

Epidemiology and visual outcome of severe eye injuries in a tertiary center of Gandaki Province of Nepal

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ABSTRACT

Introduction: Ocular trauma is an important worldwide preventable public health problem which may lead to permanent visual impairment. This study aims to determine the demographics, clinical profile and visual outcome of severe eye injuries. **Methods:** This study was conducted at a tertiary centre from January 2013 to August 2014. Cases of severe eye injuries hospitalized at or presenting to emergency/OPD were included in the study. All cases underwent detailed examination and necessary intervention. Cases were followed upto 3 months and final visual outcome was evaluated. **Results:** The study comprised of 60 individuals (65 eyes); 76.7% males and 23.3% females. Out of 60 cases, the age group 1-9 years had the highest occurrence with 23.33% followed by 20-29 years with 20% and majority were students 45%. Impact with stone was the commonest cause of injury reported on 21.7% followed by road traffic accident (RTA) 20%. Closed-globe injuries accounted for 36.6% and open-globe injuries for 33.3%. At the time of presentation, visual acuity of less than 6/18 was seen in 71.6% and at follow up was seen in 45%. Among total cases, 63.3% eyes were managed conservatively, 30% eyes underwent surgery and 6.7% were referred to higher centre for vitreoretinal surgeries. **Conclusions:** Severe eye injuries were seen in 0.13% of total eye injuries. Paediatric and young adult males formed the majority of victims. Stone and road traffic accidents were the common causes. One fourth of the eyes were blind. Primary prevention and management of the affected cases is the clear need.

Keywords: visual outcome, epidemiology, severe ocular trauma

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INTRODUCTION

Ocular injury is one of the major causes of preventable monocular blindness and visual impairment in the world and in developing countries.¹⁻⁴ The impact of ocular trauma in community is potentially enormous and is associated with direct and indirect costs because of cost of treatment and lost days of work as the majority of ocular injuries are sustained by active and productive individuals.^{5,6}

The survey results published by the US National Society to Prevent Blindness states that eye injuries can be considered second only to cataracts as the most common cause of visual impairment.⁴ The Nepal Eye Study based on 1981 Nepal Blindness survey estimated trauma as the second leading cause of unilateral blindness, accounting for 13.6%. An estimated survey showed 7.9% of all blindness in Nepal is caused by ocular trauma.⁸

The epidemiology of ocular trauma vulnerable age group, place

and source of injury provide valuable measures in ocular injuries prevention. Data on severe eye injuries are scarce. This study aims to fill this information gap so critical for planning interventions to prevent blindness and visual impairment.

METHODS

We conducted a hospital based cross sectional study at a tertiary health care centre in hilly region of Nepal from January 2013 to August 2014. The ethical clearance was obtained from the institutional review committee of Manipal College of Medical Sciences. Cases of severe eye injuries hospitalised at or presenting to emergency/OPD of tertiary care hospital during the study period and who gave informed consent were included in the study. A severe eye injury is defined as one which resulted in permanent and significant (measurable and observable on routine eye examination) structural and/or functional changes to the eye.⁷

Informed consent was obtained from patients and from parents or guardians in case of children, and confidentiality was maintained. The detailed history, about time, place of injury, mode of injury was collected. Examination included Snellen’s visual acuity test, examination of extraocular motility, slit lamp examination. Posterior segment examination was done wherever possible either by 90D lens, direct ophthalmoscope or indirect ophthalmoscope. Mechanical injuries were classified according to Birmingham eye trauma terminology (BETT) system proposed by Kuhn and co workers. Relevant investigations like X ray, CT scan, B scan, MRI were done as per need. Patients were treated and referred as per need.

Eye examination (anterior and posterior segment) including visual acuity was done on follow-up at 3 weeks, 6 weeks & 3 months. The sample size calculations was based on a standard formula Henderson and Sundareson $N=z^2pq/d^2$. Descriptive statistics, frequencies, percentages, mean, standard deviation were determined. Data of each case was entered in a specially designed proforma and the whole data was analyzed using a Statistical package for social science (SPSS) program version 20. We included 60 cases (65 eyes) of severe eye injuries.

RESULTS

Cases included 65 eyes of 60 individuals with severe eye injuries. Figure 1 gives the age distribution of the patients. The youngest age group 1-9 years had the highest occurrence with 23.33% followed by 20-29 years with 20%

(figure1). Mean age of subjects was 26.50± 18.88 (range 1- 94yrs). There were 46 (76.6%) males and 14 (23.3%) females with male: female ratio 3.3:1. The right eye was injured more frequently 34 eyes (56.7%) than the left eye. Students and farmers more often suffered severe eye injuries with 45% and 21.7% respectively. The commonest place of occurrence was seen in field 35%; followed by road 31.7%. Table 1 details the gender distribution, laterality, occupation and place of occurrence.

