

Original article

Study on ocular morbidity in mechanical injuries

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Abstract

Aim - To determine the effect of mechanical injuries on the eye and visual outcome of the same.

Materials and methods- This was a prospective study of 100 cases of ocular trauma conducted in tertiary care hospital for one year. Included patients' demographic details, nature and mode of injury, time interval between injury and examination, visual acuity by Snellen's chart, Applanation tonometry in possible cases, anterior & posterior segment examination with slit lamp, direct ophthalmoscopy, indirect ophthalmoscopy, B-scan were done. CT facial bone, X-ray orbit were taken in selected cases

Results- Out of 100 patients, 82 were male, 18 female. Mean age of male was 34.9+/- 16.0 and female was 35.7 +/- 18.2 (yrs). Among the injuries, road traffic accidents (RTA) were 47%, assault – 23%, accidental fall – 21%, others- 9%. In RTAs, accidents by 2 wheeler was 85%. Combined injury was the commonest type (53%) followed by anterior segment injury alone. 23 patients were diagnosed with traumatic optic neuropathy out of which 7 patients showed improvement with treatment and all had vision-PL and above at presentation. Open globe injuries were seen in 19 patients and accidental injury with sharp object was the most common cause. Posterior segment injury (15 patients) showed poor visual outcome (<6/60). Orbit, adnexal and anterior segment injury alone had good visual outcome.

Conclusion- Mechanical injuries affecting eye are more common in young males and RTAs with 2 wheelers is the most common mode of injury. Poor visual outcome was seen in open globe injuries and traumatic optic neuropathy, late presentation, poor vision at presentation.

Key words- Anterior segment, Posterior segment, ocular trauma, visual outcome, mechanical injury.

Introduction

Mechanical injury to eye can occur in a variety of ways and produces myriad clinical sequelae. In this era of high speed traffic and industrialization, incidences of injuries are increasing in general. Like any other part of the body, eyes are also not exempt from these injuries, in spite of being protected by lids, projected margins of orbit, the nose and cushion of fat from behind. Estimates of the incidence of eye trauma vary widely. Ocular injury due to mechanical trauma is one of the major health problems in India. Children at play in recreational activities, young men at work in urban

factories, construction sites and rural agricultural settings and older people who suffer falls commonly suffer the consequences of ocular injury. The majority of injuries are sustained by active and productive individuals. Unfortunately, these injuries are often vision threatening and the lifestyle and future of the injured individual is irrevocably altered. Aim of the study was to prospectively determine the effect of mechanical injuries on the anterior segment of the eye, Posterior segment of the eye, visual pathway and neuro-ophthalmic system, Orbit & adnexa and assess visual outcome of the same.

Materials and Methods

This was a prospective study conducted on 100 cases of ocular trauma attending tertiary care hospital for one year. Institutional Ethics committee and Informed consent from selected patients were obtained. Patients with ocular injury attending ophthalmology outpatient department were randomly included in the study. Patients of all ages, both males and females irrespective of economic status, who are co-operative, were included in the study. Patients who were unconscious, not co-operative and terminally ill were excluded. A detailed patient data including age, sex, occupation, residential area, nature of injury like road traffic accident, assault, accidental fall, accidental injuries due to stone, needle pricks etc., were taken. The presenting complaints, time interval between injury and examination, directly came for treatment or referred from peripheral hospital and initial medical assistance taken were also recorded. Patient's unaided visual acuity at the time of presentation was recorded using Snellen's chart. Orbit, eyelid and adnexa were examined by diffuse illumination. Lid injuries, periorbital contusion and injuries around orbit were recorded. Slit-lamp examination was done to patients with trauma attending our out patient department and also to trauma patients of emergency department who needed slit lamp examination. Posterior segment examination done by direct ophthalmoscopy in all patients provided the anterior segment didn't preclude fundus examination. +90D examination and indirect ophthalmoscopy done for needed patients. Intraocular pressure recorded by Applanation tonometry or non contact tonometry in trauma patients attending our department and Schiotz tonometry done to others. B-scan done to assess the posterior segment in patients with blunt and penetrating injury to eye ball and in those patients

for whom fundus examination can't be done due to hazy media. CT scan facial bones and X- ray orbit done to needed patients. Final diagnosis was made. Treatment given to these patients either medically or surgically depending on the case. Final visual acuity on discharge was recorded. Causes for poor visual recovery in the patients included in the study were noted.

