing by the day due to an increase in the number of vehicles, road congestions and lesser driving skills of new drivers; most commonly RTAs causes injuries to head region and sometimes eyes are involved, the range to injury to eyes may vary from mild to severe. The eyeball is anatomically well protected inside the bony socket and orbital margin covered anteriorly by eyelids and lashes, as well as embedded in the cushion of the retrobulbar pad of fat. Despite these, it is still vulnerable to injuries. The most common trauma to the eye in RTAs includes injuries to eyelids, lacrimal apparatus, orbital wall, periorbital structures and extra-ocular muscles, conjunctiva, cornea, sclera, uveal tissue, vitreous, choroid, optic nerve and entire globe of the eye may in involved sometimes.[1]

Global annular frequency of ocular trauma is approximately 55 million out of which 7.5 Lakhs require hospitalisation each year.[2] WHO program for prevention of blindness shows the frequency of open globe injuries in the world is 2 lakhs per annum. It has been found that large number of patients present themselves from remote areas to hospitals causing burden on eye care delivery system of hospitals.[3] 90 % of all ocular injuries are preventable and ocular trauma is one of the leading causes of preventable blindness across the world.[4,5] Severe eye injuries can cause disability leading to financial loss to the person and the family. It has been shown that the lifetime prevalence of ocular trauma is greater when compared to diseases like glaucoma, age-related macular degeneration, or diabetic retinopathy.[6]

Early detection of the extent of the injury and appropriate management is key for the prevention of further complications. Prevention is always better and the use of preventive measures such as helmets, seat belts, clear road signs, and markings using fluorescent material makes it visible in darkness are helpful to prevent RTAs.[7] Adilabad is a semi-urban town however, it is situated on an important national highway (NH) 44 and all the RTAs nearby are referred to Rajiv Gandhi Institute of Medical Sciences [RIMS], Adilabad, which is an tertiary care teaching institute. Hence, we in the present study studied the pattern of ocular trauma in road traffic accident cases referred to our institute.

METHODS

This cross-sectional study was done in the Department of Ophthalmology, RIMS, Adilabad forms Feb 2018 to Jan 2019. After obtaining institutional ethical committee permission, written consent was obtained from all the participants of the study.

Inclusion Criteria

All the RTA cases with ocular trauma at presentation were included in the study.

Exclusion Criteria

Polytrauma cases, severe head injuries, previous history of ocular injuries, and those who cannot be followed up for 6 months.

A total of n = 75 cases was included in the study following the inclusion and exclusion criteria. A detailed history was taken which included information regarding time, location, type and mechanism of injury, use of spectacles, car safety belts, and helmets. The time interval between injury and reporting was recorded. Test of visual acuity was done, ophthalmic examination included the examination of all patients with the slit lamp, 90 D examination, and indirect ophthalmoscopy was done. Ultrasound B scan was done in cases where unclear media prevented fundus examination.

Statistical Methods

All the available data was entered in MS Excel and analysed by IBM SPSS version 19 for descriptive statistics. Descriptive statistics used were frequency distribution, mean, percentage and inferential statistics was done by Freeman-Halton extension of Fisher's exact test to compute the (two-tailed) probability of obtaining a distribution of values in a 2 x 3 contingency table.

RESULTS

A total of n = 75 cases of various age groups were included in the study and followed up to 6 months. Based on the age group segregation we found that the common age group was 21 – 30 years with 44 % of cases followed by 31 – 40 years with 34.67 % of cases. The male to female ratio was 3: 1 (Table 1). Out of the total 375 RTA cases reported n = 75 (20 %) were with eye involvement. The right eye was involved in n = 45 (60 %) of cases and left eye in n = 25 (33.33 %) and both eyes were involved in n = 5 (6.67 %) cases. N = 65 (86.67 %) were riding on two-wheelers and rest were on 3 wheelers and 4 wheelers. The timing of RTA was studied, and 46.67 % trauma cases occurred in the morning, 33.33 % in the evening, and 20 % occurred at night. Out of all patients, only 13.33 % were using safety measures such as helmets or seat belts.

