ORIGINAL ARTICLE

A STUDY OF OCULAR TRAUMA PROFILE AND ITS VISUAL OUTCOME IN ROAD TRAFFIC ACCIDENTS

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ABSTRACT

Background: This is a prospective study of ocular trauma profile related to road traffic accidents that presented to a tertiary care centre in Western Maharashtra.

Aims & Objectives: To study the epidemiology and pattern of ocular trauma among the road traffic accident cases in western Maharashtra.

Methodology: Hospital based study conducted from September 2013 to March 2015. 114 subjects (122 eyes) were enrolled in the study. 8 of these subjects had bilateral ocular trauma. The examination involved assessment of visual acuity and description of nature and extent of ocular injury. The visual outcome was taken to be the best corrected vision at 3 months post trauma. The chi-square test was used to statistically analyze the data.

Results: It was observed that 32.79% of injuries were extra ocular, 59.02% were closed globe intraocular injuries and 8.19% were open globe intraocular injuries. 78.69 % of the injuries were mild, 9.84% were moderate and 11.84% were severe. The visual outcome was good (visual acuity of more than 6/18 at 3 months post-trauma) in 89.34%. Only 4.10% of the total cases studied had used safety measures viz., helmets or seat belts. A total of 12% of subjects were found to be under the influence of alcohol at the time of accident.

Conclusions: Primary preventive approach such as promoting safe riding practices and strict implementation of traffic rules like riding at safe speed wearing helmet and avoiding alcohol before driving are needed to prevent road traffic accidents associated ocular morbidity.

Keywords: ocular trauma, road traffic accidents, visual outcome, visual acuity, safety measures.

INTRODUCTION

It is a well known fact that ocular injuries are the most common cause of monocular blindness.[1] Over 2.4 million eye injuries occur each year.[2] 90% of all eye injuries are preventable, ocular trauma is one of the leading causes of preventable blindness in world today.[3,4]

Early detection and management hold the key to trauma management and prevention of further complications. Prevention is always better than cure: measures to create awareness about ocular trauma and preventive measures would result in a great decrease in ocular morbidity and mortality due to trauma.

In this study we have profiled ocular trauma secondary to road traffic accidents that came to tertiary care centre in Western Maharashtra, its clinical presentation, cause and nature of trauma, the extent of damage to the ocular tissues and the loss of vision associated with it.

METHODOLOGY

This is a three year prospective, interventional study involving all cases of ocular trauma related to road

traffic accidents coming to a tertiary care hospital in western Maharastra. The time period of the study is from September 1st, 2013 to March 31st, 2015.

Inclusion criteria: All cases of ocular trauma causing decreased vision at presentation were included in the study.

Exclusion criteria: Orbital fractures causing no visual loss were also excluded, along with very old cases of trauma.

Ethics committee clearance was obtained before the study and a written; informed consent was obtained from all patients.

A detailed history of each subject was taken. Past history of subject, ophthalmologic status post Injury was also recorded. Both eyes were examined, assessing the nature and type of injury.

The visual acuity was done with Snellen's chart when possible or finger counting was taken when subject's condition did not permit .A detailed slit-lamp examination and fundus examination was done. All subjects were followed up for 3 months from the day of enrollment.

The injuries were classified into Extraocular and Intraocular. The intraocular injury was further classified into open and closed globe injury according to Ocular Trauma Classification Scheme as those involving blunt force, resulting in contusion (closed globe injury) or rupture (open globe injury), and those involving sharp forces, resulting in lamellar laceration (closed globe injury) or penetrating, perforating, and intraocular foreign body laceration (open globe injury) and the zone of injury. Zone I, II, and III were, respectively, from the anterior to the posterior pole of the globe. It also takes into account pupil response (presence or absence of RAPD in affected eye) and visual assessment at time of injury. Since we are following up our patients for 3 months, the best corrected visual acuity at the end of 3 months was noted.

The severity of extra ocular and closed globe intraocular trauma was classified into mild, moderate and severe based on the classification by Duke Elder [5].

Open globe intraocular injuries were classified into mild, moderate and severe based on the classification by Vasu et al which was adapted from the Organ Injury Scaling VII described by the American Association for the Surgery of Trauma.[6]

The final visual outcome was measured using a Snellen's chart and graded as follows:

Good (visual acuity > 6/18); Fair (visual acuity 6/18 - 6/60); and Poor (visual acuity <6/60)

Statistical analysis was done on the basis of the Chi square test.