Statistical Analysis

The study subjects were analyzed and interpreted in terms of their demographic characteristics, type of injury, type of morbidity, eye/ eyes involved in the injury and visual outcome. The continuous variables were interpreted by Students' 't' test and categorical variables were interpreted by χ^2 (Chi-square) test where ever applicable. The above statistical procedures were performed by IBM SPSS statistics 11. The P- values less than 0.05 ($P < 0.05$) were defined as statistically significant in two-tailed test.

Results

Out of the 100 patients included, 82 were males & 18 females. The mean age of males was 34.9 +/- 16.0 and females was 35.7 +/- 18.2 (years). They were not significantly different in respect of their age ($P > 0.05$). The mean age of total subjects was 35.1 +/- 16.3 years with the range of 8-80 years. Out of 18 females, 15 (83.3 %) were affected with right eyes and 36 (43.9%) among 82 males had right eye affection and 16 (19.5 %) males were affected in both eyes. None of the females were affected in both eyes. Association of eyes with gender was statistically significant ($P < 0.01$).

Among the injuries, RTA were 47% , assault – 23%, accidental fall – 21%, others were 9%. In RTAs, accidents by 2 wheeler was 85% . There was no significant relationship between the gender and accidents ($P > 0.05$). Type of injury and laterality of eyes was not statistically significant.

Distribution of injuries is as shown in Fig.1. This

shows that combined injury involving more than one segment accounts to 53%. Anterior segment

injury alone is next commonly involved.

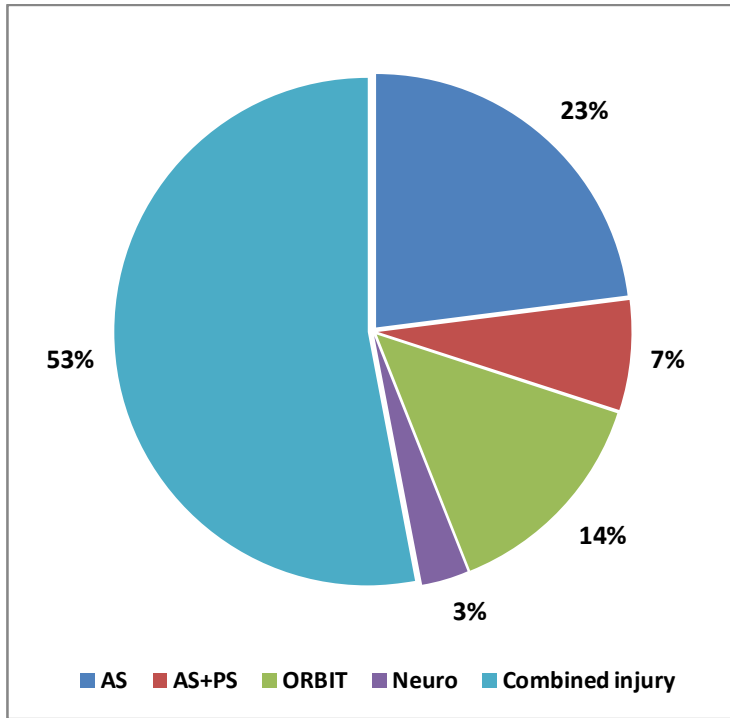


Figure 1 Percentage distribution of type of injury

There were 23 patients who had traumatic optic neuropathy. Initial visual acuity of PL and above were 18, and no PL at presentation were 5. Of these, 7 patients showed improvement with treatment. All these 7 patients had PL and above, visual acuity at presentation.