Ecchymosis of the lids was the commonest type of ocular injury shown in n = 53 (58.67 %) of cases. Out of n = 15 eyelid laceration cases, n = 10 cases were with mild partial-thickness tears present and n = 5 had severe lid tears required suturing. Traumatic iridocyclitis was found in n = 8 cases with n = 3 presenting with hyphema in which n = 2 was grade 2 occupying half and n = 1 was grade 1 occupying less than quarter volume of anterior chamber (AC). It was observed that the globe was spared in injuries involving periorbital tissue or lids and adnexa only in 33.33 % of cases and intraocular injuries (closed or open globe accounted for 66.67 %). Optic nerve injury was seen in n = 11 (14.67 %) cases and other details are shown in table 2.

The assessment of visual acuity after trauma revealed the following results. 53.33 % were with 6 / 6 to 6 / 18 acuity and 38.67 % were found to have had visual acuity of < 6 / 6 to 6 / 60. Poor visual acuity and perception of light were found in one case each. The actual effects of recent trauma on visual acuity could not be assessed as these patients also had other associated causes of reduction of vision such as cataract and refractive errors. The previous visual acuity readings were not available to determine the differences.

Most of the injuries were mild and moderate in nature hence, the conservative line of management was followed in these cases. Vision improved with conservative management in cases with ecchymosis, subconjunctival haemorrhages, and periorbital trauma. Lid tears were repaired n = 10 cases, hyphaema aspiration was done in n = 3 cases. In n = 2 cases where the lens was dislocated the lens was removed and intra ocular lens (IOL) was placed.

Age Group	Male	Female	Total Number of Cases (n)	Percentage
10 - 20	5	1	6	8.0
21 - 30	27	6	33	44.0
31 - 40	19	7	26	34.67
41 - 50	5	2	7	9.33
51 - 60	1	2	3	4.0
Total	**57**	**18**	**75**	**100**

Table 1. Demographic Profile of the Cases Included in the Study

Type of Ocular Trauma	Number of Cases	Percentage
Ecchymosis only	38	50.67
Ecchymosis with lid laceration	15	20.0
Iris trauma	2	2.67
Hyphema with ecchymosis	3	4.0
Injury to lens	2	2.67
Corneal perforation	1	1.33
Scleral perforation	2	2.67
Optic nerve injury	1	14.67
Fracture of orbit and ecchymosis	1	1.33
Associated facial injuries	10	13.33
Total	**75**	**100**

Table 2. Types of Ocular Injuries in Cases with RTA in the Study

Visual Acuity	Number (N)	Percentage (%)
6 / 6 – 6 / 18	40	53.33
< 6 / 6 – 6 / 60	29	38.67
< 6 / 60 to 3 / 60	4	5.33
< 3 / 60 to 1 / 60	1	1.33
< 1 / 60 to PR +ve	1	1.33
NO PL	0	0.0
Total	**75**	**100.0**

Table 3. Visual Acuity Determination after the RTA

Management	Number (N)	Percentage (%)
Conservative	58	77.33
Surgical Interventions		
Lid Repair	10	13.33
Hyphema Aspiration	3	4.0
Lens removal and IOL	2	2.67
Others	2	2.67

Table 4. Management Ocular Injuries in RTA Cases

Management	Visual Outcome Post Treatment			Fisher's Exact Test P-Value
	Good	Fair	Poor	
Conservative	58	04	00	0.04935384 *
Surgical	10	02	01	

Table 5. Visual Outcomes 4 Months Post-Management of Cases

* Significant

Most of the patients recovered with good vision 4 months post-treatment and few fair results and poor outcome was found in one patient who presented with perception of light (PL) vision and there was damage to the optic nerve (Table 4).

Fisher's exact test was applied to compare the results between conservative management and surgical management at the end of 4 months post treatment analysis of cases. The P-value was < 0.05, considered significant (Table 5).

DISCUSSION

Out of n = 75 cases in this study, n = 57 were males and n = 18 were females, the ratio was 3 : 1. There is a preponderance of males in the study, which is in concordance with L Menon et al;[8] in Kerala where they found the male to female ratio of 3 : 1. Males have been commonly involved as found in several other studies done in this field.[9,10] It is a known fact that males are often driving vehicles and are exposed to highway traffic accidents as compared to females. Also, young males are more likely to drive in risk and with lesser use of safety measures. The majority of involved cases were between 21 – 30 years followed by 30 – 40 years. The mean age of the patients was found to be 29.5 years with the youngest case of 7 years and the oldest 59 years.