In this study 114 subjects were enrolled and a total of 122 eyes were studied. Each eye was taken to be a single case. Eight subjects had bilateral ocular injuries. The visual acuity in the affected eye at the end of 3 months was taken as the final visual outcome.

RESULTS

Age & Sex Distribution: The pre-teen age group accounted for the least number of trauma cases (2.46 %,), while early adults (21-30 yrs) represented the largest group, i.e., 45.90%. The mean age was 30.57years± 10.53(S.D.) It was observed that ocular trauma related to road traffic accidents was much more in men as compared to women with a male to female ratio of 13.25:1.

Locality Distribution: Subjects from a rural setting accounted for 16.38% of the cases, whereas in the urban setting, the number was very high (83.62%).

Distribution Based on the Type of Vehicle Involved: The maximum number of road traffic accident related injuries was observed in subjects travelling by two wheelers (61.20%). A total of 45 subjects were travelling by car (36.89%).

Distribution Based on Use of Safety Measures: Out of the all patients only 5 were using safety measures (4.10 %) rest 117 cases did not use any safety measures (95.90%)

Association with Alcohol Consumption: It was seen that 15 cases (12.30%) were under the influence of alcohol at the time of accident.

Distribution Based on Type of Injury: It was observed that the globe was spared that is injuries involved periorbital tissue or lids and adnexae only in 32.79% of cases and intraocular injuries(closed and open globe) accounted for 67.27% .Integrity of the globe was breeched in 10 cases(8.19%).

As seen in table 1, most common injury seen is Subconjunctival hemorrhage (54.10%) followed by lid laceration (39.34%) and ecchymosis of eyelids (33.16%).

Table 1: Classification of injuries based on the part of the eye involved

Structure	Injury	Cases (%)
Eye Brow	Contusion	5 (4.10)
	Laceration	33 (27.05)
Eye Lid	Contusion	6 (4.92)
	Ecchymosis	41 (33.16)
	Laceration	48 (39.34)
Conjunctiva	Chemosis	23 (18.85)
	Laceration	8(6.56)
	Subconjunctival hemorrhage	66 (54.10)
Cornea	Superficial foreign body	1 (0.82)
	Abrasion	8 (6.56)
	Laceration	6 (4.92)
Anterior Chamber	Hyphaema	3 (2.46)
	Traumatic uveitis	5 (4.10)
	Shallow	5 (4.10)
Iris	Prolapsed	5 (4.10)
	Torn	1 (0.82)
Lens	Cataract	2 (1.64)
	Anterior capsule rupture	1 (0.82)
	Dislocated	1 (0.82)
Sclera	Laceration	5 (4.10)
Vitreous	Hemorrhage	2 (1.64)
	Prolapse	1 (0.82)
Retina	Commotio Retinae	4 (3.28)
Optic Nerve	Injury	5 (4.10)
	Avulsion	1 (0.82)
Orbit	Fracture	21 (17.21)

As seen in table 1, most common injury seen is Subconjunctival hemorrhage (54.10%) followed by lid laceration (39.34%) and ecchymosis of eyelids (33.16%).

Most injuries were mild (78.69%), moderate injuries (9.84%) accounted for one tenth of cases and severe injuries were seen in 11.48%.

Most subjects had vision of 6/12 or better .Visual acuity of <1/60 was seen in 7.38% out of which 4.10% had no light perception.

DISCUSSION

One out of every twenty patients seen by an ophthalmologist is a case of ocular trauma.[1] Injury is second only to cataract and strabismus as a leading cause for hospitalization.[7] A study done in Southern India, states that ocular trauma affects one in 25 persons in the urban population, and one in 167 persons in the population are estimated to be blind in at least one eye due to trauma. On one hand there is an increase in the number of cases of ocular trauma and on the other hand newer microsurgery techniques and equipment have helped in improving the visual outcome in such cases.[9] Review of studies has shown that the majority of trauma resulting in blindness occurs during early adulthood with mean age below 30 years ± 5 years and common cause of injury is road traffic crashes and falls.[8]