Open globe injury was noted in 19 patients. Common cause for open globe injury was accidental injury (15) with sharp objects followed by RTA (3) and assault (1). Of those with accidental injury 6 patients developed

endophthalmitis and 2 of them had intraocular foreign body.

Category of vision at different intervals is as shown in table 1. Visual acuity categorised as Good vision- 6/12-6/6, moderate vision – 6/36-6/24, poor vision – 3/60-6/60 and blind – no PL – 3/60. This table shows injured eyes with good vision at presentation improved. The patients with blind eyes as per WHO definition(i.e) <3/60 , did'nt show much improvement.

Table 1 : Category of vision at different intervals

Vision	At admission	At discharge	At 1 month Follow up
Good	61	68	69
Moderate	2	3	2
Poor	9	4	5
Blind	28	25	24

The cause for visual acuity of < 6/60 is shown Fig 2.. Posterior segment injury showed poor visual outcome in 15 cases. Orbit and adnexal injury and anterior segment injury alone had good visual outcome.

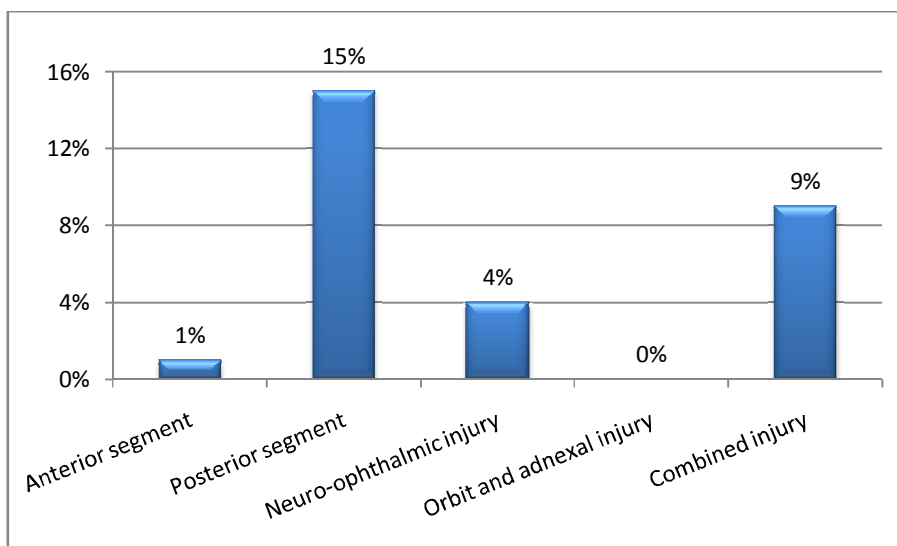


Figure 2 Analysis of patients with poor visual outcome

Discussion

Ocular injuries are one of the common causes of ocular morbidity nowadays. It has been estimated that, 1.6 million people are blind in the world due to ocular trauma, 2.3 million people are visually impaired due to trauma and 19 million people are unilaterally blind due to ocular trauma. Males are more affected than females and ocular injuries are common in younger age groups. In this study, common age group involved was between 20 – 39

years 42%. This is comparable to study by Atkari et al¹. This age group is the economically productive age group and ocular injury to this age group causes a great deal of economic loss to the country. Although students (22%) formed the major subgroup, drivers (17%), coolies (22%) and farmers (14%) were also involved. But study by Atkari et al showed most of the involved patients were farmers (32.1%). High incidence in students may be due to their increased involvement in risk activities. They play hazardous and dangerous

games. This could be the reason for high incidence in students.

Males are more commonly affected (82%) compared to females (18%). Male predominance and peak age involvement in our study were similar to other studies. This is due to the fact that, males are more involved in outdoor activities. A prospective study on the profile of ocular trauma at tertiary eye care by D.V.Singh et al² showed similar results. This is comparable to the demographic profile noted in a study in South India by Pieramici DJ, Sternberg P Jr, Aaberg TM et al³. Involvement of males more than females, who are the bread winner for most of the families will have an impact on productivity of our nation for sure.