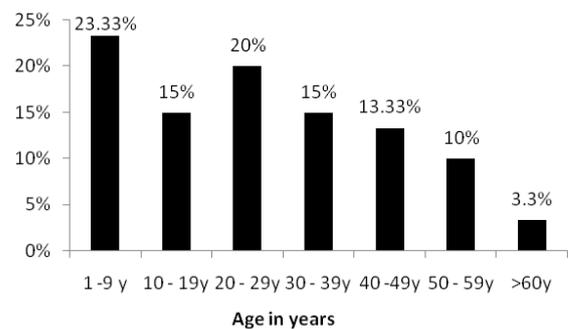


Fig 1. Age distribution of patients with severe ocular trauma

Table 1: Demographic characteristics and settings of severe eye injuries (n=60)

	Variables	Frequency	Percent
Gender	Male	46	76.67
	Female	14	23.33
	Bilateral	5	8.3
Eye involvement	Unilateral (Right eye)	34	56.7
	Unilateral (Left eye)	21	35
	Student	27	45
Occupation	Farmer	13	21.7
	Business (shopkeeper/vendor)	8	13.3
	Private service (salaried/factory)	6	10.0
	Day/unskilled labour	3	5
	Baby	3	5
Place of occurrence	Field	21	35
	Road	19	31.67
	Home	14	23.33
	School/hospital premises	6	10

Regarding mode of injury, play/sports and accidental trauma at work each accounted 33.3% of injuries, road traffic accidents accounted 20% of cases. Ten percent of injuries were results of assault. Impact with stone was the commonest (21.7%) source of injury. Vehicular accident and wooden stick accounted for 20% and 15 % each, sharp objects 8.3%, fall from height and chemical injury each 6.7%. Nearly half of the cases (51.7%) presented within twenty-four hours of the injury and 28.3% within 3 days, 15% within 3 days to 7 days and 5% after 7 days.

Table 2 shows visual acuity at presentation. Among bilateral involvement, 2 cases presented with VA of 3/60 to 1/60, 1

case presented with 1/60 to perception of light, 1 with VA of 6/60 to 3/60 and 1 case with VA of 6/6 to 6/18.

Table 2: VA at time of presentation

Visual Acuity	At presentation (number of bilateral eye n=60)	Frequency(%)
6/6-6/18	13+1*	23.33
6/18-6/60	12	20
6/60-3/60	1+1*	3.33
3/60-1/60	6 + 2*	13.33
1/60-PL	16+1*	28.33
NPL	4	6.66
could not be elicited	3	5

* denotes number of bilateral eye involved

Closed globe injury was seen in 36.66% (n=22) cases; zone I in 16.66%(n=10) zone II in 5% (n=3) and zone III in 15% (n=9). Open globe injury was seen in 33.33% (n=20) cases; zone I in 18.33%(n=11) zone II in 11.66% (n=7) and zone III in 3.33% (n=2). Among open globe injuries, 8 cases had uvea prolapsed.

Burn injury was seen in 6 cases, chemical injury in 4 and thermal injury in 2 cases. Orbital wall fracture was seen in 17 cases. Among them 7 cases had orbital floor fracture, 3 had orbital roof fracture, 1 had medial wall fracture, 4 had floor and medial wall fracture and 2 had roof and medial wall fracture. Other findings is shown in table 3.

Table 3: Nature of injuries

Nature of injuries	Number of eyes (%)
eyelid laceration without canaliculi obstruction	6 (10)
eyelid laceration with canaliculi obstruction	1 (1.66)
corneal laceration	23 (38)
corneal ulcer	5 (8.3)
hyphema	5 (8.3)
Traumatic iridocyclitis	2 (3.3)
traumatic cataract	12 (20)
vitreous haemorrhage	4 (6.6)
retinal tear with retinal detachment	5 (8.3)
berlin's edema	1 (1.66)
traumatic optic neuropathy	7 (11.6)
enophthalmos	3 (5)
extraocular muscle palsy	2 (3.3)

Among them bilateral vitreous haemorrhage was seen in 1 case. Out of total, 63.3% of cases were managed conservatively, 30% were managed by surgery. Four cases (6.7%) needed referral to higher centre for vitreoretinal surgeries.

Corneoscleral repair was done for n=5 (8.3%) cases, eyewall repair with anterior chamber wash was done for n=7(11.7%) cases, eyewall repair with iris reposition for n= 3 (5%) and abscission was done for n=2 (3.3%), ocular adnexa repair for n=3 (5%) and evisceration was required

in 2 (3.3%) cases.

Visual acuity at follow up is shown in table no.4. Among bilateral involvement, 4 cases had BCVA of 6/6 to 6/18 in each eye and 1 case had BCVA of 6/60 to 3/60 in one eye and 3/60 to 1/60 in the other eye (table 5). During the follow up period, endophthalmitis was seen in 1 case and angle closure glaucoma with retinal detachment in 1 case.