A Gahlot et al; in Pune found the mean age as 30.57 years.[10] M El Shtewiet al;[7] at Tripoli, Libya, found the mean age of the cases was 32.5 years. In an urban study by S Vats et al; at Delhi, the mean age was 28.21.[11] Kuhn et al; found in US Eye Injury Registry 61 % of the cases of eye injury were between 16 - 35 years and the mean age was 29 years agreeing with the results of current study.[12] Right eye was involved in n = 45 (60 %) of cases and left eye in n = 25 (33.33 %) and both eyes were involved in n = 5 (6.67 %) cases. More common involvement of the right eye was also reported by other studies.[7,13] Most of the cases were riding 2 wheelers which are increasingly used by the younger population. Kumaraswamy et al;[14] also had similar observation where they found 85.4 % of cases who sustained ocular injuries were 2-wheeler riders. In our study, n = 50 cases were with injury to globe and most of the other injuries were ocular adnexal injuries rather than penetration of the globe.

Oum BS et al;[15] and Kulkarni AR et al;[16] had also made similar observations in their studies. N = 50 globe injuries n = 45 (90 %) were closed globe injuries and n = 5 (10 %) were open globe injuries. Avinash Mishra et al;[17] in their study found 86.4 % of cases with closed globe injuries and 13.6 % with open globe injuries. Vasu et al;[18] in their study found 38.1 % of open globe injuries and 61.9 % with closed globe injuries. The greater number of closed globe injuries in this study may be due to a semi-urban setting and lower impact crashes. The anatomical placement of eyeball protected by bony socket and periorbital structures. The low degree impact injuries in RTA usually affect these structures probably could be a reason for such an observation in our study and other studies.

Ecchymosis of the lids was the commonest type of ocular injury present in n = 53 (70.67 %) of cases. Alam J et al;[19] have reported periorbital oedema with ecchymosis as the

commonest findings in ocular injuries. Murlidhar et al;[1] have reported sub-conjunctival haemorrhage followed by ecchymosis as the commonest findings in ocular trauma cases. The next common injury in this study was eyelid laceration found in n = 15 (20.0 %) cases. In a similar study by Puzari et al;[20] found subconjunctival haemorrhage in 83.33 % of cases followed by ecchymosis and lid oedema. Hyphema was reported in 4.0 % of cases of the study. Kumarasamy et al;[14] also reported hyphaemia in 4.16 % of patients agreeing with the results of the current study. In this study post-treatment, visual acuity outcome was good up to 6 / 18 in 90.67 % of cases fair in 8.0 % cases and poor in one case. El Shtewi et al;[7] in their study reported post-treatment 61.22 % of their cases had a visual acuity of 6 / 6 – 6 / 18 (good visual acuity), 19.59 % had visual acuity of 6 / 24 – 6 / 60 (fair visual acuity), 15.94 % had a visual acuity of < 6 / 60 (poor visual acuity) and 3.28 % had no light perception.[7] Panagiotidis D et al;[21] reported 29.5 % of all cases seen had a poor visual outcome, 13.1 % had a fair visual outcome, 52.5 % had a good outcome. The difference in results compared to the present study could be explained by the fact that we had higher numbers of closed globe injuries and most of the injuries were mild in nature.

Therefore, in most cases, we have opted for conservative treatment and the post-treatment visual acuity was good in a large number of cases. Issue of road safety need to be addressed as this is one of common cause of RTAs. It has been found that the life-time frequency of ocular trauma is greater than diseases like glaucoma or age induced macular degeneration.[6] It can be achieved by implementing strict traffic rules and appropriate penalization in case of violations of traffic rules. Public awareness and education for vulnerable groups should be done in order to decrease the overall burden of ocular trauma due to RTAs.

CONCLUSIONS

The incidence of RTAs is increasing due to an increase in the number of vehicles used by the public. Ocular injuries are more often seen in young men especially those driving two-wheelers without safety devices like helmets. Most of the ocular injuries due to RTAs in the adnexal tissues were mild in nature. Open globe injuries and cases with previous ocular problems have poor outcomes. Better implementation of traffic rules, wearing helmets with two-wheeler driving, and observance of other traffic rules can minimise morbidity due to ocular trauma.

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