The proportion of right eye involvement (51%) was more than left eye (33%), which is in agreement with other studies. Similar results were noted in a study by D.V.Singh et al.

In our study among the mode of trauma, road traffic accident(47%) was the major cause for mechanical injuries to eye. Assault was the cause for 33%, accidental falls for 21% . Of the road traffic accidents, two wheeler accidents were responsible for 40%. Similar results were seen in De Juan E et al⁴ study on penetrating ocular injuries. This may be due to increased vehicular traffic and increased population. Rash driving is the major reason for two wheeler accidents.

In our study, 49% of patients presented directly to our hospital and 51% had initial medical assistance and referred from peripheral hospitals. Of the directly presented patients, 12 patients have come after 12 hours. In our study 14% have reported within 6 hours of injury. But in Atkari et al study only 3.09% patients have reported within 6 hours. Now due to increased communication and transport facilities, more patients are able to reach tertiary care hospitals earlier. Initial hours after injury are important as early treatment helps in speedy recovery. We noted that patients in whom treatment was initiated within 12 hours had better visual acuity.

Based on injuries sustained, anterior segment alone was involved in 23%, anterior and posterior segment in 7%, neuro-ophthalmic manifestations alone in 3%, orbital and adnexal injury alone in 14% and combined injuries in 53%. Anterior segment and orbital injuries alone had better visual outcome and less morbidity than neuro-ophthal, posterior segment and combined injuries. This was in agreement with study by Virgilio Lima Gomey⁵. In our study, 18 patients had traumatic optic neuropathy. Of these 7 patients (39%) showed improvement with steroid treatment. This is comparatively less than other study by J.A.Mauriello et al⁶, which showed 56.25% with steroid treatment. This difference may be due to delayed presentation and so delay in initiation of steroid treatment. We could find that patients with at least PL vision on presentation improved with treatment. Of the 7 patients who showed visual improvement, all had vision of PL and above.

In our study, open globe injury was found in 19% of patients and in them 6 patients (30.1%) developed endophthalmitis. Similar incidence was noted in a study by D.V.Singh et al. This is comparatively high compared to study by Thompson SW, Rubsamen PE et al⁷. The delayed presentation to the tertiary centre may be the reason for this high occurrence. In our study we had two patients with open globe injury, who subsequently developed endophthalmitis after foreign body removal. This was due to late presentation to our hospital, after 48 hours. Lens capsule injury is associated with endophthalmitis. This is seen in one patient, in our study. This is also noted in studies by Reynolds DS et al⁸ and Schmidseeder E, et al⁹. The presence of intraocular foreign body, lens capsule injury and delayed presentation are risk factors for developing endophthalmitis.

In our study, 71% had good vision at discharge and one month follow up. Patients who presented with good visual acuity had good visual outcome. This is also shown in study by Sternberg P Jr et al and also by Ksenija Karaman et al¹⁰. The presenting visual acuity is one of the important prognostic factors for good visual outcome.

Poor visual outcome of <6/60 were seen in 29 % in our study. The major cause for this is found to be posterior segment injury alone (51%). Combined injury accounted for (31%). Poor visual outcome in posterior segment injury is due to high incidence of vitreous disturbance, incarceration of retinal tissue, vitreous haemorrhage and associated retinal and choroids detachment. This is in agreement with study by Cleary PE, Ryan SJ et al¹¹.

Conclusion

Mechanical injuries affecting eye are more common in young males and RTAs with 2 wheelers is the most common mode of injury. Early institution of treatment reduced ocular morbidity. Poor visual outcome was seen in open globe injuries and traumatic optic neuropathy, late presentation, poor vision at presentation.

Key Message

Children should be allowed to play under parent supervision, protective eye shields to be worn by people working outdoors, wearing helmets & seat belts can help prevent ocular injuries to a great extent.

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