Table 4: Visual acuity at follow up

Visual Acuity	At follow up (number of bilateral eye) n=60	Frequency(%)
6/6-6/18	26+4*	50
6/18-6/60	7	11.66
6/60-3/60	4+1**	7.5
3/60-1/60	3+1**	5.8
1/60-PL	8	13.3
NPL	4	6.66
could not be elicited	3	5

* number of bilateral eye involved, **single eye Visual acuity (VA) of bliateral involved eye

DISCUSSION

Ocular trauma is a major cause of worldwide visual impairment and morbidity.⁴ This study is helpful in defining the frequency, distribution, causes and other underlying factors related to traumatic injuries. Our study showed number of severe ocular trauma cases to be 60 out of 45,891 cases listed during this period that accounts 0.13% in total ocular trauma cases and majority of them was seen among age group 1-9 years(23.3%) followed by 20-29 years (20%). Children and economically earning groups are more victimised similar to the study conducted by Ilsar et al.⁹ which concluded peak incidence of ocular injuries among 21-30 (21%) age and 0-10 (18.5%) age. Similarly May et al.⁷ study suggested less than 30 years are frequently involved in study of serious eye injuries in US injury registry. Godar et al.²⁰ and Sthapit et al.²¹ study showed average age group was 28.89 ±19.06 years and 28.43 ±16.36 years respectively. These groups are outgoing groups, they have high physical activitiy, thus more exposed to varying surroundings and vulnerable to injuries. Children are more susceptible due to their immature motor skills and reduced ability to avoid or detect dangers.¹¹ The study showed male: female ratio of 3.3:1 could be explained to the adventurous nature of boys and engagement in outdoor activities where trauma will be highly encountered. To some extent, it may be due to higher reporting of injuries occurring in male to hospital than females as we have male preferential society.

Students and farmers were seen as more prone to severe

ocular injuries similar to studies done by Malla²² and Khatri et al.¹² Our study showed severe eye injuries were related to sports 33.3% (n=20), injuries related to work 33.33% (n=20) followed by road traffic accidents 20% (n= 12). Similar findings were found in other studies.^{10,13} In our study, the commonest source of injury was blunt trauma by stone 22% followed by vehicular accidents 20% similar to other studies.^{14-16,20,22} The reason may be because this study is done in mountainous part of country covered with stones.

In this study, the time period between trauma and presentation to hospital was within 24 hours in 51.7% cases, similar to study by Voon et al.¹⁰ that concluded 55.5% presented within 24 hours and Sthapit et al.²¹ which concluded 54.5% presented within 24 hours, however, 43.3% cases presented within 1-7 days in our study may be explained due to decreased public awareness, health education and transportation facility. Closed globe injuries were seen more frequently to occur than open globe injuries. This is consistent with studies done by Kinderan et al.¹⁷ which concluded closed globe injuries to be 73.3% and 68.33% by Misra et al.¹⁸

At the time of presentation 23.3% cases presented with VA of 6/6 to 6/18 increased to 50% in follow up after treatment. VA of 6/18 to 6/60 was seen in n=12 (20%) seen in 11% in follow up, VA of 6/60 to 3/60 was seen in n=2 (3.3%) observed in 7.5% in follow up, VA of 3/60 to 1/60 was seen in n=8 (13.33%) decreased to 5.8% in follow up, VA of 1/60 to perception of light was seen in n= 17 (28.33%) which decreased to n=8 (13.33%) at 3 months follow up. NPL was seen in 6.66% (n=4) at the time of presentation. 1 case developed endophthalmitis during follow up period. Rapoport et al.¹⁹ in a study of eye injuries in children in Israel concluded visual acuity at the time of hospital discharge better than 6/30 in the majority of eyes, while 11% had a VA of less than 6/60, and no light perception was seen in 3% cases and endophthalmitis in 1.4%.

The limitations of study are small sample size, visual acuity could not be assessed in 3 cases and surgeries were performed by different surgeons.

CONCLUSIONS

Severe ocular trauma is one of the major causes of preventable ocular blindness. Paediatric age group less than 10 years and young earning males are frequently affected. Injuries at play, work and road traffic accidents comprise the main causes. Nearly half had severe visual

impairment and worse at presentation and 33.33% in follow up. We hope to improve both primary prevention of injury and secondary earlier and meticulous management for affected cases. Different legislation acts and traffic regulations, use of protective eye wears, health education targeting the vulnerable age group regarding prevention and seeking early medical help, adult supervision of children shall minimize or prevent morbidity due to severe trauma. This study may help to increase public awareness and make some contribution in prevention and management of eye injuries.

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