Table 2: Severity of injury, Visual Acuity and outcome

	Extraocular (%)	Intraocular Closed Globe (%)	Intraocular Open Globe (%)	Total (%)
Severity				
Mild	38 (95)	58 (80.55)	0	96 (78.69)
Moderate	2 (5)	9 (12.5)	1 (10)	12 (9.84)
Severe	0	5 (6.94)	9 (90)	14 (11.48)
Visual acuity				
>6/12	39 (97.5)	67 (93.05)	2 (20.0)	108 (88.52)
6/18- 6/24	1 (2.5)	0	0	1 (0.82)
<6/24- CF 1M	0	1 (1.38)	3 (30.0)	4 (3.28)
<CFIM-PL	0	2 (2.77)	2 (20.0)	4 (3.28)
PL-	0	2 (2.77)	3 (30.0)	5 (4.10)
Visual Outcome				
Good(>6/18)	40(100)	67(93.06)	2(20)	109 (89.34)
Fair(6/18-6/60)	0	1(1.39)	2(20)	3 (2.46)
Poor<6/60	0	4(5.55)	6(60)	10 (8.20)

Ocular trauma due to road traffic accidents is preventable. A study done in Northern Ireland in 1986 has shown that there is a 60% reduction in perforating eye injuries following seat belt legislation.[10] Another study done in New South Wales, Australia showed that 16% of the major trauma cases had ocu-

lar or orbital trauma. 55 % of patients with injuries involving the face had ocular or orbital injuries. Analysis of the major trauma cohort showed that in motor vehicle drivers, orbital and base of skull fractures, eyelid lacerations, and superficial eye injuries were strongly associated with vision-threatening injury.[11]

In the present study the mean age of ocular trauma was 30.57 ± 10.53. Similar findings were reported by Kuhn et al in their study of the United States Eye Injury Registry over a seven year period (1982-1989). They found that 61% of cases were between 16-35 yrs and had a mean age of 29 yrs.[12]

M: F ratio in our study was 13.25:1.These findings are consistent with studies done by El Shtewi et al. The higher incidence of male subjects in road traffic accidents is probably because our population has fewer female drivers/ riders. Most commuting is done by males.[13]

In our study maximum no. of cases occurred in urban setting. Peden et al, in the World Report of The Road Traffic Injury Prevention- 2004, observed that the urban population was at greater risk for road traffic accidents as compared to the rural population due to more vehicular traffic. They also observed the relative mortality and morbidity to be higher in the rural setting due to higher speeds and the paucity of medical service.[14]

In the present study most of the road traffic accidents causing ocular trauma was by two- wheelers. This finding is inconsistent with other studies. Panagiotidis et al in a study in Athens, Greece, found that 86.56% of subjects were in cars while 11.95% were on motorcycles at the time of injury [(15)]. The higher incidence of two wheelers being involved in road traffic accidents in our study is probably because our population predominantly prefers to use two wheelers due to narrower lanes in our urban setting and possibly due to economic constraints as well.

In our present study it is seen that very few people use safety measures while driving. Panagiotidis et al found that 5.2% of the car drivers were using seat belts and none of the two wheeler accident victims had used helmets in their study [(15)]. Schrader et al in their study also observed that despite compulsory seat belt legislation in Germany, majority of their study group had not worn their seat belts at the time of the accident.[16] Schrader et al also found that 50% of their cases were inebriated at the time of accident. Probably a higher percentage of cases under the influence of alcohol would have been detected in our study if breath analysis test or blood alcohol levels were done.

Vasu et al in their study found that 38.10% were open globe injuries while 61.90% were closed globe injuries.[6] The probable factors leading to fewer open globe injuries in our study are:

1. A majority of our cases were riding two wheelers, while other studies had assessed cases that were mostly four wheeler drivers. Most open globe injuries were due to windshield fragment injuries.
2. Slower moving traffic due to road conditions and vehicular congestion within the urban setting leads to lower impact crashes. A large majority of our study group came from such a setting.

Vasu et al had found out that in the closed globe injury 23.08% were mild, 28.02% were moderate and 48.72 % were severe. In the open globe injuries, 25% were mild, 33.33% were moderate, and 41.6% were severe.

El Shtewi et al reported that post treatment, 61.22% of their cases had a visual acuity of 6/6-6/18,19.59% had visual acuity of 6/24-6/60,15.94% had a visual acuity of <6/60 and 3.28% had no light perception.[13] This finding is similar to the present study.

Panagiotidis et al reported that 29.5% of all cases seen had a poor visual outcome, 13.1% had fair visual outcome, 52.5% had good outcome.[15] In our study the final visual outcome was good in 90% cases and this can be explained by lesser number of open globe and severe ocular injury in our study.

CONCLUSIONS

RTA related ocular trauma though representing small percentage of cases, has significant morbidity associated with it. This morbidity can be drastically reduced if precautionary measures are taken such as seat belts, helmets. They also reduce possibility of head injury. Along with public awareness stricter road traffic legislation is required.

The public must be made aware of dangers of driving under influence of alcohol.

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